FINANCIAL MANAGEMENT

An introduction

JIM McMENAMIN

FINANCIAL MANAGEMENT

'A well-balanced and user-friendly introduction to a complex discipline.'
   P.A.Belk, Loughborough Business School

'Useful examples, topical illustrations and clear discussion make this an excellent student text—the author has adopted a practical approach which helps the reader appreciate the importance of financial management in the business world.'
   Tony Head, Sheffield Hallam University

'An excellent introduction to the complexities of financial management. The book will be particularly useful for business students and others who are coming new to the subject.'
   Clive Bishop, Manchester Metropolitan University.

Financial Management is intended for use by non-specialist students taking a finance module in a range of general business and management courses. Finance is a notoriously difficult core subject for business undergraduates. So far the area has been dominated by large and complex introductory texts—often from the USA—which many lecturers find too detailed and unwieldy. This carefully developed and researched text fills this gap by providing a short, modular, UK-focused introduction to the subject of financial management. Quality controlled by an academic review panel, the content and approach have been rigorously developed to answer the needs of non-finance students. *Financial Management* offers the following additional features:

- a coherent and unifying model of financial management
- learning objectives, clear worked examples, in-chapter exercises with solutions, key learning points, real-world vignettes, structured review questions with selected answers, case studies, glossary, summary of key formulae
- user-friendly and flexible structure, most chapters can be studied as discrete modular units
- contemporary coverage including corporate governance, ethics, Economic Value Added (EVA), Market Value Added (MVA), stakeholder theory and the treasury function
- Contents: Part 1: The Scope and Environment of Financial Management, 1 Introduction and Overview, 2 Key Issues in Modern Financial Management, 3 The

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FINANCIAL MANAGEMENT: AN INTRODUCTION—TUTOR'S GUIDE

The tutor's guide is available to academics who adopt *Financial Management: An introduction* for course use.

It includes the answers to end of chapter review questions, suggested solutions to case studies together with indicative marketing schemes, transparency masters of key charts, tables and diagrams, a multiple choice question bank and specimen test papers.

For more information please email:

info.business@routledge.com

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Tutor's Guide

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FINANCIAL MANAGEMENT

An introduction

JIM MCMENAMIN

LONDON AND NEW YORK

To my family

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PREFACE

INTENDED AUDIENCE

Financial Management: An Introduction is intended for use by undergraduate and postgraduate students taking a finance module in a range of general business and management-related courses.

The material in this text has already been successfully tested on undergraduate and postgraduate students on a variety of business and management courses such as accounting, business studies, computing, hotel and tourism, and MBAs.

Most of the students for whom this text is intended will have already acquired a basic knowledge of financial accounting, economics and statistics, which is the only prerequisite for using this text.

The practising manager

This book should also be of considerable value to professional, non-financial, managers who wish to improve their managerial career prospects by gaining an understanding and appreciation of the essential ingredients of financial management.

A SHORTER BOOK

The length of this book—it has a total of 19 chapters, which is less than other financial management texts—reflects the changing needs of tutors and students. The shift to shorter modularised courses means that there is less time available for both tutors and students to cover the subject comprehensively.

A key challenge therefore has been to try and focus on the essential elements of financial management considered of strong practical benefit to students and practising managers. The text is designed to equip non-specialist students with the financial skills and knowledge considered essential and of real practical benefit for a general business or management-related career.

CONTEMPORARY COVERAGE

The text includes coverage of key contemporary features of financial management such as *corporate governance, ethics, Economic Value Added (EVA), Market Value Added (MVA), stakeholder theory* and *the treasury function.*

ORGANISATION AND STRUCTURE

Coherent model

This book has been structured with two particular goals in mind. The primary goal is to offer students of financial management a coherent model around which they can build knowledge and understanding of the subject. Providing such a model allows them to visualise where relevant aspects of financial management fit together in a logical and progressive framework.

Students of financial management, particularly non-specialist students, often perceive the subject as a diverse collection of seemingly unrelated concepts, techniques and theories without any apparent overall structure. Consequently, they find it difficult to fit these various pieces together into a coherent model or conceptual framework.

This book has been designed to overcome this difficulty by providing a unifying and coherent model of the financial management process, one which will help students visualise essential financial concepts and their interrelationships. By following this model students will begin to appreciate and understand how and where apparently unrelated concepts and techniques fit into the overall context of financial management.

There is also the advantage that by structuring our approach around such a management model, the basic constructs will already be familiar to many students and managers.

Modular structure

The second goal, bearing in mind the shift in most universities and colleges to shorter modularised courses, is to offer tutors a logical and progressive, yet flexible, modular teaching framework. While the essential structure progresses in a logical sequence, this does not imply rigidity: most chapters can be studied as discrete modular units to suit an individual tutor's objectives. Hopefully this structure will provide flexibility for tutors teaching on courses of varying length and intensity.

With these goals in mind the book is organised into seven parts which are outlined as follows.

PART 1 THE SCOPE AND ENVIRONMENT OF FINANCIAL MANAGEMENT

Part 1, which consists of an Overview of financial management and Chapters 1 through 4, addresses the broad scope of financial management and presents an analysis of the financial environment in which the business firm operates. The opening ***Overview*** highlights the key concepts of financial management through the medium of a mini business scenario. ***Chapter 1*** provides the essential introduction to the goals, concepts, techniques and processes of financial management, and emphasises the principal goal of financial management as the maximisation of shareholder wealth.

    *C**hapter 2*** explains the role of the financial manager and treasury management. The chapter proceeds to explore the impact and influence of the key issues of *agency* and *stakeholder theory, corporate governance* and *ethics* on modern financial management. These are issues which are often described as limiting or constraining influences on the shareholder wealth maximisation objective of the firm. However they are described, they are matters of key relevance to the modern financial manager and their impact is fully examined.

PART 1
The Scope and Environment of Financial Management
Overview
Chapter 1 Introduction
Chapter 2 Key Issues in Modern Financial Management
Chapter 3 The Financial Environment
Chapter 4 Capital Markets

↓

PART 2
The Core Concepts in Financial Management
Chapter 5 The Time Value of Money
Chapter 6 Risk and Return—*Portfolio Theory*
Chapter 7 Risk and Return—*The Capital Asset Pricing Model (CAPM)*
Chapter 8 The Central Concept of Value

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PART 3
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Chapter 9 Financial Analysis and Performance Evaluation

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Preface diagram Outline of the book

Neither the financial manager nor the firm operates in a self-contained environment. **Chapter 3** explores the *financial environment—which* is part of the wider economic environment within which the business firm operates—not only in a domestic context but also internationally. The chapter provides an analysis of the role of *financial markets, financial institutions,* and *financial instruments,* the three main constituents of the financial environment, and explores how their roles are changing in today's global environment.

   C*hapter 4* deals in more depth with *capital markets,* where companies' long-term securities such as shares and bonds are traded and reviews the role of capital markets as a source of long-term capital for the firm. The role of the London Stock Exchange is emphasised. The chapter devotes some time to discussing the key issue of financial *market efficiency* and its implications for the financial manager. The problems encountered by small firms in raising finance in the capital markets are also examined.

PART 2 THE CORE CONCEPTS IN FINANCIAL MANAGEMENT

Part 2 contains Chapters 5 through 8 and deals with the core concepts in financial management, *time value of money, risk and return,* and *value.* These key concepts form the essential conceptual and technical building blocks for the rest of the text. Having examined the role of financial markets in Part 1, Part 2 proceeds to demonstrate how the markets value or price a firm's securities. As the goal of the firm is the maximisation of shareholder wealth this is reflected by the value or price of a company's shares in the capital markets at a point in time.

C*hapter 5* presents comprehensive treatment of the *time value of money.* It explains how the timing of cash flows affects their value and deals with the concepts *of future value, present value, annuities, perpetuities* and *net present value.*

Chapters 6 and 7 together cover risk and return. ***Chapter 6*** first explains the determination of risk and return and proceeds to analyse risk and return in the context of *portfolio theory.* The essential statistical techniques are briefly reviewed. ***Chapter 7*** develops the analysis of risk by introducing the *Capital Asset Pricing Model (CAPM),* a key aspect of modern financial management, and explains how the CAPM links systematic risk to return to determine the price of a firm's securities.

C*hapter 8* deals with the central financial management concept of *value.* The chapter integrates the key concepts of time value of money and risk and return into the fundamental *asset valuation* framework and examines the different approaches to asset valuation including more recent developments such as *Shareholder Value Analysis (SVA), Economic Value Added (EVA) and Market Value Added (MVA).*

PART 3 FINANCIAL ANALYSIS AND PERFORMANCE EVALUATION

Parts 1 and 2 lay the essential introductory background and conceptual foundation upon which the rest of the text builds. In Part 3 we begin to apply our fundamental model of the financial management process. The starting point for our model is ***Chapter 9*** which introduces an essential skill for any financial manager, namely *financial analysis and performance evaluation.*

Financial analysis will help the financial manager evaluate the firm's current financial strengths and weaknesses and assess the effects of past investment and financing decisions on the firm's returns and risk and thus its value. It is only after developing a

sound understanding of a company's current financial position that effective future financial decisions and plans aimed at maximising shareholder wealth can be made.

This chapter also discusses the distinctions and difficulties of performance measurement in service organisations and in not-for-profit organisations together with an analysis of *corporate failure.*

PART 4 STRATEGIC FINANCIAL DECISION-MAKING

The investment decision

While financial analysis is essentially a retrospective exercise evaluating the effects of past decisions, Part 4 in contrast is forward-looking and deals with the second stage in the financial management process, that is, financial decision-making. It examines the critical financial decision for any firm—the *strategic investment decision (SID).* As it is the quality of a firm's strategic investment decisions which is critical in deciding its future and in determining the wealth of its shareholders, it is vital that such decisions are properly appraised and evaluated before being implemented.

Chapter 10 introduces the concept of *investment appraisal* and explains its essential tools and techniques mainly under conditions of certainty. The role of net present value (NPV), introduced in Chapter 5, in evaluating investment projects is emphasised and the influence of non-financial considerations in the investment decision-making process is reviewed. This chapter also examines the operation of investment appraisal in the public sector.

Chapter 11 develops and refines the approach to investment decision-making by introducing risk and explaining the main techniques of investment *risk analysis.*

Chapter 12 explores the derivation of a firm's cost of capital, which is the rate of return used to discount the firm's investment cash flows. The cost of capital links the firm's strategic investment and financing decisions and its accurate determination is a critical factor in the investment appraisal process.

PART 5 STRATEGIC FINANCIAL DECISION-MAKING

The financing decision

Part 5 develops financial decision-making by examining the nature of the firm's strategic

financing decisions. The quality of the firm's investment decisions will have a direct impact on the value of the firm and the wealth of its shareholders. However, the connection between financing decisions and the value of the firm is less clear. The key issues of capital structure and dividend relevance are examined.

Chapter 13 deals with the firm's long-term, strategic financing arrangements. It explores the determination and relevance of a firm's long-term capital structure and presents an analysis of gearing.

Chapter 14 explores the firm's dividend policy, which is a major element in the firm's strategic financing decision, and examines its relevance to corporate value.

PART 6 STRATEGIC FINANCIAL PLANNING AND CONTROL

Part 6 progresses to examine the final planning and control stages of the financial management process, mainly from a strategic perspective. When strategic investment decisions are made, they need to be implemented effectively if they are to produce the desired results, that is, an increase in shareholder value.

Successful implementation requires effective *financial planning and control systems* to be in place and these are discussed in **Chapter 15 .** Financial planning maps out the future financial direction of the firm and financial control ensures that the directions on the financial map are being followed. The role of *computer-based modelling* in financial planning and decision-making is also examined.

PART 7 SHORT-TERM FINANCIAL MANAGEMENT

In Part 7 we change our focus from strategic to operational financial management. We move from financial decision-making in the strategic context to financial decision-making in the operational context. Strategic investment and financing decisions affect the structure of a firm's long-term (fixed) assets, its long-term liabilities and its long-term cash flows: operational investment and financing decisions affect the structure of the firm's short-term (current) assets, liabilities and cash flows.

In the context of our overarching financial management model, short-term financial management emphasises financial decision-making, planning and control at the operational level of managing the firm's short-term assets, short-term liabilities and cash flows—an aspect of financial management which is vital for a firm's survival. As the focus of short-term financial management is on the firm's short-term or current assets and

liabilities it is often referred to as *working capital management.*

C*hapter 16* relates the concepts of financial planning introduced in Chapter 15 to the management of the firm's financial resources in the short term. The chapter explores the two key dimensions of short-term financial planning—*cash planning* and *profit planning.*

C*hapter 17* develops the analysis of short-term financial management by examining the firm's management of its *working capital* and its short-term investment and financing decisions. The chapter progresses to specifically examine the management of the key short-term asset of stocks.

C*hapter 18* extends the coverage of working capital management to analyse the management of *debtors* and *cash.* The management of debtors includes an examination of credit management and a review of factoring and invoice discounting. The management of cash includes an analysis of cash management models and the cash cycle. Aspects of computerised and international cash management are also reviewed.

C*hapter 19* reviews the management of the firm's current liabilities and evaluates the main *sources of short- and medium-term business finance.*

Pedagogical features

This book incorporates a number of distinctive pedagogical features designed to facilitate the student learning and teaching processes.

Chapter outline
   Each chapter begins with a brief outline. This enables students and tutors to see at a glance the main topics covered in the chapter.

Learning objectives
   Each chapter also opens with a set of clear and specific learning objectives. These will serve as benchmarks against which students can test their understanding and progress. They will also serve as a framework around which tutors can structure lectures and seminars.

Chapter overview
   At the beginning of each chapter the student is provided with a short overview of the concepts and techniques to be covered in the chapter, relating them to their overall financial management context.

Key terms
   Key terms are highlighted in bold type when they are introduced in the text. A glossary of key financial terms is also provided.

Worked examples
   Worked examples demonstrating numerate topics are clearly presented where relevant.

In-chapter exercises
   In-chapter exercises are designed to stimulate student participation and activity. They

allow students to consolidate their understanding of key concepts and techniques before progressing. Solutions to all in-chapter exercises are provided in Appendix B.

Key learning points

Key learning points are identified and emphasised where appropriate. These have been distilled from the text to help students identify more quickly the key point(s) to learn and understand in a chapter or section.

Chapter recap

A recap at the end of each chapter enables students to quickly review and summarise the key topics covered in the chapter.

Further reading

Each chapter concludes with a selected further reading list for students wishing to explore chapter topics in more depth.

References

An appropriate reference section is also provided. Combined with the selected further reading these will assist students in preparing assignments, practical projects and dissertations. Often the original articles referred to offer clearer insights into the subject matter than the summaries, condensations and interpretations of the same articles provided by subsequent authors.

Review questions

At the end of every chapter there is a structured series of review questions designed to test the student's understanding of the main concepts and techniques presented in the chapter. The review questions include **concept review questions,** which are mainly theoretical and discursive in nature, and allow students to test their understanding of the basic concepts and principles presented in the chapter. The concept review questions are complemented by **practice** and **test questions** where relevant, including questions from past professional examination papers. Solutions to selected review questions are provided in Appendix C. Solutions to all other review questions and case studies are provided in the **tutor's guide.** These review questions can form the basis for seminars, tutorials and student assessment exercises.

Practical projects

Suggestions are given at the end of relevant chapters for student-based practical projects. The projects are designed to develop the student's understanding of the practical application of the concepts and techniques covered in a particular chapter, or series of chapters. These projects can be used as individual or group-based student assessment exercises.

Case studies

In addition to review questions and practical project suggestions, a number of challenging integrative case studies are included at the end of relevant parts of the text. This blend of review questions, suggested practical projects, and case studies offers the

tutor a very flexible range of alternative material for use in student assignments, projects, tutorials and seminars.

Relating theory to practice
  Concepts and ideas are illustrated with numerous real-world examples, illustrations and references. In this connection **vignettes** are integrated into the text in the form of a short case in point. These are designed to help students see, in close proximity to the theory, the practical relevance, application, or misapplication, of key concepts, topics and themes.

Glossary of key financial terms
  To assist students develop their financial literacy and come to terms with the language of finance more quickly, a glossary of the key financial terms is included at the end of the book.

Selected equations and formulae
  For ease of reference and familiarisation, a summary of the key equations and formulae is provided at the end of the text.

TEACHING AIDS

A tutor's guide is available for adopters of the text. The guide includes answers to end-of-chapter review questions, suggested solutions to case studies together with indicative marking schemes, transparency masters of key charts, tables and diagrams, a bank of additional 'quick test' multiple choice questions and test papers.

SUGGESTIONS FOR IMPROVEMENT

The author and publisher would welcome comments, observations and suggestions for improvement from lecturers, practising managers and students who have used this text. Kindly forward comments and suggestions to the publisher at the address given in the text.

ACKNOWLEDGEMENTS

Producing this textbook could not have been achieved without the help, contribution and advice of many people. I would like to offer a special word of thanks to:

- Penny Belk, Clive Bishop, Tony Head and other, anonymous, reviewers for their helpful and insightful comments and suggestions. Occasionally review comments and advice conflict and it is not therefore practicable to incorporate them all. I trust that reviewers will not take offence if some of their comments have been omitted.
- The staff at Routledge, in particular Stuart Hay, for their continued support and encouragement.
- The Association of Chartered Certified Accountants (ACCA), and the Chartered Institute of Management Accountants (CIMA) for their kind cooperation and permission to reproduce questions from past professional examinations. The suggested solutions are the responsibility of the author.
- *The Financial Times* for kind permission to reproduce copyright material.
- All those companies that have kindly granted permission to reproduce material from their annual reports, accounts and other documents.
- My students, who have valiantly endured the testing of much of the material in this book.

The company and business names used in worked examples, exercises, case studies and review questions etc. have been designed to add a degree of reality to the text and to depart from the 'widgets' syndrome. The names are fictional and no resemblance to any real company is intended. If a name should appear similar to, or perhaps turns out to be the same as, a real company, this is purely coincidental. In other cases where actual data from real companies has been used to illustrate a point or topic this should be clear from the text.

part one
THE SCOPE AND ENVIRONMENT OF FINANCIAL MANAGEMENT

PART 1 CONTAINS THE FOLLOWING:

Part 1 provides the essential introduction to the basic principles, practices and concepts of modern financial management. Part 1 also describes the financial environment in which the business firm operates. This sets the broader environmental context in which the financial manager and the financial management process function.

The Overview offers a brief initial insight into the nature of financial management and serves to highlight some of its core concepts.

Chapter 1 provides an introduction to the key aspects of financial management, including the goal of the firm.

Chapter 2 introduces the role of the financial manager and treasury management. The chapter proceeds to explore the influence of agency theory, stakeholder theory, corporate governance, and ethics, on financial management today.

Chapter 3 analyses the nature of the firm's financial environment and the financial manager's interaction with that environment, while Chapter 4 explores more closely the role of capital markets—a major constituent of the financial environment.

Part 1 concludes with a Case Study on financial planning.

OVERVIEW

Coffee ventures

Imagine the scenario. You have just discovered a new process for enhancing the flavour of coffee beans. Together with a few friends, you decide to form and manage a small company, called Coffee Ventures, to process and market your new brand of coffee. As well as being managers of the company, you and your friends are the main shareholders—you are also the owners of the company.

Before you can start the business you will need to make some key financial decisions. Clearly you will have to decide which essential assets, such as premises and equipment, need to be acquired. These assets will cost money, and their total cost will be the amount of your initial investment in the business. In the language of finance, this is an **investment decision.**

A second and related decision is: how is this investment to be financed? Clearly you cannot acquire the assets without the necessary capital. There will be many questions to consider. These are likely to include: what is the best way to finance this investment? who will provide the finance? how much will it cost to raise? This is essentially the nature of a **financing decision.**

In addition to needing capital to acquire fixed assets such as premises and equipment, the business will also need capital to finance its activities on a day-to-day basis. This form of capital is known as **working capital,** it is the capital necessary to purchase stocks of coffee beans, pay suppliers, wages, expenses, and so forth. This represents a third concern for the new venture—how best to finance its day-to-day operations.

The objective will be to ensure that there is always sufficient cash available to pay the firm's operating expenses and that business activities do not suffer due to a shortage of cash. Here the focus is on **short-term financial management,** that is, making investment and financing decisions that affect the firm in the short term and ensuring the effective management of the firm's short-term or working capital.

Presumably you would not make any of these decisions aimlessly, you would have a goal in mind—to make a **return** on the investment. As shareholders and owners, you would hope to be financially better off by undertaking the investment than not. If the venture proves successful it will generate positive **cash flows,** increase the wealth of the shareholders, and enhance the value of the business.

This process of **value creation** is the driving force behind financial management. Creating wealth for the shareholders, by increasing the value of their investment in the business, is the central goal of financial management. This goal tends to be stated more formally as the **maximisation of shareholder wealth,** and all financial decisions are assumed to be directed towards this goal.

Evidently the return from the coffee venture is not guaranteed: the outcome is far from certain. The company may make a substantial return on the investment, leaving all the shareholders wealthier. Alternatively, the venture may fail completely with the shareholders losing all of their investment. Financial decisions, like most business

decisions, are invariably made in the face of considerable uncertainty about the future, they necessarily involve **risk.**

Hopefully the return you would expect to earn by undertaking this business venture would be sufficient to reward your efforts and justify the risk. You would certainly expect to earn a greater return than if you simply invest your money in a bank deposit account—otherwise starting the venture would be futile. Undertaking such a business venture is evidently the more risky investment alternative, consequently the return expected would be greater.

You would also be unlikely to attract many other people to invest in your business if they too were only offered the prospect of a return equal to that they would get by leaving their money with a bank. Investing in business, particularly a new business venture such as this, is a much more risky affair, and most people will only invest if they expect the return to compensate for the level of risk involved.

In financial decision-making there is an inseparable connection between risk and return—the higher the perceived risk of an investment, the higher the return required by the investor, and vice versa. This relationship between risk and return is often referred to as the **risk-return trade-off—**higher investment returns can only be earned by accepting higher risk.

Assuming the venture is successful and the company grows, then it is likely to require additional capital to finance its growth plans. One option would be to raise this additional capital through the **financial markets,** for example by issuing securities to investors. Securities are financial instruments such as shares and debentures which represent claims by their holders on the assets of the company.

If the company establishes a healthy financial track record, earns the required rate of return, and has good growth prospects, then its securities should prove attractive to investors, making the additional capital easier to raise. All these factors, trading history, returns, and growth potential, will also substantially influence the value placed on the company's securities, and thus on the company and the wealth of its shareholders, by the financial markets.

Should the company continue into the future, then this cycle of investing and financing is likely to be repeated innumerable times during its existence, and it is a cycle in which the company's financial manager will be intimately involved.

The Coffee Ventures scenario has been presented to provide a brief, initial insight into the nature of financial management and to introduce some of its core concepts. The scenario does not contain all the features of modern financial management, but it does illustrate some of the most important.

The concepts of *cash flows, risk and return,* and *shareholder value,* highlighted in the Coffee Ventures scenario, are extremely important in financial management. They form its fundamental building blocks, have a profound effect on financial decision-making, on the value of a business, and consequently on the wealth of its owners.

Similarly, the role of the financial markets, both as a source of company finance and in valuing a company's securities, is also extremely important in financial management. It is the value of a company's securities, as determined in the financial marketplace, which is used to measure the value of a company and the wealth of its owners.

Diagram 1 is intended to illustrate the interconnections and relationships between the

various aspects of financial management, and to provide a brief overview of the areas covered in the text.

Diagram 1 shows the goal of the firm—the maximisation of shareholder value—as being the central aim of financial management. The nature of this goal is explained in Chapter 1. This goal is underpinned and directly affected by the core financial management concepts—its achievement requires an understanding of their role and impact. The core concepts are the subject of Part 2.
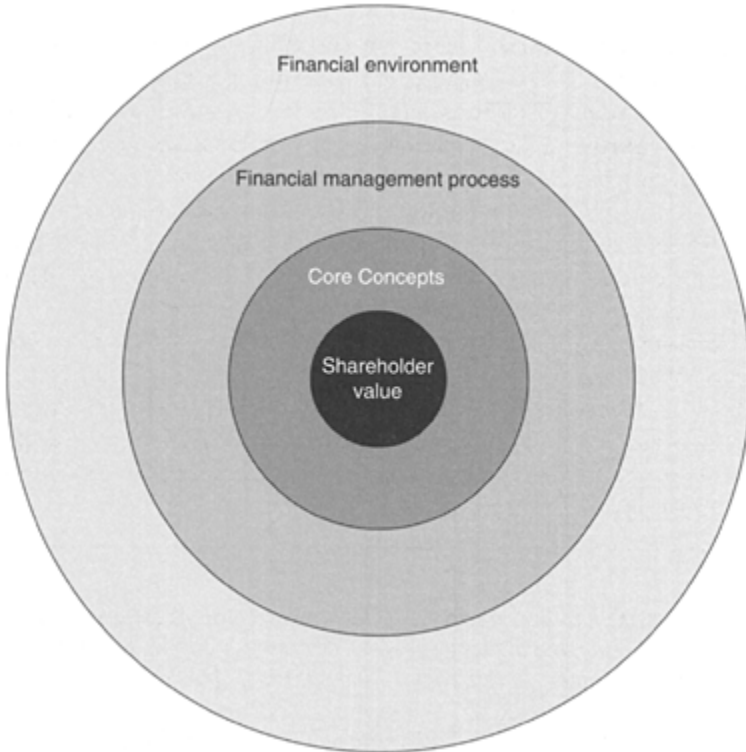
Part 1 diagram : Overview of financial management

The activities of the financial manager, and the outcomes of the financial management process (the firm's investment and financing decisions), are shaped by the core concepts and are directed at achieving the goal of the firm. For example, in Part 4 we will see how the concepts of cash flows, their timings, and risk, affect the value of investment decisions to the business. Parts 3 through 6 explore the various aspects of the financial management process, mainly in a strategic management context, while Part 7 explores the functioning of the financial management process in an operational management context.

The outer circle of the diagram shows that all the firm's financial management activities are influenced by the financial environment, which in turn is influenced by the wider business and economic environment. The financial environment, which is dynamic

and rapidly changing, consists of financial markets, financial institutions, and financial instruments.

Events in the financial environment directly impact on the firm's investing and financing activities. For example, changes in market interest rates will influence the financial manager's investment and financing decisions. Investment decisions may be deferred if interest rates are considered too high.

Finally, the outcomes of the financial management process—the firm's financial decisions—are assessed by the financial markets and reflected in the market value of the firm's securities, and ultimately in the wealth of its shareholders. The financial environment is explored early in the text in Part 1, as it sets the broader environmental context in which the financial management of the firm takes place. An appreciation of its role is essential in understanding the topics covered in subsequent parts. In due course we will spend much of our time exploring and developing each of these, and other important aspects of financial management, in considerably more depth as we progress through this book.

Inevitably when individual topics are later analysed in detail it is easy to lose sight of the overall perspective, of 'not seeing the wood for the trees'. The reader may therefore find it helpful in restoring perspective to return to this overview section from time to time.

1
INTRODUCTION

This chapter provides an introduction to financial management and an overview of its main features in the operation of a modern business enterprise. The following topics are covered:

an introduction to financial management;
the financial management process;
the goal of the firm;
the core concepts of financial management.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 explain the role and goal of financial management in a modern business enterprise;
2 explain the financial management process; and
3 understand the role of the core concepts in financial management.

OVERVIEW

The financial decisions faced by the owner-managers of Coffee Ventures are no different from the key financial decisions constantly faced by managers in every business: in which assets should the firm invest? And how should the chosen investments be financed?

As indicated in the scenario, these two decisions, the investment decision and the financing decision, and the processes by which they are made, form the very essence of financial management, and collectively they are intrinsic to the role of the financial manager—in any organisation. It is the financial manager who will contribute specialist financial skills and knowledge to this financial decision-making process.

As the scenario demonstrated, for a commercial firm the objective of these decisions is the maximisation of shareholder wealth, which in the theory of financial management is stated as the primary goal of the firm. Notice that the objective is not the maximisation of profit—for reasons we will explain later.

It will be a primary task for the financial manager to ensure that the firm's investment and financing decisions, long-term and short-term, are soundly based and that their outcomes result in an increase in the long-term value of the firm. We will explore the role

of the financial manager more fully in Chapter 2.

INTRODUCTION

In this chapter our primary purpose is to provide an introduction to the key concepts, principles, and practices of financial management in a modern business enterprise. This chapter thus lays the foundation for the rest of this book. Many of the concepts and terms introduced here will recur throughout the text and making an effort to come to grips with them now will produce its rewards later.

In particular this chapter introduces a unifying model of the **financial management process.** This model will serve as an integrated and coherent frame of reference for our approach to the study of financial management throughout this text. The model emphasises the link between an organisation's financial management and its general management processes.

Similar to other management disciplines, such as human resource and marketing management, financial management does not exist in isolation but is an integral part of the general management of any organisation. As such, it is similarly affected by the key changes and trends which are impacting on general management in the broader business environment today. For example, financial management, in common with most other aspects of business, is increasingly an internationalised affair.

The sustained progress towards the greater internationalisation of business and finance has been greatly facilitated by the dramatic advances in communications and information technology. These advances have lowered costs and increased the efficiency and attractiveness of conducting international business—so much so that the world is now virtually a global marketplace. The effect on the financial manager is that a firm's investment and financing decisions are being taken more frequently in an international business context.

A significant trend in finance has been the shift to a global financial marketplace. This has been greatly aided by changes such as the **deregulation and liberalisation of financial markets,** the explosion in the range of new financial products and services available to the financial manager, a practice referred to as **financial innovation,** and the trend by financial institutions to build up their worldwide network of operations.

There is no doubt that over the coming years these trends will continue (and seemingly at an accelerating pace) to have a profound effect on the world of business and finance. The Internet, the World-Wide Web, and electronic commerce (e.g. electronic money and payments systems and electronic retailing), for example, are comparatively recent innovations which have changed radically, in a relatively short period of time, the way individuals and businesses operate and communicate.

All of these changes and trends present the financial manager with a greater range of challenges, opportunities, and options for enhancing the investing and financing activities of the firm, but they also have their inherent risks. The challenge for the financial manager is to explore the options, take advantage of the opportunities they present, while taking care to manage the risks.

THE NATURE OF FINANCIAL MANAGEMENT

In attempting to define financial management one of the first problems we encounter is that of terminology. Confusingly, as so often the case in finance and accounting, multiple terms can be used to describe the same thing. For example, financial management is alternatively called, 'business finance', 'managerial finance', and 'corporate finance'.

All of these terms refer to the management of the essential investing and financing activities which business firms must undertake to produce the goods and services which people require. For our purposes we will adhere to the term 'financial management'.

One possible definition of financial management is simply: *'the ways and means of managing money'*. A more formal definition would be: **the determination, acquisition, allocation, and utilisation of financial resources,** usually with the aim of achieving some particular goals or objectives.

More specifically, financial management is about: analysing financial situations, making financial decisions, setting financial objectives, formulating financial plans to attain those objectives, and providing effective systems of financial control to ensure plans progress towards the set objectives. These activities can be presented in the form of a financial management process which will be explained shortly.

In relation to the goals and objectives of financial management, these are likely to vary according to different circumstances. For example, the goal for an individual might be accumulating a certain amount of personal wealth, for a commercial company it might be making a target amount of profit. Alternatively, in the case of a not-for-profit organisation (NPO) such as a charity, the goal might be providing the best value, in terms of the services provided, to its client group and probably from a limited financial budget.

Not-for-profit organisations (NPOs) are those whose essential purpose or ethos is something other than the commercial imperative of making money: their primary goals and objectives are not profit-related. Obvious examples are organisations which have been set up to fulfil some charitable or social purpose, such as registered charities and housing associations.

THE UNIVERSAL ROLE OF FINANCIAL MANAGEMENT

While the goal of shareholder wealth maximisation may not be relevant for not-for-profit enterprises, which do not have shareholders, the basic principles, practices, and precepts of financial management still apply.

Virtually all individuals and organisations (whether they realise it or not!) are in some way involved in financial management. Financial management is, for example, carried on in domestic households, business firms, financial institutions such as banks and building societies, hospitals, charities, community and voluntary groups, and so forth.

In other words, all types of organisations, whether their functions or objectives can be classified as profit-oriented or non-profit-oriented, are involved in the practice of financial management, and more importantly, effective financial management is essential

for their survival and growth. Many business and non-business organisations have collapsed, or have come near to collapse, as a result of weak and ineffective financial management. In this text, however, our primary focus will be on the principles and practices of financial management as they apply to the profit-oriented business firm.

THE MANAGEMENT PROCESS

Before proceeding to study financial management and the role of the financial manager, it will be helpful to set financial management in its organisational context. Financial management is an integral part of the general management process in most organisations and the practice of financial management cannot be carried on independently of, or in isolation from, the general management of the organisation.

Managers carry out the essential managerial functions of **analysis, decision-making, planning,** and **control.** The financial management process, and consequently the financial manager, operate in support of the general management function in seeking to realise the objectives of the organisation.

The key management functions

The key management functions of analysis, decision-making, planning, and control can be separated broadly into three different dimensions. Each dimension will require a different managerial emphasis and different sets of managerial skills. Figure 1.1 illustrates the three broad dimensions of the key management functions.
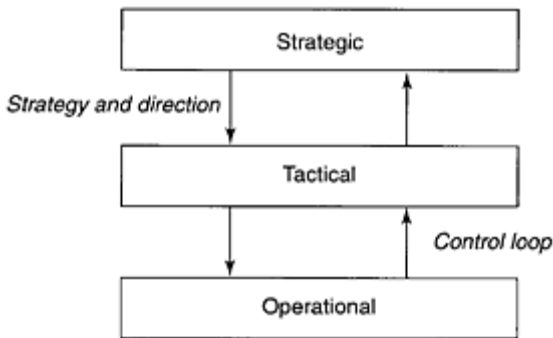
Figure 1.1 Dimensions of analysis, decision-making, planning
and control

The organisation's strategic objectives and strategic direction are determined by its senior management and are transmitted throughout the organisation—as indicated by the downward pointing arrows in Figure 1.1. Control information on the progress of the organisation towards its strategic objectives is in turn reported back to senior management. This effects the 'control loop' as indicated by the upward pointing arrows.

Alternatively it may be helpful to look at these dimensions in terms of a continuum, to illustrate their *relative* comparisons, as presented in Table 1.1. The dimensions are shown in the form of a continuum as the boundaries between them are not always clear-cut. At times, a strategic decision may merge into tactical, and tactical into operational, or the decision may include a mixture of strategic, tactical and operational dimensions. For

Table 1.1 The management continuum

| Characteristic | Dimension | | |
	Strategic	*Tactical*	*Operational*
• *Timeframe*	Long-term	Medium-term	Short-term
• *Aggregation*	High	Moderate	Low
• *Scope*	Broad	Medium	Narrow
• *Level in organisation*	High	Middle	Low
• *Complexity*	High	Moderate	Low
• *Risk*	High	Moderate	Low

example, the decision to build a new production plant, or a new hospital, clearly has strategic, tactical, and operational dimensions.

The respective characteristics of each dimension are summarised below. Various aspects of this process will be dealt with more fully in later chapters. Chapters 15 and 16, for example, discuss the planning and control functions in more depth.

It should be borne in mind that what we are presenting here is a general framework. How the management process operates in each organisation will be influenced by its size, scale of operation, organisational culture, managerial style, and so forth.

Strategic

The determination of an organisation's corporate, or overall, strategy, and the setting of its strategic direction are normally the responsibility of its most senior management team, for example the chief executive and the board of directors. It is this senior management group which will carry out the strategic dimension of analysis, decision-making, planning, and control. In this sense it is carried out at a **high level** in the organisation.

Strategic implies a **long-term** timeframe. For example, a strategic planning timeframe will typically extend over a five-year planning horizon. The strategic dimension also has the characteristics of being **broad in scope,** as it affects the future of the entire organisation, or at least a very significant part of it, in a major way, and of being **highly aggregated,** in that it deals with very summarised information and very broadly stated goals, objectives and plans.

The strategic dimension is further characterised by possessing high degrees of **risk** and **complexity.** Strategic decisions and plans are future-oriented, they require a substantial commitment of resources, particularly financial, and are invariably undertaken in the face of considerable **risk** and uncertainty. If strategic decisions and plans go wrong this can have profound implications for the entire organisation, perhaps in cases even threatening its very survival.

Strategic decisions and plans are also highly ***complex.*** They typically affect many parts of the organisation and often in diverse ways. Their implications and repercussions may not be fully understood throughout the organisation, and their implementation, particularly in large organisations, is complex to control and coordinate.

Once determined by the top management team, the corporate strategy and direction are communicated throughout the organisation as indicated by the downward pointing arrows in Figure 1.1. **Strategic control systems** will in turn inform management about progress towards strategic objectives as shown by the upward arrows in Figure 1.1.

A distinguishing characteristic of the strategic dimension is that objectives and plans will tend to be expressed in very broad, general terms. For example, to increase market share by 20 per cent, or to achieve a doubling in earnings per share (EPS) or of return on investment (ROI) over a five-year period, or to reduce the organisation's dependency on borrowed funds, might be just a few of the strategic financial objectives chosen. A key strategic objective of Cadbury Schweppes plc (see Example 1), for instance, is to double shareholder value over five years.

Strategic objectives therefore tend to be general statements of intent (see Example 1). How they are actually going to be achieved will require much more detailed expression. This will happen, for example, as the planning process gradually evolves through the strategic, to the tactical, and finally to the operational stage.

Example 1 —Strategy Statement

The following expression of strategy is taken from a recent annual report of Cadbury Schweppes plc—a UK-based multinational company that manufactures, markets and distributes its branded products in 200 countries. The group employs over 40,000 people worldwide.

O**ur strategy is based on:**

- **global representation in the two growth markets of beverages and confectionery;**
- **competing in these two markets with strong brands which earn high margins and generate substantial cash flows;**
- **growing volume and market share by innovation—in products, packaging and routes to market;**
- **development through value enhancing acquisitions;**
- **creating an organisation increasingly energised to 'manage for value'.** [1]

Tactical

This is an *intermediate dimension* which serves to couple together the two more distinct dimensions of strategic and operational. In large organisations this usually falls within the responsibility of middle managers and is often described as ***mid-level*** in the organisation.

The timeframe is ***medium term*** (typically a 2–3 year planning horizon). Data is

moderately aggregated in that information, objectives and plans are more detailed and specific than at the strategic stage, but not so detailed that they are suitable for use at the operational level. This tactical interface serves to link and integrate the strategic and operational dimensions.

In this dimension objectives and plans gradually become more specific, and individual managerial responsibilities become clearer in relation to the implementation and realisation of the overall business strategy. In large corporations, for example, divisional, business unit, or product group managers would be involved in the tactical decision-making.

Typical tactical objectives would include: modernising production/operations systems, probably by the introduction of new technology; revitalising the existing range of products or services, for instance, introducing new product varieties.

Operational

In contrast, the operational management process is performed at a ***low level*** in the organisation, as it affects the operating core. The timeframe is ***short term*** (usually up to one year ahead) and the data used is ***disaggregated*** in the sense that it deals with very detailed and specific information, objectives, plans and targets. Operational is also ***narrow in scope*** as the focus is on a particular part of the organisation, such as a specific operating unit or division.

This is the 'nuts and bolts' or 'factory floor' dimension, where the strategic aspirations ultimately become translated into very specific and detailed short-term objectives, targets and plans, with clearly identified lines of responsibility for individual managers and employees.

The operational dimension is also characterised by comparatively low degrees of ***risk*** and ***complexity.*** Their effects and implications for the organisation if they fail will not be so profound as the failure of strategic decisions and plans. As the operational dimension timeframe is short term they are accompanied by less risk and uncertainty.

Summary

The entire management process of decision-making, planning and control is continuous, dynamic and iterative. In an age of increasing rapidity of change (e.g. technological and social) and greater discontinuity—that is, past events are no longer a guide to future events—in the business world, the management process has to be performed in a dynamic way for a modern business to survive and succeed.

In fact, the pace of change in some businesses, such as banking, computing, financial services, and telecommunications, is so fast that the cost structures, working practices, and management systems that were acceptable even one year ago are no longer acceptable today.

THE FINANCIAL MANAGEMENT PROCESS

The financial management process follows logically from the general management process outlined above. The financial management process consists of several key stages or functions which, for reasons of analysis and ease of understanding, are presented in a sequential and discrete format. In reality the process will be continuous and dynamic, with some activities overlapping and/or being carried out simultaneously.

Financial management as a dynamic decision-making process

At this stage it will be helpful to introduce financial management as a *dynamic* decision-making process involving a series of interrelated activities as follows:

  1 financial analysis;
  2 financial decision-making;
  3 financial planning; and
  4 financial control.

This is an outline of the model of the financial management process which we shall follow throughout this text. Later we will review each of these key activities in more detail together with the financial manager's role in the process.

   Clearly the process outlined can be adapted to suit other business functions such as marketing and operations management, but our focus here is on the finance function. However, the point is worth repeating that the financial management function, just like the marketing and operations functions, cannot be performed in isolation from the overall business or corporate strategy.

   The financial management process will operate in the context of the overall strategic management process, with, for example, financial plans and decisions being shaped by the requirements of the organisation's corporate strategy.

   Before proceeding to analyse the model of the financial management process we will first review the vital role of **financial information.**

Financial information—a key ingredient

Whereas cash flow can be termed the 'lifeblood' of an organisation, information can be likened to the human nervous system, in the sense that messages are being continuously transmitted throughout the body corporate, resulting in decisions being made and actions being taken.

   The financial management process cannot operate effectively without reliable and relevant financial information—a critical ingredient in the process. The **quality** of the decision-making and ultimately the quality of the outcomes will be directly related to the quality of the information on which the decisions and plans are based.

   As financial management involves making strategic investment and financing decisions, which are critical to the future of the enterprise, then clearly the quality of the

financial information used will directly affect the quality of the decisions made, the plans that are implemented, and ultimately the value of the business.

Witness the Channel Tunnel project, which has been dogged by one financial crisis after another. Many of the decisions and plans concerning the troubled tunnel project were, it is clear now, based on unsound information about expected traffic and usage volumes—a critical piece of information on which crucial decisions and plans for the entire project were based. The key estimates and assumptions about traffic volumes, and consequently about expected revenues, turned out to be overly optimistic.

The critical importance of effective and reliable business information systems, in facilitating and supporting the various management functions, especially the decision-making, cannot be overstated. At every stage of the management process, there will be a continual need for relevant and accurate financial information (e.g. concerning profits, costs and cash flows) which may lead to a modification of plans and objectives.

In an ideal world, decisions would only be made when all the information which is desired is available. However, it is the nature of the real business world that decisions have frequently to be made on the basis of incomplete information. For example, management is unlikely to have complete information about competitors' plans and objectives, market trends, or the future state of the economy.

The more strategic in nature the decisions that are made, the higher the level of **risk and uncertainty** about future outcomes, and the greater the degree of **managerial judgement** that has to be applied.

Financial information may be **quantitative** (consisting of actual numbers) or **qualitative** (made up of general observations which are not easily translated into a financial number).

The provision of *reliable and relevant financial information,* and sound *professional advice* based on such information, will be a key responsibility of the financial manager—who will therefore need to ensure that reliable financial information systems are in place.

The financial management process

Having acknowledged the critical importance of financial information in decision-making, we can now proceed with our analysis of the financial management process. At this point we are only concerned with an overview of the various stages in the process, a fuller discussion of each key stage will follow in later, relevant chapters.

A model of the financial management process is presented in Figure 1.2 and attempts to illustrate its continuous, cyclical nature. The role of financial information is shown as a key input into the process.

This model of the financial management process forms the basic structure and framework for most of our approach to financial management in this text. It will be developed and refined as we progress through the book. In Parts 3 through 6 we analyse individual aspects of the process, mainly in a strategic context, while Part 7, which deals with financial management in the short-term, explores how the process functions in an operational context.

Financial analysis

This is the preliminary, diagnostic stage and will include: a financial analysis and review to determine the current financial performance and condition of the business; an identification of any particular financial problems, risks, constraints or limitations; and an assessment of financial *S* trengths, *W* eaknesses, *O* pportunities and *T* hreats (a financial **SWOT analysis**). Any additional financial information that may be needed to complete the review will also be sought. Financial analysis will be further explored in Chapter 9.
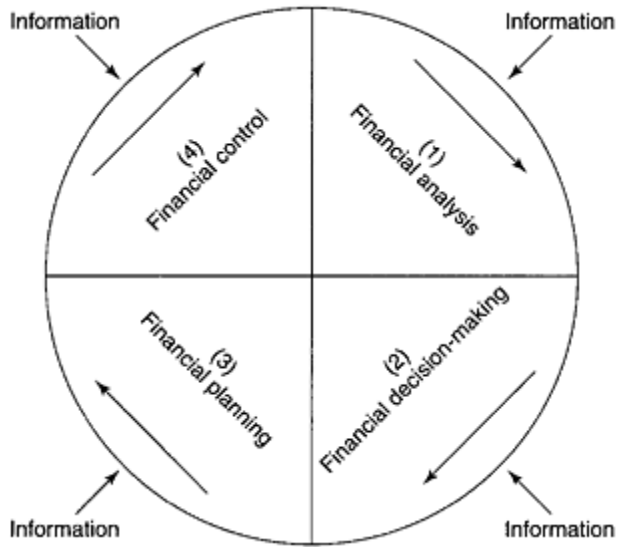
Figure 1.2 The financial management process

Financial decision-making

Based on the findings of the review stage, financial decisions and choices will have to be made. These are likely to include **strategic investment decisions,** such as investing in new production facilities or the acquisition of another company, and **strategic financing decisions,** for example, the decision to raise additional long-term loans.

Strategic investment decision-making is explored more fully in Chapters 10 and 11, while strategic financing decisions are discussed in Chapters 13 and 14.

Alternatively, the financial review may dictate that disinvestment or 'downsizing' is necessary. This may involve the closure or disposal of an unprofitable production facility or subsidiary. In any event the review is likely to present management with a range of **strategic options** for the business as a whole. The financial manager will be intimately involved in the financial evaluation and assessment of the options presented, in determining their respective *costs, benefits,* and *risks.*

Financial objective-setting

The decision-making phase will include the determination of the firm's financial objectives. In the context of the financial review, specific financial objectives will be set. While the primary financial objective, as was illustrated in the Coffee Ventures scenario, is the maximisation of shareholder value, this nevertheless requires specific subsidiary and more pragmatic objectives to be determined, so that the primary objective can be achieved. In general terms these subsidiary financial objectives will normally be related to:

1 Profitability . For a business enterprise, the objective of making a profit is taken as given, it is the commercial imperative. The firm's investment decisions should yield a rate of return commensurate with the level of risk involved. The management task is to continually seek to improve profitability, and specific objectives for growth in earnings and return on investment (ROI) levels are likely to be set. In addition, management rewards may be linked to the achievement of such objectives.

2 Liquidity . This means ensuring that sufficient cash is always available to pay the bills when they fall due and that the business remains solvent. The importance of sound liquidity, or cash flow, management cannot be overemphasised. More business enterprises fail as a result of lack of liquidity—in other words the cash flow dries up—rather than as a result of poor profitability. Here objectives will be specified in terms of volumes of cash flow generation and various liquidity ratios.

3 Capital structure . A firm's capital structure refers to the relationship between debt and equity finance in its long-term funding arrangements. *Debt finance* refers to external borrowings such as long-term loans: *equity finance* refers to the funds provided by the firm's owners, the shareholders. The firm usually raises long-term debt and equity financing through the financial markets.

From a purely practical point of view, the financial manager should ensure that the firm maintains a healthy balance between the proportion of debt and equity finance in its capital structure, related to the individual firm's circumstances. This relationship between debt and equity finance is also referred to as the level of **financial gearing** or **financial leverage.**

While it makes financial sense for a firm to use borrowed money, the firm will not wish to be overly dependent on borrowed money as this increases its **financial risk.** Debt finance is often regarded as a cheaper source of capital than equity because the interest payments on borrowings are a tax allowable expense.

The more money a firm (or individual) borrows, the more it is committed to repaying in the form of interest and principal, whether it is making a profit or not. As these commitments increase so too does the risk to the ordinary shareholder, who is rewarded by way of dividend only after all other financial obligations have been met. Capital structure topics are discussed further in Chapters 9 and 13.

Many of these objectives will be expressed in terms of **key financial ratios** such as *earnings per share (EPS), return on investment (ROI), dividends per share (DPS)* and *debt/equity ratios.*

One advantage of financial objectives is that most are *measurable* and *quantifiable,* such as the volume of profits and cash flows. However, objectives are also likely to include some **qualitative objectives,** such as the financial image (e.g. a conservative or

entrepreneurial image) which the company wishes to project.

Financial objectives will also be defined for achievement within a specified **timeframe,** in the sense that they will be categorised as being of a short-, medium-, or long-term nature. For example, management may be seeking to achieve a 50 per cent growth in earnings per share (EPS) or return on investment (ROI) over the next five years, or to substantially reduce gearing levels.

These are clearly long-term, strategic financial objectives but they must be broken down and phased into short-term (e.g. annual/quarterly/monthly) objectives to serve as benchmarks against which periodic progress can be measured.

For example, in its 1997 annual report Cadbury Schweppes declared what it defined as 'three key medium term' financial objectives as follows:

- **double shareholder value within five years;**
- **consistently deliver double digit earnings per share growth;**
- **generate at least £150 million of free cash flow per year.**

As stated above, a common financial objective for a commercial company is seeking growth in return on investment (ROI) and earnings per share (EPS). ROI and EPS are both profitability measures. ROI expresses returns (profits) as a percentage of the amount of money invested in the business. EPS expresses the company's profitability in terms of the amount of money earned (after interest and taxes) per ordinary share invested. The calculation of the measures is illustrated in Example 2.

Example 2 —*Return on investment (ROI) and earnings per share (EPS)*

WestWood Leisure is a rapidly growing company which owns a number of health clubs and leisure centres. The company has an issued share capital of 1 million ordinary shares and an investment of £3,575,000. A summarised profit and loss account for the financial year just ended is as follows:

	£000
Turnover	2,562
Cost of sales	1,409
Gross profit	1,153
Administrative expenses	438
Operating profit	715
Interest payable	34
	681
Taxation	211
Profit after tax	470
Earnings per share (EPS)	*47p*

Return on investment (ROI) is calculated as:

$$\frac{\text{Profit before interest \& tax (PBIT)}}{\text{Investment (total assets } - \text{ current liabilities)}} \times 100 = \%$$

$$= \frac{£715,000}{£3,575,000} \times 100 = 20\%$$

Investment is usually measured in terms of the value of a company's total assets less its current liabilities.

Earnings per share (EPS) is stated in terms of *pence* per share and is calculated by dividing the profit after interest and tax of £470,000 by 1,000,000 ordinary shares.

EXERCISE 1 —ROI AND EPS

A company with an issued share capital of 3 million ordinary shares and an investment of £17,714,000 has reported the following financial results (figures are in £000s):

Operating profit £2,480; interest payable £45; taxation £755.

Calculate the company's return on investment (ROI) and earnings per share (EPS). Answers are provided in Appendix B.

Financial planning

While the financial objectives set out *what* has to be achieved, the financial plans will detail *how* the financial objectives are to be achieved. For example, the ROI and EPS figures calculated in Example 2 are historic. Based on this performance WestWood's management may now wish to set specific ROI and EPS objectives for the next few years ahead, and develop plans to achieve them.

Financial plans, like objectives, will have a timeframe, short-, medium-, or long-term and will essentially provide the 'road maps' detailing how the firm's objectives are to be reached.

The essence of financial planning is to ensure that *the right amount of funds is available at the right time and at the right cost for the level of risk involved* to enable the firm's objectives to be achieved. Financial plans will therefore show, for example, the volume, and timing of funding requirements needed to achieve the firm's objectives.

B**udgeting** will be a key financial planning tool. Budgets are essentially short-term, detailed financial plans and individual managers will be made responsible for their achievement.

Ultimately the whole financial planning process is likely to be summarised in a few key budgeted or forecast financial statements: a budget balance sheet, a budget profit and

loss account, and a budget cash flow statement. These budgets or forecasts will then provide the reference point, or **financial master plan,** against which progress can be monitored and controlled.

The efficiency and effectiveness of the financial planning process will be greatly aided by the application **of computerised financial modelling.** Proprietary software packages (e.g. Excel and Lotus) can be used to create a range of possible financial scenarios and to evaluate the financial effects of any changes in plans or targets.

Long-term or strategic financial planning is the subject of Chapter 15, while short-term, or operational financial planning is further analysed in Chapter 16.

Financial control

The final stage of the process will require effective management reporting and control systems to be set in place throughout the organisation. This is to ensure that plans are properly implemented, that progress is continually reported to management, and that any deviations from plans are clearly identified.

Effective control systems, by providing a continual comparison of actual performance with planned performance, will alert management to deviations in a timely manner.

If things are not progressing as planned, for example sales and profits are lower than expected, then remedial action can be taken to bring plans back on track. Alternatively, plans and objectives may need to be modified, if this is considered appropriate.

This final control stage will inevitably lead back to a review and analysis of financial performance—back to Stage 1—which in turn will lead to new decisions being made, objectives and plans being modified and so forth, thus continuing the dynamic management cycle.

Similar to financial planning, long-term or strategic financial control is discussed in Chapter 15, while short-term, or operational financial control is analysed in Chapter 16.

What does financial management involve?

The critical activity of the financial management process is that of financial decision-making, specifically decisions aimed at creating maximum value for the owners of the business. Decisions about spending, investing, or borrowing money, for example, are important financial decisions with which most of us are from time to time concerned. In the operation of a business enterprise the key function of the financial manager involves evaluating these types of decisions. As we have seen in the Coffee Ventures scenario, the financial manager will be primarily concerned with two main types of interrelated decisions:

1 **investment decisions; and**
2 **financing decisions.**

Investment decisions involve identifying the assets or projects in which the firm's limited financial resources should be invested. Financing decisions involve deciding on the most cost-effective method of financing the chosen investments. Should debt or equity finance be used, or perhaps a mix of both?

The assets in which the firm invests can be **real assets,** such as fixed tangible assets (e.g. property and equipment), **intangible assets** (e.g. registered patents and trademarks) and **financial assets** (e.g. shares and bank deposits).

Most of the assets which appear on a firm's balance sheet are of the tangible type—buildings, equipment, inventories, and so on. Intangible assets on the balance sheet will include registered patents, trademarks, and often brand names.

However, many of what are considered to be 'investments' in intangible assets cannot appear on a balance sheet. These would include expenditures in such areas as research and development, marketing and advertising, staff training and development, customer service and quality.

Undoubtedly 'investments' of this nature are vital in today's competitive business environment and add considerably to the *'reputational capital'* of a firm in the financial markets, but from a purely technical accounting point of view these expenditures cannot be capitalised, that is, treated as assets in the balance sheet. Expenditures of this type are charged as expense items to the profit and loss account as they are incurred.

We will now take a closer look at the respective characteristics of investment and financing decisions.

Investment decisions

These can be broken down into:

  1 strategic investment decisions (SIDs); and
  2 tactical/operational investment decisions.

Strategic investment decisions

These are concerned with investing in the long-term, wealth-creating assets of the business, such as investments in fixed tangible assets (e.g. land and buildings) or the acquisition of other businesses.

Strategic investment decisions will normally involve committing very substantial sums of money to selected investment projects for long periods into the future, usually in the face of considerable risk and uncertainty. Yet, as we shall see later, it is the strategic investment decisions which have the potential for creating real value for the business, and thus wealth for its owners.

It is the quality of its strategic investment decisions which are absolutely crucial to the long-term success of a business. Strategic investment decision-making is the subject of Part 4, Chapters 10 to 12.

Tactical/operational investment decisions

These relate to investing in medium- to short-term assets such as stocks, debtors, bank, and money market deposits. These are the assets which are essential to the firm's day-to-day operations. Short-term investment decision-making is presented in Part 7, Chapters 17 to 19.

Financing decisions

These can similarly be analysed as:

1 strategic financing decisions; and
2 tactical/operational financing decisions.

Strategic financing decisions

These involve determining the most suitable long-term financing arrangements for the firm—the arrangements for financing its long-term, wealth-creating assets. The primary source of long-term financing for the firm is the capital markets, the role of which is discussed in Chapter 4.

The strategic financing decision typically involves deciding what is the most appropriate mix or blend of equity and long-term debt finance in the firm's **capital structure**—sometimes called the capital structure decision. Capital structure decisions, and their links, if any, to the value of the firm, is a very controversial issue in financial management, an issue which is addressed in Chapter 13.

An essential and important part of the strategic financing decision relates to a firm's **dividend policy,** and is often referred to separately as *the dividend decision.* Dividend policy involves deciding how much of the firm's earnings should be paid out to shareholders in the form of dividends in return for their investment in the firm, and how much should be retained to finance the firm's future investment plans.

Like capital structure, the relevance or otherwise of dividend policy in the determination of a firm's value is also a controversial topic in financial management and is explored in Chapter 14.

Tactical and operational financing decisions

These concern how best to finance the firm's investment in its medium- and short-term assets respectively. For example, deciding on the most appropriate method(s) of financing the investment needed in current assets such as stocks and debtors. Short-term financial decision-making is one of the themes in Part 7.

The skill and competence with which investment and financing decisions are made will distinguish the effective financial manager from the ineffective financial manager. **Taken together the outcomes of these two main types of decisions will determine the value of the firm** and as we have seen, the goal of maximising the market value of the firm is the focus for corporate financial decision-making.

EXERCISE 2 —FINANCIAL DECISIONS
Identify which of the following represent investment, financing, or other types of decisions for a food manufacturing company:

1) Building an extension to the factory.
2) Arranging a long-term loan secured on the factory premises.
3) Replacing laboratory testing equipment.

4) Spending £20,000 on a market research programme.
5) Entering into a service and maintenance agreement for production machinery.
6) Spending £10,000 on a new quality control programme.
7) Purchasing additional stocks of raw materials.
8) Redecorating the manager's office.
9) Spending £30,000 to acquire patent and trademark rights.
10) Arranging a bank overdraft.

The balance sheet as a model of the firm

The firm's investment and financing activities will be reflected in its balance sheet, as illustrated in Example 3. Investment decisions will affect the structure of the firm's assets, financing decisions will affect the structure of the firm's capital and liabilities.

For our present purposes it will be helpful to view the balance sheet in its traditional horizontal or 'set of scales' format. Assets are shown on the left side, balanced by liabilities and shareholders' equity (or capital) [2] on the right. You may remember this in the form of the balance sheet equation:

Assets=Liabilities+Shareholders' equity

Alternatively,

Assets−Liabilities=Shareholders' equity

Example 3 —Investing and financing

Presented below is the current balance sheet for Red Sails Boating, a small company which designs and manufactures small and medium-sized pleasure craft.

Red Sails Boating
Balance sheet

Assets		Liabilities & shareholders' equity	
	£		£
Fixed assets	100,000	Shareholders' equity	130,000
Current assets	50,000	Current liabilities	20,000
	150,000		150,000

The company buys new machinery at a cost of £30,000 and finances the investment through a long-term loan from the bank. The revised balance sheet appears as follows:

Red Sails Boating
Balance sheet

Assets		Liabilities & shareholders' equity	
	£		£
Fixed assets	130,000	Shareholders' equity	130,000
Current assets	50,000	Long-term loan	30,000
		Current liabilities	20,000
	180,000		180,000

The company's total assets have increased in value by the amount of the investment, but so too have its liabilities by the amount of the financing. The firm's capital structure has changed, and its level of financial risk has increased due to the higher level of debt in its capital structure. Debt now represents almost 28 per cent of total financing, (£50,000/£180,000) compared to 13 per cent (£20,000/£150,000) before the investment. The firm is now more highly geared or leveraged.

In the context of this small business, purchasing this asset represents a strategic investment decision and the long-term bank loan represents a strategic financing decision.

It is important to remember that the balance sheet reflects the book value of the firm's assets, not the firm's market value.

THE GOAL OF THE FIRM

A commercial company is owned by its shareholders; it is they who have the equity interest in the form of owning ordinary shares. Shareholders' equity interest in Example 3 is shown as £130,000 (total assets of £180,000−total liabilities of £50,000). However, this is the book or balance sheet value of shareholders' equity, we are interested in the market value of shareholders' equity. As the ordinary shareholders provide the essential capital for the company and bear most of the risk, it therefore seems only equitable that the firm should be managed in their best interests.

In financial management theory, the goal of the business firm is to create the maximum value for its shareholders and this goal is commonly expressed as the **maximisation of shareholder wealth** or the maximisation of shareholder value.

The maximisation of shareholder wealth, or value, means the maximisation of the firm's total **market value** as reflected in *the long-run ordinary share price.* In the case of a publicly quoted company shareholder wealth is measured by the share price in the financial markets.

Recall that Cadbury Schweppes forthrightly stated that their governing objective is to increase shareholder value over time. More explicitly Cadbury's management seeks to double shareholder value over the years 1997 to 2002, which effectively means doubling the market value of the company's ordinary shares.

As we shall see in later chapters, it is the buying and selling transactions in the financial markets which determine the price of a firm's financial securities, (that is, its shares and bonds) and thus its market value.

If the financial markets consider a company's future prospects to be good this will stimulate demand for the company's shares, increasing its share price in the markets. Conversely, if the company's prospects are considered poor this may induce shareholders to sell, thus reducing its share price and devaluing the company.

For a private company, such as Red Sails Boating, which does not have its shares quoted on a stock market, shareholder wealth maximisation remains a valid goal, but measuring the value of the shares in the absence of an active market for them, as we shall discover in later chapters, is a much more difficult task.

It is acknowledged that even a commercial, profit-seeking enterprise will in practice have other goals and objectives in addition to maximising the wealth of its shareholders (see for example Grinyer 1986). These other goals and objectives may be **financial** and/or **non-financial** in nature. As we have stated, financial objectives will typically include earnings per share (EPS), dividends per share (DPS), and return on investment (ROI). Non-financial goals could include employee welfare, health and safety, and social and environmental goals. The goals and aspirations of an organisation may even be expressed in the form of a *'mission statement'*.

A mission statement sets out an organisation's ethos, its raison d'être, the beliefs and value systems which underlie its operation. It is also likely to contain a declaration, in very broad terms, of its fundamental goals, aims and objectives, which may or may not be finance-related.

However, from a purely financial point of view, our focus is on shareholder wealth maximisation as the dominant goal. This is for one simple reason, the firm operates in a competitive financial market and investors have many alternative investment opportunities open to them and limited funds to invest.

If the firm wishes to attract funds for investment, then it must provide investors (actual and potential) with a fair return for the risk involved. If it does not, then attracting essential financing will become extremely difficult, if not impossible, placing the firm's future existence at risk.

Not-for-profit organisations (NPOs)

In the case of not-for-profit (NPOs) and public sector organisations, the concept of value maximisation is also relevant, as management is concerned with maximising the value of the organisation's outputs (e.g. health, education or social care) to the local community. In such organisations goals are often stated in terms of achieving maximum **value for money (VFM)** in the delivery of services.

For a not-for-profit organisation, such as an NHS health care trust, the goal can be stated in terms of maximising the value to the local community of the health care services which the trust is responsible for providing—normally from a limited budget. Similarly, the goal for a charity, which may be charged with the responsibility of providing specific social and welfare needs, could be stated in terms of maximising the value of its outputs to its identified client group.

However, defining and measuring value in the context of the not-for-profit sector is very problematic—there is no share price to be used as a guide. How, for example, in such organisations, is value to be defined and by whom? Is value to be defined by the provider or the consumer of the service? Should it be a combination of both? Furthermore, how is value to be measured and by whom?

Part of the problem is to do with the nature of the services provided in the non-profit sector. They are frequently *intangible* (e.g. health care, social care and education) and their benefits or outcomes are notoriously difficult to evaluate or quantify. For example, in health and social care services how would you describe the outputs of services in respect of caring for the elderly or the mentally ill? In addition, how would you value or measure these outputs?

In addition to their primary goals, NPOs will have a series of specific objectives, financial and non-financial, which they are required to achieve. For example, NHS health care trusts, and other public sector organisations, are specifically required by government to earn a target rate of return of 6 per cent on their net assets employed in delivering their services. They are also of course required to live within their overall financial budgets, and only allowed to borrow money within clearly defined limits.

We shall return to some of these issues again later in this book. In the meantime we will return to our discussion on the goal of the commercial business enterprise, the type of organisation with which we are predominantly concerned.

Why is the goal not profit maximisation?

You may have learned from your studies of economics that the goal of the business firm is profit maximisation. In financial management, profit maximisation is not an appropriate goal as it ignores the following factors: **(1) the timing of returns, (2) cash flows,** and **(3) risk,** all of which are key elements in determining shareholder wealth.

The timing of returns

One shortcoming of profit maximisation is that it tends to focus on the absolute amount of returns and ignores their timing by simply seeking to select those investments which yield the greatest total amount of profits. Look at the investment choice presented in Example 4. Which investment is of greater value, Project A which yields earnings (profits) of £100,000 a year for the next three years, or Project B which yields £330,000 of earnings in three years' time?

Example 4 —Profit maximisation versus value maximisation

	Project A Earnings (£)	*Project B* Earnings (£)
Year 1	100,000	0
Year 2	100,000	0
Year 3	100,000	330,000

Profit maximisation would dictate the choice of Project B, as it has the greater amount of total profits, £330,000. However, this may not be the value maximising decision. With Project A, the firm has the opportunity to reinvest the funds earned in years 1 and 2, and possibly accumulate even greater total returns in the future.

Whether this is the case will depend on the *time value of money.* Most people prefer to receive funds sooner rather than later, as they then have the opportunity to invest the funds earlier and thus accumulate more wealth. Therefore, in order to make value or wealth maximising decisions, we need to take into account not only the amounts but also the respective timings of investment returns.

Cash flows

Profits do not represent cash flows. Although profits may be used as the traditional accounting measure of a firm's financial performance and a firm may report 'healthy' profits in its annual accounts, it does not necessarily mean that cash is actually available to pay bills and fund investment. For example, depreciation and other provisions are included in a profit and loss account but they are not cash flow items.

Despite the existence of company law and professional accounting standards, firms still have 'flexibility' in the reporting of profit figures to give the most favourable impression of financial performance.

In Example 4 the earnings of the two projects may, or may not, represent actual cash flows. As far as we are concerned in financial management, **cash flow is the real measure of a firm's performance and is the measure by which the financial markets value a firm.**

Risk

The objective of profit maximisation also ignores the concept of **risk,** which, for our purposes here, is defined as ***the chance that the actual outcome of a decision may differ from the expected outcome.***

A firm's returns, as we have mentioned, should be measured in terms of cash flows not profits, and clearly there is always the risk that actual cash flows may be more or less than those expected by the firm's management.

In comparing the respective returns of the two projects in Example 4, we did not consider their relative risks. For example, Project A may be the expansion of an existing product line, whereas Project B may involve launching a new product in the market.

Clearly Project B, in this scenario, would be the higher risk investment and therefore its cash flows would be subject to a greater degree of uncertainty. If Project B is considered higher risk than Project A then it will be expected to yield a higher return.

By focusing solely on returns, the goal of profit maximisation is only looking at 'one side of the coin'. We cannot make a valid comparison between investments unless we consider both the respective risk and return of each investment.

This is the ***risk-return trade-off*** alluded to in our Coffee Ventures scenario. Investors can only earn higher returns by accepting higher levels of risk. If a low-risk investment is preferred, then a commensurate low level of return will be expected. **It is this**

combination of risk and return that determines a firm's share value and thus the wealth of its owners.

From our financial management perspective, the valid goal of the firm is the maximisation of shareholder wealth and in a commercial firm, all management decisions and actions should be directed towards this goal. It is an integral part of the financial manager's role to ensure that the financial decisions taken lead to an increase in the firm's long-term share price and consequently the long-term wealth of its owners.

EXERCISE 3 —FINANCIAL OBJECTIVES

(a) What do you consider would be the main financial objectives of:

  (i) a hotel and restaurant company?
 (ii) an NHS Hospital Trust?

(b) What actions might the manager of an hotel take to improve profits in the short term but which would impair shareholder value in the longer term?

THE CORE CONCEPTS OF FINANCIAL MANAGEMENT

In making financial decisions, the financial manager will be guided and influenced by a number of core financial management concepts. It is also these core concepts which assist in distinguishing financial management from the more traditional accounting models of the firm.

Table 1.2 Financial management versus financial accounting

	Financial management	*Financial accounting*
Role	Decision-making	Stewardship
Focus	Value creation	Costs
Returns	Cash flows	Profits
Perspective	Future-oriented and outward-looking	Historic and inward-looking
Timeframe	Long-term	Short-term

Some of these core concepts are presented in Table 1.2 (adapted from D.Allen, *Strategic Financial Decisions*), which summarises the key distinctions between the traditional accounting model of the firm and the financial management model.

The role of financial management is as a decision-making activity, which focuses on the creation of value for the owners of the firm and evaluates performance (returns) in terms of generating valuable cash flows. In contrast, the role of the traditional accounting model is ensuring good financial housekeeping or stewardship, on accumulating costs

and measuring performance or outcomes in terms of profit or loss—in accordance with prescribed legal and professional rules and regulations.

As a decision-making activity, financial management is future-oriented and looks beyond the firm to recognise the impact of the external environment. Accounting tends to be historic, is more concerned with 'keeping the financial score', and with the recording of the individual firm's past financial transactions and results, it is essentially introspective and retrospective.

Moreover, the traditional accounting model emphasises the short-term by compiling periodic accounts covering discrete time periods (e.g. monthly, quarterly or annual accounts). Financial management is primarily concerned with creating value for owners over the long term.

We can now proceed to examine the core concepts of financial management, as follows:

  1 cash flow;
  2 risk and return;
  3 time value of money;
  4 opportunity cost; and
  5 value.

These concepts are the essential characteristics of financial management. Our aim here is simply to introduce each of these key concepts as they will recur constantly throughout our study of financial management, but their importance to a sound understanding of financial management cannot be overemphasised. They serve to guide and direct the financial manager in the task of making business decisions which contribute to shareholder value.

Cash flow

'Cash generation is the foundation of creative value for shareholders.'
(J Sainsbury Plc, Annual Report, 1998).

One key distinction between financial accounting and financial management, highlighted in Example 4 and Table 1.2, is the emphasis on cash flows in financial management. Traditional accounting models are profit focused, whereas financial management is very much concerned with the **generation and management of value-enhancing cash flows.** After all it is cash, not profits, which is needed to pay the bills and dividends to shareholders.

There are two dimensions to cash flow, **cash inflows** and **cash outflows,** and cash flow management involves the effective management of both. An organisation's cash flows will arise as a result of:

1 Operating activities . These are the cash flows that arise from normal trading activities, such as the cash received from customers for goods/services sold and the cash paid for trade supplies and operating expenses.

2 Investing activities . These cash flows arise from non-trading, investment-related activities such as cash actually received from the disposal of assets and investments and conversely, cash actually paid to purchase assets and investments.

3 Financing activities . Again, these are cash flows that arise as a result of non-trading activities. In this case they are the cash inflows connected with raising new capital such as issuing new ordinary shares or long-term debt and the cash outflows associated with, for example, repayments of loans and finance leases.

Profit versus cash flow

Profit is an accounting concept whereas cash is a financial management concept, cash is *'the real thing'*. As we have seen, cash is needed by all organisations to pay creditors, wages and operating expenses. Cash flow is considered by many accountants and economists as the most important measure of a firm's performance. A healthy cash flow is essential for any organisation's survival. A shortage of cash is the root cause of the failure of many organisations (profit-making and not-for-profit organisations).

Profit figures, on the other hand, while measurable according to legal and professional standards, can still be manipulated (legitimately) by firms to their best advantage—you will have heard of the term 'creative accounting'.

As we discussed earlier, reporting profits in a profit and loss account does not necessarily mean that the corresponding amount of cash is available for investment. Thus, compared with profits, cash flow is an unambiguous measure of a firm's financial performance. Consider Example 5 which illustrates the crucial difference between (1) the traditional accounting (profits) perspective, and (2) a financial management (cash flow) perspective of a business's financial position.

Example 5 —Accounting versus Financial management perspectives

Wild Rover Joinery is a small company which designs and manufactures interior fixtures and fittings for hotels, pubs and restaurants. The company's summarised profit and loss account for the financial year just ended is as follows:

	£
Sales	500,000
Costs	450,000
Profit	50,000

Accounting perspective

If the costs figure includes the costs of manufacture (wages, materials, etc.), and the sales figure includes an amount for a debtor (someone who owes the firm money) of £80,000 for work completed

just one week before the end of the year, then, under traditional accounting rules and conventions, the company seems to have made a healthy profit of £50,000 for the year.

Financial management perspective

Contrast this traditional accounting perspective with a very simple financial management (cash flow) perspective. Despite a sales figure of £500,000 appearing in the profit and loss account, the cash inflow for the business is only £420,000. This is the cash received from the customers who have actually paid for their contracts. On the other hand, the company has paid out £450,000 for wages, materials and expenses. As a result the firm shows a negative net cash flow of £30,000.

	£
Cash inflow	420,000
Cash outflow	450,000
Net cash flow	(30,000)

The financial management perspective reveals more clearly the financial condition of the business. Wild Rover would certainly experience financial hardship, possibly even insolvency, if the customer owing the money should be unable to pay. The distinction between profits and cash flows is an important one in finance and we will meet it frequently.

It would be a key part of the financial manager's role, in any organisation, to monitor cash flows closely and take appropriate actions to minimise the risks of customer non-payment and insolvency.

Example 5 simply serves to illustrate some of the limitations and inherent dangers of relying solely on traditional accounting measures as providing a true insight into the financial performance and condition of a business. Investors and shareholders need to probe further than the more traditional accounting perspectives when attempting to discover the real financial performance and condition of a firm.

Measuring cash flow

As illustrated in Example 5, a firm's net cash flow is calculated by deducting cash payments from cash receipts, and hopefully it will be a positive figure with receipts exceeding payments. Although this appears to be a very simple calculation, in practice it is a rather more complex process, one reason being that the term 'cash flow' itself is open to varying interpretations.

In the UK and Republic of Ireland, medium and large companies are required by a professional accounting standard (not by law) to include a **cash flow statement** in their published annual accounts. The accounting standard laid down by the Accounting

Standards Board (ASB) is called **Financial Reporting Standard No. 1—'Cash Flow Statements'.** This standard was originally introduced in 1991 and subsequently revised in 1996.

FRS 1 (usually pronounced as 'Friz-one') prescribes certain rules and formats for the preparation and presentation of cash flow statements. Although FRS 1 (Revised 1996), also defines cash as: 'Cash in hand and deposits repayable on demand with any qualifying financial institution, less overdrafts from any qualifying institution repayable on demand', there is still considerable variation in practice in the way companies define cash in their accounts. For our present practical purposes the following definitions will suffice. The simplest definition of cash flow is:

> C**ash flow=Operating profit+depreciation ± other non-cash items**

Depreciation represents the loss in value of an asset over a period of time. It is an expense associated with ownership of the asset and as such must be deducted from revenues in calculating a firm's operating profit.

However, the important point is that *depreciation is not a cash expense.* For example, a cheque is not written to pay for depreciation in the way that payments are made for other expenses such as salaries, wages, and materials. Therefore depreciation is added back to the operating profit figure to give an estimate of the cash generated by the firm. Any other non-cash items (e.g. profits or losses on the sale of fixed assets) that have been included in the profit and loss account would need to be adjusted accordingly.

Many financiers and analysts take this calculation a stage further and prefer an estimate of **free cash flow (FCF):**

> F**ree cash flow=Cash flow−(investment expenditures+dividends+taxes)**

This measurement of cash flow shows the *discretionary cash* remaining after making the necessary investments in fixed assets, rewarding shareholders with dividends and paying tax obligations. Free cash flow then represents the amount of cash available for discretionary purposes such as reducing debt levels, increasing dividends, repurchasing shares, or providing for some other strategic purpose such as acquisitions and mergers.

For example, in its 1997 annual accounts, Cadbury Schweppes calculated its free cash flow as follows:

	£m
Cash flow from operating activities	733
Capital expenditure	(204)
Interest and tax	(205)
Dividends	(167)
Free cash flow	*157*

One of the company's key financial objectives is to generate at least £150 million of free cash flow per year.

However it is measured or defined, **cash flow generation is the true test of a firm's**

performance and is vital for its long-term survival and growth.

EXERCISE 4 —FREE CASH FLOW

Given the following information for Oakgrove Enterprises, calculate the company's free cash flow. Figures in £000s.

Dividends £38, interest £21, operating profit £364, capital expenditure £109, depreciation £46, tax £73.

Risk and return

As was illustrated in the Coffee Ventures scenario, the motivation for undertaking an investment decision is the expectation of gaining a satisfactory return—a return which rewards effort and justifies the risk. But the return from an investment, particularly a business investment, is not guaranteed.

The actual return may prove to be more than, less than, or equal to, the return expected before the investment was undertaken. Investment decisions are typically made with imperfect knowledge of the future, and necessarily involve risk; how much risk depends on the nature of the investment.

In the context of financial management by risk we mean **the chance that the actual returns may differ from the expected returns,** and in finance a risky investment is one whose potential returns are expected to have a high degree of variation or volatility. Remember that in financial management returns are measured in terms of expected future cash flows—not profits, and risk is *the degree of volatility surrounding expected future cash flow returns.*

In assessing the risk of an investment, a decision-maker clearly does not know what the actual outcome will be. However, the decision-making process can be aided by the application of some statistical techniques, such as probability theory. This allows the decision-maker to create probability weightings for a range of possible outcomes. Risk is thus a phenomenon which can be quantified by expressing it in terms of probabilities, and consequently probability theory is central to risk analysis.

It was indicated in the opening Coffee Ventures scenario that the concepts of risk and expected return tend to be intimately related. In basic terms, the greater the perceived level of risk associated with a given investment, then the greater the level of return expected by an investor. As Figure 1.3 illustrates, there is almost always a **risk-return trade-off in** financial decisions.

The risk of investing in a bank or building society savings account (Investment 1 in Figure 1.3) is lower than investing in the shares of a long-established 'blue chip' company, such as Bass, BT, or Marks & Spencer (Investment 2), and so is the expected return. In contrast, the risk of investing in a young, fast-growing company recently floated on the stock market (Investment 3), would normally be much higher than the risk of investing in the shares of a 'blue chip' company.

The risk of investing in an entirely new venture, as in the Coffee Ventures case, would be higher still. Consequently, rational investors will require higher returns from investing

in higher risk investments, returns which they consider compensate for the level of risk.

Figure 1.3 shows, other things being equal, the positive relationship (correlation) between expected return and risk of the three investment opportunities: as the expected return increases there is a corresponding increase in the level of risk the investor must accept and vice versa.
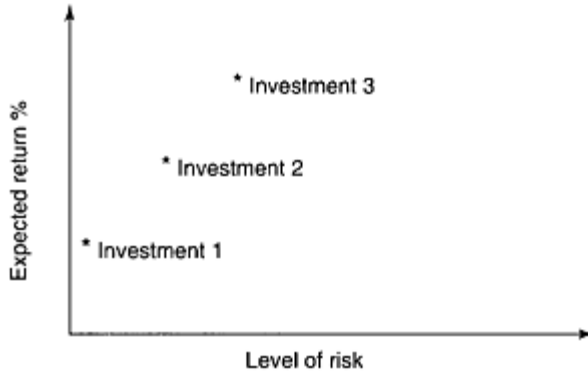
Figure 1.3 The expected risk-return trade-off

The objective of investment decisions is to increase the wealth of the investor and for a firm the wealth of its owners. However, as we shall see when we come to examine investment decision-making more closely, differences in risk can significantly affect the value of investments and thus the value of the firm.

The investor's propensity for risk-taking

Investment decisions will be influenced by the investor's propensity for risk-taking, or the investor's attitude to risk. Investors can be classified according to their propensity for risk-taking. For example, investors who have a low risk propensity, in other words they have a preference for less risk, are regarded as being **risk-averse.**

Investors who have a high risk propensity, or a desire for risk, are referred to as **risk-taking.** It should be noted that risk aversion is a preference for less risk, it does not imply complete risk avoidance; it is simply a preference for less rather than more risk.

Individuals and corporations are generally considered to be risk-averse, in the sense that they are willing to reduce their risk burden by paying others to assume some of their risks. For example, most people will pay premiums to insurance companies for accepting their everyday personal and business risks. This is another way of saying that investors must be paid or compensated for taking on more risk. Shareholders and managers are generally considered to be risk-averse, that is, for an increase in risk they require a commensurate increase in return.

The risk-return concept is immensely important in financial management and we shall meet it frequently.

EXERCISE 5 —THE RISK-RETURN TRADE-OFF
Briefly explain what is meant by the risk-return trade-off.

The time value of money

Not only is the concept of measuring returns in terms of cash flows important in financial management, but it is also the timing of cash flow returns which is vitally important. It is the timing of cash flows, as well as their size, which determines their value.

You may have heard the expression: 'A pound today is worth more than a pound tomorrow'. If offered the choice between receiving £100 today or £100 one year from now, most of us would prefer to receive the cash now. We would then have the option to invest it, say at 10 per cent interest, so that in one year's time it would be worth £110. Most people prefer to receive cash sooner rather than later, and to spend cash later rather than sooner, because most of us realise, at least intuitively, that *money has a time value.*

Cash flows which are to be received at some time in the future, say, one or two years from now, have less value than the equivalent cash flows to be received today. Cash received today can be reinvested in other investments to generate more cash flows. They could at least be placed in a deposit account to earn interest, thereby increasing their future value. This raises the notion that there is an **opportunity cost** (see next section) associated with investment cash flows, because alternative investment opportunities always exist.

In later chapters we will examine the formal appraisal techniques and methods, principally **net present value (NPV)** analysis, which can be used to evaluate the size, timing, and riskiness of an investment's expected future cash flows.

Opportunity cost

The concept of opportunity cost alluded to above is extremely important in financial management; in fact, some commentators would contend that it is the single most important concept. To attract finance for its investment plans, a firm must offer potential investors an attractive rate of return, a rate of return which is competitive with the rate an investor could obtain elsewhere on an alternative investment *of equal risk.*

Remember you cannot compare returns between investments without also comparing their respective risks. You have to evaluate both risk and return to ensure that you are comparing 'like with like'. This was demonstrated in Example 4.

We can explain the concept of opportunity cost with reference to the Coffee Ventures scenario. Most investors will have a number of investment opportunities open to them, and probably limited funds to invest. Rational investors would only invest their available funds in Coffee Ventures, if they perceived the level of return to be at least equal to what they would expect to earn from an alternative investment of equal risk.

When only limited funds are available, investors will have to make choices between competing investment alternatives. From an investor's perspective, the opportunity cost of investing in Coffee Ventures would be the return given up by not investing in another

comparable investment.

When risks are equal, a rational investor is not going to forgo a higher return investment for one with a lower expected return. For example, an investor is unlikely to invest money in Coffee Ventures at an expected return of 12 per cent, if that investor can earn a return of 15 per cent by investing in an alternative, equally risky, business venture.

Thus for Coffee Ventures to be able to attract funds for its investments, the company would have to earn a rate of financial return which at least matches that which is available to investors on competing alternative investments of equal risk. This rate of return which investors require Coffee Ventures to earn to encourage them to invest is the company's *opportunity cost of capital.* If the company's investments earn less than this rate of return, then investors are likely to take their funds elsewhere.

The firm's opportunity cost of capital is the rate of return the firm must pay to investors to induce them to part with their money. Thus **the cost of capital to the firm is the opportunity cost of the next best investment alternative of equal risk available to the investor.**

This opportunity cost of capital is the rate of return which should be used to test the firm's investment decisions. In simple terms, potential investments which are expected to earn less than this rate of return should be rejected. Those which are expected to earn an equal or higher rate of return should be accepted. We will return to these issues again in Part 4.

Value

All of the preceding concepts lead us towards the final core concept of value. It has already been stated that the process of value creation is the driving force behind financial management, and that creating wealth for shareholders by increasing the value of their investment in the business is the central goal of financial management. This goal is the focus of all financial decisions.

It would not be possible for the financial manager to create value for shareholders without a proper understanding of how a potential investment's expected cash flow returns, their timings, and their riskiness contribute to its value. There is an intimate connection between the concepts outlined above and the central concept of value. The concepts of cash flow returns, their time value, and their riskiness are like the strands which weave together the fabric of value.

When making investment and financing decisions the financial manager clearly cannot assess their impact on shareholder value without first analysing their effects on the firm's cash flows, their timings and on its risk.

If value-enhancing investment and financing decisions are made, this will be reflected in an increase in the firm's value. In the case of a public company, shareholders can expect to see their wealth increase through an increase in the market value of the company's shares.

For a public company maximising shareholder value in essence means **maximising the market value of the firm as reflected in its *long-run* share price** and a shareholder's wealth at any point in time is measured by the market value of the shares held. The market value of the firm can be defined in terms of the following equation:

$$MV = MV_D + MV_E$$

MV is the total market value of the firm; MV_E is the market value of its equity (share capital) and MV_D is the market value of its debt (bonds and debentures). This is assuming that all of the relevant debt and equity instruments are regularly traded in the financial markets.

Summary

In financial management theory the key concepts of cash flow, time value of money, risk-return, and opportunity cost all combine to determine the value of the firm, or indeed of any asset or investment. In summary, these concepts affect the firm's value in the following ways:

1 **Cash flows.** The greater the volume of positive cash flows the firm is expected to generate, the greater will be its value—assuming all other factors remain constant.
2 **Time value of money.** The sooner cash flows are expected to be received, the greater will be their value, all other factors remaining constant.
3 **Risk.** The more risky or variable cash flows are expected to be, the lower will be the value of the investment, again assuming all other factors remain constant.
4 **Opportunity cost.** The lower the return an investment offers, compared to similar investments of equal risk, the lower its value, all other factors remaining unchanged.

> **KEY LEARNING POINT**
> The value of the firm (like the value of any asset) is determined by the amount, *timing,* and *riskiness* of its expected future cash flows.

RECAP

Financial management: Financial management is primarily a **decision-making activity** involving **investment and financing decisions,** which are guided by a set of core concepts and the goal **of shareholder wealth maximisation.**

The financial management process: The financial management process is part of an organisation's general management process. It consists of a dynamic and interrelated series of key activities: **(1) financial analysis; (2) financial decision-making; (3) financial planning; and (4) financial control.** The central activity is that of financial decision-making.

The core concepts: The core concepts of financial management are: *cash flow, risk and return, time value of money, opportunity cost* and *value.* It is cash flows, their timings, and their riskiness that determine the value of a firm's investments and thus of the firm. In financial management **the value of the firm (like the value of any**

asset) is determined by the amount, timing, and riskiness of its expected future cash flows.

REVIEW QUESTIONS

Concept review questions

1

  (a) Do you consider shareholder wealth maximisation to be a valid objective for a commercial firm? Give reasons for your answer.
  (b) Is a commercial firm likely to have objectives other than shareholder wealth maximisation?
  (c) Is the objective of shareholder wealth maximisation appropriate for not-for-profit organisations?
  (d) Do you think this objective is relevant to the owner-managers of small business enterprises (SBEs)?

2 Why is profit maximisation not considered a valid goal in financial management?
3 (a) What are the fundamental concepts of financial management? (b) How do they relate to the goal of the firm?
4 (a) How are risk and return related in financial decision-making? (b) When faced with an identical risk-return relationship for an investment, are all managers or investors likely to make the same decision?
5 Explain the difference between strategic and operational financial decisions.
6 What is the financial management process? Outline its various stages.

Test questions

7 **Profitability planning.** WestWood Leisure is a rapidly growing company which owns a number of health clubs and leisure centres. Presented below is summary financial information for the current year for WestWood together with management's financial plan for the next three years. The company has an issued share capital of 1 million ordinary shares and this is not expected to change during the planning period.
  The managing director has declared that two key financial objectives over the period are: (1) to at least maintain current rates of return on investment, and (2) to achieve growth in earnings per share of at least 10 per cent per year.
  As an assistant to the financial manager you are required to carry out whatever financial calculations you consider necessary to determine if management's plans will achieve the managing director's objectives. Comment on your findings.

WestWood Leisure		Forecast		
Year	Current	1	2	3
	£000	£000	£000	£000
Turnover	2,562	3,074	3,689	4,427
Cost of sales	1,409	1,691	2,029	2,435
Gross profit	1,153	1,384	1,660	1,992
Administrative expenses	438	592	798	1,077
Operating profit	715	792	862	915
Interest payable	34	70	109	109
	681	722	753	806
Taxation	211	224	233	250
Profit after tax	470	498	520	556
Investment	3,575	3,933	4,326	4,542

8 **Liquidity planning.** You have now been requested to calculate WestWood's free cash flow (FCF) for the current and future years. The following information is relevant:

- Depreciation is to be calculated at 15 per cent of administrative expenses.
- Dividends are calculated at 20 per cent of after tax profits.
- Capital expenditure (i.e. investment) in the current year is nil. Hint: it is only the annual increase in investment expenditure which is relevant in calculating each year's free cash flow.

Do you think WestWood will have any difficulty in financing its investments and operations over the planning term? Comment on your findings. For convenience and presentation round your calculations to the nearest £000.

> *Practical project*
> Obtain a copy of the most recent annual report and accounts for two companies in a business sector relevant to your studies. Annual reports for many of the leading companies can be obtained from the Financial Times Annual Reports Service, or by contacting the company directly. Most leading companies also have an online service where company information, including annual reports and accounts, is available on the Internet.
> Compare and contrast the two reports with reference to the information they provide about the following:
>
> - Company strategy and goals.
> - Financial highlights (e.g. trends in earnings per share and dividends per share).
> - Environmental and social issues.

- Any other notable features about the two companies in relation to financial management.

In addition, survey the financial media for current information on your companies which relates to any of the above aspects. Keep your reports and analysis for future reference.

NOTES

1 Cadbury Schweppes Annual Report 1997.
2 The terms *shareholders' capital, shareholders' equity,* and *owners' equity* are often used interchangeably. They are all used to describe the owners' financial stake or interest in the business.

FURTHER READING

General

Introductions to financial management are provided in the standard financial management texts. Some helpful starting points are provided in:
- *Principles of Corporate Finance* . Brealey, R.A. and Myers, S.C., 5th edition, McGraw-Hill, 1996.
- *Management of Company Finance* . Samuels, J., Wilkes, F. and Brayshaw, R., 6th edition, Chapman & Hall, 1995.
- *Managerial Finance* . Weston, F.J. and Copeland, T.E., 9th edition, The Dryden Press, 1992.

During 1997 *The Financial Times* published a series of 12 Mastering Finance articles, since published in book form under the title *Mastering Finance* by Financial Times/Pitman publishing. These articles provide valuable insights into, and further information on, many aspects of financial management covered in this text.

Shareholder value

- Shareholder value in practice. Barfield, R., *The Treasurer* , January 1995.

Business strategy and finance

Two excellent texts on general business strategy are:
- *Exploring Corporate Strategy* . Johnson, G. and Scholes, K., 4th edition, Prentice Hall, 1997.
- *Corporate Strategy* . Lynch, R., Pitman Publishing, 1997.

The following books explicitly explore the connection between strategy and finance.

- *Corporate Strategy and Financial Analysis* . Ellis, J. and Williams, D., Pitman Publishing, 1993.
- *Strategic Financial Decisions* . Allen, D., CIMA, 1994.

REFERENCE

Grinyer, J.Alternatives to Maximization of Shareholders' Wealth in Capital Budgeting Decisions. *Accounting and Business Research ,* Autumn 1986.

2
KEY ISSUES IN MODERN FINANCIAL MANAGEMENT

> This chapter continues with our introduction to financial management. It introduces the role of the financial manager and provides an overview of the key issues which impact on the financial management of a modern business enterprise. The following topics are covered:
>
> the role of the financial manager including the treasury function;
> the agency issue and stakeholder theory;
> corporate governance and business ethics.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 define the role of the financial manager including treasury management;
2 explain how issues of agency and stakeholder theory impact on financial decision-making and the goal of the firm;
3 explain the role of corporate governance and ethics in financial decision-making.

OVERVIEW

Chapter 1 introduced the concepts and principles of financial management and stated the primary goal of the firm to be shareholder wealth maximisation. In this chapter we examine the role of the financial manager and treasury management. We then proceed to explore the goal of shareholder wealth maximisation in the context of a range of issues, which have assumed increasing importance in recent years in the field of financial management. These are the issues of **agency, stakeholding, corporate governance, and ethics.**

We shall discover that it is not possible, or indeed desirable, for a firm to pursue shareholder wealth maximisation to the exclusion of all other considerations. In the management of a firm there are a diverse group of interests, often conflicting interests, which need to be recognised and included within the goals and objectives of the firm. There is, for example, the key group of the firm's managers who operate and control the firm on a day-to-day basis on behalf of the shareholders, the owners of the firm.

In large public companies there is a **principal-agent relationship** between shareholders and managers, with managers acting as agents on behalf of shareholders—their principals. As we shall see, this separation of ownership and control, or agency relationship, especially in large companies, can create tensions and problems between the interests of managers and the interests of shareholders. This conflict of interests is known as the **agency issue** or the agency problem.

In addition to the interests of shareholders and managers, there are other **'stakeholders'** whose interests need to be considered. That is, other groups exist who can be considered to have a legitimate interest, or stake (economic or otherwise) in the goals and objectives of the firm.

There are, for example, employees, customers, and community groups, all of whom have differing and perhaps competing interests to be served. **Stakeholder theory** advocates an all-inclusive approach to management by recognising the rights of *all* the diverse interest groups in managing the activities of the firm.

The rash of company financial scandals in the UK, and elsewhere, in the late 1980s and early 1990s, in which shareholders, investors, and employees suffered substantial financial losses, prompted a review of **corporate governance.** Corporate governance refers to the standards of behaviour and codes of conduct which govern the relationships between 'various participants in determining the direction and performance of corporations' (Monks and Minow 1995).

Increasingly in the business and financial world, **ethics** has become a major issue. The prominence of ethics in management is due, not only as a reaction to the numerous and dramatic cases of improper, and even corrupt, behaviour of some company directors, but also to the increasing awareness and proactivity among consumers worldwide about the ethical conduct and values of companies.

All of these issues make financial management and the role of the financial manager in a modern enterprise a clearly challenging prospect. The purpose of this chapter is to explore how each of these factors impact on financial management, on the behaviour of the financial manager, and on the principal financial goal of shareholder wealth maximisation.

THE ROLE OF THE FINANCIAL MANAGER

Having reviewed the key concepts underlying financial management in the previous chapter, it is time to turn our attention to the role of the key player in the financial management of any organisation—the financial manager.

The overriding goal of the financial manager, as for all other managers, in a commercial enterprise should be the maximisation of value for shareholders. In a not-for-profit organisation (NPO) it should be the maximisation of value for an identified client group. In particular the financial manager, in any organisation, will be responsible for **the effective management of the finance function** and for ensuring that the function fully contributes to the successful management of the enterprise.

The financial manager while a financial *specialist,* is also a *team player* as he or she will be a key member of the senior management team. This team role will require

effective interpersonal as well as technical skills in contributing to the overall management of the organisation and its goal of value maximisation.

It should be noted that, in other than small organisations, the various functions and responsibilities of the financial manager are likely to be shared among a number of specialist staff. In small enterprises the financial manager is likely to be a 'jack of all trades', being responsible for the conventional financial and management accounting functions as well as financial management.

Specifically the financial manager will be intimately involved, and bring his/her specialist skills to bear, in all the stages of the **financial management process;** financial analysis, financial decision-making, financial planning and financial control. Some specific responsibilities of the financial manager's function, depending upon organisational structure and size, will include:

1 Funds management. This is perhaps the primary function and includes the effective and efficient **acquisition, allocation** and **utilisation** of funds. *Acquisition* will involve ensuring that adequate funds are available, and acquiring the right amount of funds from the right source at the right cost for the risk involved to meet the organisation's funding needs. *Allocation* entails the effective allocation of the acquired funds to projects and services in accordance with stated plans and agreed priorities. *Utilisation* means ensuring that funds are used efficiently and effectively by the parties to whom they have been allocated in the pursuit of organisational objectives.

2 Risk management. The key task here is to minimise the firm's exposure to risks, for example financial risk and foreign exchange risk.

3 Financial environment. The financial manager will need to interact with *financial markets* and *financial institutions* in performing the investing and financing activities of the firm.

4 Tax management. The financial manager's objective will be to minimise the firm's tax liabilities.

5 Financial public relations. This involves the management of the firm's financial image and its relationships with the financial community. It will mean promoting an appropriate financial image for the firm—e.g. conservative, entrepreneurial or aggressive—and cultivating good relations with investors, existing and potential.

Clearly, in large organisations some of these responsibilities will be delegated to specialist finance departments or sections. Taxation, for instance, may fall within the ambit of a specialist taxation department in a large multinational corporation (MNC), whereas funds and risk management may be the responsibility of a centralised **treasury department.**

Recognising that different organisations will have different structural arrangements in accordance with their needs, Figure 2.1 illustrates the possible structure of the finance function for a large company. It divides the finance role into two separate functions. One is the **control function** which is managed by the chief accountant and provides the traditional financial and management accounting services to the business. The second is the **treasury function** which is normally concerned with *funds acquisition, liquidity management, risk management* and *investor relations.*

Figure 2.1 The structure of the finance function

These two respective functions of control and treasury may or may not be centralised, although in large organisations the treasury function usually is centralised.

While for convenience we tend to describe the role of the financial manager as seemingly that of one individual, it is more likely in practice that the various functions and responsibilities of the financial manager will be split into a range of specialised activities as Figure 2.1 illustrates. In which case specialist staff will be responsible for managing each relevant activity.

By way of contrast, in small firms there may only be one qualified accountant—reporting directly to the firm's owner(s) and managing a small finance staff—who combines the role of financial accountant, management accountant and treasurer.

The financial manager is also responsible for the provision of effective **financial information** and sound **professional advice** to facilitate the decision-making of the management team. The financial manager will be particularly skilled in the understanding and application of the key financial management concepts in creating value for the business. The financial decisions taken by the financial manager and the management team in general will clearly impact on the value of the firm as Figure 2.2 illustrates.
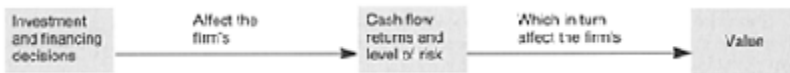
Figure 2.2 Financial decisions and the value of the firm

The international dimension

Financial management today is an increasingly international affair. The internationalisation, integration and deregulation of **financial markets** (e.g. capital and money markets), **financial institutions** (e.g. banks and insurance companies) and **financial instruments** (e.g. shares and bonds), and the extensive range of options which they now offer for investing and financing arrangements, make it essential for the financial manager to understand, appreciate and operate in the wider international

financial environment.

For example, in relation to funds acquisition, the financial manager today will no doubt scan the international marketplace in search of the cheapest source of financing for the business. Similarly, when funds have to be allocated across national borders to subsidiaries, the financial manager will need to be aware of the respective risks (e.g. currency exposure), costs and tax implications of trading in the relevant countries.

In Europe the financial manager has to recognise the expanding role and influence of the **European Union (EU)** in regulating the business and economic climate within member states. The EU has been attempting to produce a 'fair trading' environment within the Community and to eliminate restrictive trade practices and agreements. EU law, for example, prohibits firms from operating anti-competitive agreements and abusing dominant market positions.

The overall goal of the EU is harmonisation and integration, political and economic. A key element of integration is to have a single currency (the 'Euro') and a European central bank within the Community. To this end the European Monetary System (EMS) was introduced in March 1979. The EMS includes the Exchange Rate Mechanism (ERM), which is the system by which participating European currencies are linked to the European Currency Unit (ECU).

From the financial manager's point of view, monetary union and a single European currency would reduce the costs of foreign trading and financing, and greatly simplify the financial environment within which the business firm has to operate.

Treasury management

The finance structure outlined in Figure 2.1 presents a separate treasury function. It is common financial management practice for large multinational corporations (MNCs) to have a separate treasury function—which may be centralised at corporate headquarters—staffed by people with specialised treasury management skills and knowledge.

The Chartered Institute of Management Accountants (CIMA) in its *Official Terminology* (1996) defines treasury management as: 'The corporate handling of all financial matters, the generation of external and internal funds for business, the management of currencies and cash flows, and the complex strategies, policies and procedures of corporate finance.'

Where a separate treasury function exists, its key responsibilities will include:

Funds management

This will involve the formulation of *funding policies* and priorities, and the cost-effective acquisition and allocation of funds. It will also include the vital area of the firm or group's *liquidity* management, for example, cash forecasting and the borrowing or investing of short-term funds. The treasurer will have to deal with financial markets and institutions when borrowing or investing funds.

Risk management

This will include the identification of risks and the formulation of policies and procedures for hedging (which means reducing or minimising) the different types of risk to which the firm is likely to be exposed. In the language of risk management the term exposure means being unprotected or vulnerable with regard to risk.

The various risks will typically include: *business risk* (which is related to the operating characteristics of an individual firm); *financial risk* (which refers to the level of debt in relation to equity finance in a firm's capital structure); *credit risk* (the risk that a debtor or borrower may not pay what they owe); and *currency risk* (which refers to the risk of loss or gain from exchange rate movements when trading in foreign currencies). Risk management is also likely to include the management of the firm's *insurance arrangements.*

Business risk is a type of risk which is largely outside the control of the company's managers. It is the risk which is inherent in the operations of an individual company. For example, the business risk characteristics of a bank are different from those of a catering services company, which in turn are different from those of a heavy engineering or a food manufacturing company.

Financial risk, in contrast, is a type of risk which is largely within the control of the company's managers. Financial risk is the risk that a company incurs when it uses borrowed funds. The greater a company's reliance on borrowed money, that is, on debt financing, the greater the risk that it will be unable to meet its financial commitments (e.g. loan interest and principal payments, and leasing payments).

A common measure of financial risk is to calculate a ***financial gearing or leverage ratio.*** The financial gearing ratio measures the proportion of debt in relation to equity finance in a firm's capital structure—for this reason the ratio is also frequently called the *debt-equity ratio.* Like the ROI ratio which we examined earlier, there are a variety of methods of calculating a gearing ratio, a common method is:

$$\frac{\text{Total debt capital}}{\text{Total debt capital} + \text{equity shareholders' funds}} \times 100 = \%$$

Total debt capital includes all long-, medium- and short-term loans. Many analysts would also include any long-term lease commitments with debt capital. Essentially debt will be taken to include all capital on which the company is committed to paying a fixed, or contractually binding, rate of return.

Generally speaking, the higher the gearing ratio, the higher a firm's financial risk. Unfortunately no hard and fast rules exist for determining what is a 'good' or 'bad' level of gearing. There are many variables which come into play, and what might be considered a high gearing ratio for one firm may not necessarily be high for another. We will examine financial gearing in more depth in Chapters 9 and 13.

Example 1 *—**Measuring financial risk***

A summarised balance sheet for Davies Enterprises is as follows:

	£m
Fixed assets	4.22
Net current assets	1.23
Total assets less current liabilities	5.45
Long-term loan	1.50
Net assets	*3.95*
Capital and reserves	
Called up share capital	2.50
Profit and loss account	1.45
Equity shareholders' funds	*3.95*

The company's gearing ratio is calculated as:

$$\frac{£1.50m}{£1.50m + £3.95m} \times 100 = 27.5\%$$

EXERCISE 1 —FINANCIAL GEARING

Recalculate Davies gearing ratio, assuming the company raised an additional £1 million long-term loan to finance the acquisition of new fixed assets.

The following illustrates one company's, namely Cadbury Schweppes', approach to risk management:

Management of the financial risks of the Group is an important aspect of ensuring that the businesses continue to create value for shareholders. Risk management is carried out through wide-ranging risk reviews, a comprehensive system of internal controls, a global insurance programme and the active review by an internal audit department of financial and operational exposures of the business. [1]

Foreign exchange (FOREX) and interest rate risk management

International financing and trade will not only involve dealing in risky foreign currency markets, but will also involve borrowing or lending transactions in international financial markets. This will expose the firm to the risk of adverse or favourable movements in international interest rates, in addition to the risk of adverse movements in domestic

interest rates. This type of risk is referred to as ***interest rate risk.***

In an international firm, an important role of the treasury function will be hedging currency and interest rate risks. This means employing techniques and strategies which will reduce or minimise the firm's exposure to these types of risk. Again, to illustrate, we can refer to the procedures and policies operated by Cadbury Schweppes: 'the Group's treasury department takes steps to mitigate exposure to changes in interest rates and foreign exchange'. [2]

The report proceeds to outline the steps the company takes, but these are technical and are presently beyond our scope.

EXERCISE 2 —RISK IDENTIFICATION

Identify which aspect of a company's risk is likely to be affected by the following:

1. Raising an additional, variable interest rate, loan from a financial institution.
2. goods on credit to a domestic customer.
3. Entering into a new leasing agreement.
4. Selling goods on credit to a foreign customer.

Pension fund management

The treasury function may also be responsible for the efficient investment and portfolio management of employee pension schemes. Alternatively this task may be contracted out to a specialist asset or fund management organisation, such as the asset management arm of a leading investment bank.

Tax management

The aim will be to minimise the firm's overall tax liabilities and this will require specialist knowledge not only of domestic tax regimes but also those of other countries in which the firm operates.

Relationships with financial stakeholders

The treasury function will be concerned with maintaining and developing good relationships with the firm's financial stakeholders, such as shareholders, lenders and tax authorities.

In very large companies there may be a specialist **investor relations** department which is responsible for dealing with shareholders, institutional investors, credit rating agencies, investment bankers, stockbrokers and so forth.

A centralised treasury function?

In a large complex multinational corporation, a centralised treasury function will essentially fulfil the role of the corporation's central bank and provide the benefits of more efficient and effective cash management.

Advantages of centralisation

Centralising the treasury function offers the specific advantages of:

Strategic benefits

A centralised treasury function will take decisions and implement investing and financing policies and procedures which are consistent with the overall strategy and objectives of the group. This will avoid the sub-optimal performance that can sometimes occur when individual subsidiaries pursue their own objectives and policies.

Economies of scale

By pooling funds into a central treasury section larger volumes of cash can be managed. Bulk cash management provides better opportunities for negotiating lower bank charges and lower interest rates on borrowing, or conversely higher interest rates for larger deposits. Cost and efficiency savings should also result from avoiding the duplication of tasks and activities at subsidiary level. For example, it should be possible to achieve savings in administrative staffing and overheads.

Modern technology makes it possible to transfer securely, and virtually instantaneously, through the banking system, large sums of money electronically between countries. This makes it easier to manage cash flows centrally.

Concentration of specialised knowledge and skills

For a multinational company, expert knowledge and skills are essential in managing the vast and complex global array of financial markets, financial institutions and financial instruments (e.g. futures, options, swaps and the host of other financial 'derivatives' available today). Treasury management skills and expertise are expensive to acquire and maintain. It may not therefore make economic sense to replicate expensive treasury management functions at individual subsidiary level.

Foreign exchange (FOREX) management

This is likely to be more efficient if carried out by a central treasury department as the varying foreign currency incomes and expenditures from disparate subsidiaries can be matched. For example, it is possible for a multinational firm to reduce currency risk, and thus the need for expensive hedging techniques, by matching centrally all its foreign currency receipts and payments.

For instance a UK company could use US dollar receipts from US customers to make US dollar payments to US suppliers. This process of *currency matching* can be facilitated by operating foreign currency bank accounts. For a UK company, foreign currency accounts of virtually any denomination may be held with a domestic bank, or

alternatively a UK firm may choose to deal with a bank in the currency's country of origin.

In addition, a centralised treasury function will be better placed to form a global or strategic view of the firm's currency and interest rate risk exposures. Thus it will be in a better position to assess the overall hedging requirements of the group.

Financial control

Centralising treasury operations will allow group management greater control over funds and risk management. Providing effective internal controls and systems are in place, centralisation will reduce the risk of incurring substantial financial losses or financial catastrophes, for example as in the collapse of Barings Bank.

Smaller 'idle' cash balances

The cash balances required for precautionary or safety motives (for example, to avoid cash shortages) are likely to be less if cash balances are held centrally than if held by individual subsidiaries.

Disadvantages of centralisation

In contrast, centralisation of the treasury function has the disadvantages of of the following.

Less flexibility and responsiveness to local needs

Centralisation is likely to inhibit the ability of subsidiary financial managers to respond quickly to local investment and borrowing opportunities. Moreover, local managers may be less motivated if cash management is not directly under their control.

Increased bureaucracy

Centralisation is likely to increase bureaucracy through more cumbersome internal rules, regulations, procedures and detailed central reporting requirements. This may also be a demotivating influence on local managers.

Performance evaluation

Centralisation has important implications for the performance evaluation of individual subsidiary managers. Local managers should only be held accountable for the decisions and actions over which they have direct control and for events for which they are directly responsible. The effects of central treasury or head office decisions and directions should be removed.

For example, it is unrealistic to expect subsidiary financial managers to be accountable for central treasury overheads. This is a service for which they may be charged on their budget statements, but in reality it is a cost over which they have very little if any direct control. The same principle applies to the charging out to subsidiaries of other corporate overheads or central services.

TREASURY POLICIES AT UNILEVER

The group treasury function operates as a cost centre, governed by financial policies and plans agreed by the directors. Its purpose *is* to serve the needs of the business through effective management of financial risk, to secure finance at minimum cost and invest liquid funds securely. All major areas of activity are covered by policies, guidelines, exposure limits, a system of authorities and independent reporting. Performance is closely monitored, with independent reviews undertaken by the corporate internal audit function.

To ensure maximum flexibility in meeting changing business needs, investment management policy is to concentrate Unilever's substantial liquid funds centrally in the parent and finance companies. These funds, mainly in guilders and sterling, are invested in short-term bank deposits and marketable securities, or on-lent to subsidiaries. [3]

EXERCISE 3 —THE ROLE OF THE FINANCIAL MANAGER

Identify which of the following activities are not the responsibility of the financial manager or treasurer.

1) Securing adequate funding for the organisation.
2) Preparing the annual report and accounts.
3) Making presentations to potential investors.
4) Preparing cash flow and profit forecasts.
5) Auditing the accounts.
6) Preparing product costings.
7) Hedging foreign currency exposure.
8) Advising management on the value of proposed investments.

THE AGENCY ISSUE

Earlier it was stated that the decisions and actions of all managers, including the financial manager, should be directed towards the goal of shareholder wealth maximisation. Is this the case in practice? Do company directors and managers, [4] who are in effect agents of the owners, consistently act in the best interests of the owners (the shareholders), or do they tend to act in their own best interests?

The shareholder-manager relationship, or the separation of *ownership* and *control,* gives rise to a potential conflict between the objectives of the individual managers and the objectives of the shareholders on whose behalf the managers operate the firm. This is

known as **the agency problem**—that the managers may place their personal goals and objectives above those of the firm's owners and act accordingly.

The agency problem is the potential for conflict in objectives which exists in any principal-agent relationship. In the corporate finance world, the principals are the shareholders who own the firm and managers act as their agents.

For the shareholders of a firm where ownership is separate from managerial control, the agency problem is that managers, who are in day-to-day control of the firm, may tend to act in their own personal best interests, rather than those of the shareholders, the firm's owners.

It should be mentioned at this stage that the agency problem only really arises in the context of large enterprises, small and medium-sized enterprises (SMEs) tend to be managed and controlled by the owners, who are frequently the founding members.

In the case of larger companies while it is common practice for directors to own shares in their companies, their holdings normally—certainly in the case of companies listed on the stock market—are relatively small.

Managers may be more concerned with maximising their personal wealth through generous salaries, pension and remuneration packages, their status, job security and perquisites (executive cars, luxurious offices and exclusive golf club memberships) than they are with the interests of non-director shareholders.

As a result of pursuing such personal goals, the decisions and actions of managers will be *'satisficing'* , (a compromise between satisfying and maximising behaviour), rather than maximising. This will lead to a less than a maximum return for the firm and thus less wealth for its shareholders.

For a fuller discussion of the agency relationship see Jensen and Meckling (1976). They assert, for example, that a manager as agent and not owning 100 per cent of the share capital is likely to maximise his/her own welfare at the expense of the owners' welfare.

Each time managers, as agents, give precedence to their own personal best interests over those of their principals, the shareholders, this results in **agency costs** which have the effect of reducing owners' wealth. Agency costs are the additional costs incurred by a principal when acting through an agent rather than dealing directly with another party. Specifically, for a firm's owners, the shareholders, agency costs arise as a consequence of:

Managerial rewards

Managers, despite the Cadbury, Greenbury and other reports, still have a considerable degree of discretion and freedom when it comes to determining their own rewards, financial and non-financial. They can typically vote themselves huge pay increases, bonuses, pension and other benefits and often these are not even related to the firm's actual performance. The costs of excessive and unjustified managerial rewards are clearly borne by the shareholders.

Information asymmetry

Managers will possess intimate inside knowledge of the firm's operations. As insiders they will have access to more information about the firm than the shareholders. They can share this information with shareholders and other stakeholders, for example lenders, or withhold it if they believe that it is in their best interests to do so. This unequal access to, and distribution of, information between managers and owners is known as information asymmetry, and it is a cost borne by the shareholders.

Managers' risk preferences

The risk preferences of managers may be in contrast to those of their principals, the shareholders. Managers may maintain a very low risk preference and only invest the firm's funds in low-risk, low-return projects in case the venture fails and they lose their jobs.

Alternatively, managers may have a high-risk preference and expose the firm to inordinately high levels of risk, which are not in the owners' best interests, in order, for example, to be rewarded with high bonuses.

Managers' short-termism

Managers may make decisions which maximise returns in the short term at the expense of the firm's longer-term wealth, particularly if their rewards are related to short-term performance. For example, important expenditures on repairs and maintenance, and investments in new fixed assets, may be deferred so as not to depress short-term performance measures such as return on investment (ROI). These decisions and actions would not be in the best interests of shareholders' who are seeking to improve the firm's longer-term value.

How can shareholders deal with the agency problem?

There are a number of strategies which shareholders can adopt to deal with the agency problem, all of which increase the firm's operating costs but should reduce agency costs.

1 Monitoring and control arrangements. Shareholders can introduce systems and procedures (e.g. management audit and internal control systems) to limit the satisficing and minimal risk behaviour of managers.

2 Bonding arrangements. This is similar to insurance contracts in which a third party (e.g. a bonding or insurance company) will, in return for a premium, underwrite the risk of loss to the firm of, for example, defalcation or dishonesty by managers.

3 Incentive arrangements for managers. The objective here is to secure better goal harmony between owners and managers, through directly linking the rewards of managers to their performance; which is usually measured by the achievement of specific objectives and targets as set by the owners.

E*xecutive share option schemes (ESOPS)* and ***performance incentive plans (PIPs)***

are two of the more common and popular examples of incentive arrangements. Executive share option schemes allow managers the option to purchase the company's shares at an agreed price and if the share price rises managers can realise very substantial capital gains by exercising their options.

Share option schemes introduce better **goal congruence** (i.e. harmony) between managers and non-executive shareholders. Managerial performance measures linked to long-term improvements in share price are more consistent with shareholder wealth maximisation.

In recent years the considerable gains made by senior executives—the so called 'fat cats' of the privatised utilities (e.g. British Gas and the privatised water and electricity companies)—through share option schemes has aroused much controversy, debate and public disquiet about the nature of such schemes and the pay practices of top managers in general.

Such was the furore over the excessive amounts that some executives apparently gained under some share option schemes, that the Chancellor of the Exchequer at the time, Kenneth Clarke, was prompted to act by changing the tax treatment of share options in the 1995 Budget. Measures were introduced to tax executive share option gains under income tax rules rather than the previously more favourable capital gains rules, without disadvantaging *employee share ownership schemes.*

Performance incentive plans may include **performance shares**—equity shares granted to managers as a result of their performance—and/or cash bonuses related to the realisation of specific targets. These targets are likely to include measures of financial performance such as earnings per share (EPS), return on investment (ROI) and other key financial ratios.

None of these arrangements provide prefect solutions to the agency problem, the temptation always exists for managers to act in their own best interests rather than those of shareholders.

External influences and constraints on management behaviour

In addition to the internal measures which the shareholders of an individual firm can take to alleviate the agency problem, there are also certain external influences and constraints on managerial behaviour. These mainly take the form of **market constraints** and **legal constraints.**

Market constraints

The external threat of a hostile takeover (that is one which is not welcomed or supported by the management of the takeover target company) is always present, particularly where the predator (the acquiring company) considers the target company to be badly managed and undervalued. If a hostile takeover is successful the existing management of the newly acquired company, which was seen as inefficient, will be replaced.

This threat of job-loss should influence managers to be more attentive and alert to their shareholder and market expectations concerning value creation. This threat is frequently referred to as **the market for corporate control.**

Legal constraints

Shareholders elect the board of directors of a company in a general meeting. A private company must have at least one director while a public company must have at least two. Under UK company law directors must: act bona fide in the best interests of the company as a whole; exercise reasonable care and skill in the management of the company; and not allow their personal interests to conflict with their duties to the company (Thomas 1992).

Directors' and managers' actions may also be constrained by the company's *articles of association.*

Legal agreements between the company and providers of debt finance (i.e. lenders) may contain restrictive covenants, such as limits on dividend payments and other borrowing restrictions.

While strictly speaking not a legal requirement, listed companies must nonetheless comply with the *Stock Exchange rules and regulations* if they wish to remain listed on the Exchange.

Despite the availability of these internal and external controls, certain cases arose in the UK the late 1980s and early 1990s in which the existing controls were seen to be plainly inadequate and were often ignored or circumvented by the management of some companies. This, as we shall see shortly, led to a complete review of the standards, practices and methods by which UK companies should be governed.

Who are the shareholders?

At this point you may well be asking, who are the shareholders in companies? And do they really care about the behaviour of managers?

It is the **financial institutions** (mainly the pension funds, insurance companies and unit trusts) which between them own most of the shares in UK companies, as is the case elsewhere in the main capital markets of the world. For example, in 1994 (the latest CSO figures available at the time of writing) the structure of ownership in the equities of UK companies was as shown in Table 2.1. At the end of 1994 just over 60 per cent of UK equities were owned by UK financial institutions. The proportion owned by pension funds has steadily increased over the past 20 years, from just under 17 per cent in 1975. Similarly with overseas investors, (mainly US institutional investors) their ownership has increased dramatically, particularly in recent years: it was less than 4 per cent in 1981.

This is a reflection of the trend towards greater *globalisation of financial markets*—a point we shall return to when we examine the changes in financial markets in subsequent chapters. Thus, taken together, UK and overseas financial institutions now account for over 70 per cent of the ownership of UK equities.

As the concentration of ownership by institutions has progressively increased there has been a corresponding sharp decline in the proportion owned by individual shareholders, despite government efforts to widen share ownership in the UK (e.g. privatisation issues). In 1963 individuals accounted for 54 per cent of ownership, by 1975 this had dropped to 37.5 per cent and has tended to remain at around 20 per cent in recent years.

Table 2.1 Ownership of UK equities, 1994 (%)

Pension funds	27.8
Insurance companies	21.9
Unit trusts	6.8
Banks	0.4
Investment trusts and other financial institutions	3.3
Sub total	60.2
Individuals	20.3
Overseas	16.3
Companies and others	3.2
Total	100.0

Source: Central Statistical Office (CSO).

More recent estimates of UK share ownership suggest that the five leading investment fund management companies (e.g. Mercury Asset Management, Prudential, and Schroders) own 26 per cent of the FTSE 100 companies and the top ten investment fund institutions own 36 per cent (Martinson 1998).

As to whether shareholders really care about the actions of managers, by and large **shareholder apathy** does exist (for example, see Martinson 1998), but on occasions protests by shareholders at what are perceived to be some of the more controversial actions and decisions of managers can be very damaging to the company's image and public reputation.

There was for example, the very public demonstrations and protests by angry British Gas shareholders at the company's annual general meeting in 1995 over the decision to award the then chief executive, Cedric Brown, a seemingly excessive pay increase. The protests, mainly by private individuals with relatively small shareholdings, however, did not reverse the company's decision as it was the institutional investors who held most of the voting power.

Individuals with relatively small shareholdings in a company can simply sell their shares if they are not happy with the way in which the company is run. Institutional investors, with usually very significant shareholdings, are better placed to influence management and board policies and decisions—usually behind closed doors.

The funds which financial institutions have available for investment in the corporate sector come from the pension scheme contributions, insurance policy premiums, and personal savings accounts of many thousands of individuals. The institutions are responsible for investing this money wisely and the success or otherwise of their investment strategies—and thus the personal wealth of their contributors and policy holders—is inevitably linked to the performance of the companies in which they invest.

So, at least indirectly, many thousands of private individuals do share, or have a 'stake', in the fortunes of the companies in which the institutions invest. This leads us nicely into our next topic of stakeholder theory.

> **EXERCISE 4 —SHARE OWNERSHIP**
>   Why would a company's managers be interested in knowing who the company's shareholders are?

STAKEHOLDER THEORY

What is needed is for the concept of shareholder to be broadened to that of 'stakeholder'. All those affected by corporate behaviour—the general public, workers, consumers, and the surrounding community—ought to have some representation on corporate boards.

<div align="right">(Tom Hayden, The American Future, 1980)</div>

Our previous discussion of agency theory concentrated on the two-dimensional owner-manager relationship in a commercial company and the tensions between the respective goals of each party. Stakeholder theory takes a much broader perspective than this and looks beyond these two central stakeholder groups to include other groups. These would include groups such as employees and the local community, who are considered to have *a legitimate interest, or even a direct share, in the goals of the firm* and who will benefit or suffer according to the fate of the firm. Stakeholder theory applies equally well to public sector and not-for-profit organisations.

In the private sector the owners are the **primary stakeholders.** Citizens are the primary stakeholders in the public sector as exemplified in the citizens charter, patients charter, and so forth. Employees, lenders (other than creditors) and any others with a *direct economic interest* in the entity are **secondary stakeholders;** while potential investors and their advisers, stockbrokers, tax authorities, members of the public and other users of published accounts are classified as **tertiary stakeholders.**

Organisations which follow stakeholder theory consider it to be part of their 'social responsibility' and they prefer to believe that encouraging and actively promoting good stakeholder relationships is vital for the long-term benefit of the firm.

For example, providing good value for customers enhances customer loyalty and improves competitiveness, which in turn creates value for the firm, allowing it to create even greater value (wealth) for its other stakeholders such as its employees. Stakeholder theory is reflected in the 'partnership' approach taken by many organisations in their relationships with suppliers, customers and community groups.

The stakeholder approach to management is an all-inclusive or 'holistic' one as it recognises the rights of all the diverse interest groups rather than just the rights of the shareholders. Consequently, multiple organisational goals are likely to emerge, of which the maximisation of shareholder value becomes just one, and maybe not even the dominant one!

Stakeholder theory 'in practice'

Cadbury Schweppes plc, (voted Britain's most admired company in 1995) a major global company trading in beverages and confectionery is just one example of a leading company which believes in adopting a stakeholder approach to its business. This was made explicit in the company's annual report for 1996, which stated:

> Our task is to build on our traditions of quality and value to provide brands, products, financial results and management performance that meet the interests of our shareholders, consumers, employees, customers, suppliers and the communities in which we operate.

The company's annual report for 1996 also included separate sections dealing with the company's attitudes and policies on Corporate Governance, Education and Training, and Environmental and Social issues.

The 1995 annual report (a shareholder analysis was not provided in the 1996 annual report) disclosed that institutional investors, by actual number, accounted for just over 1 per cent of the total number of shareholders but owned approximately 84 per cent of the company's ordinary share capital.

Another example is the Co-operative Bank, which has social responsibility and ecological sustainability as an integral part of its mission. The bank believes that a partnership approach between organisations, their customers, staff, suppliers, society and others is essential in delivering value.

Can a company really serve so many masters?

Is the key to a company's success the ability of its managers to equitably satisfy such a diverse range of, often competing and conflicting, interests? Advocates and practitioners of stakeholder theory, such as Cadbury's and the Co-operative Bank, clearly believe so, but other commentators believe not.

An alternative perspective on stakeholder theory was exemplified in a *Financial Times* article entitled 'The Snares of Stakeholding' by Samuel Brittan (1996) in which he argued that:

> The core argument against stakeholding is not one of economics but of psychology and motivation. Someone who is theoretically responsible to everyone for everything is in practice not responsible to anyone for anything. People function best if they have specific responsibilities for which they are held accountable by means which are transparent, verifiable and respect the realities of human nature.

Managing a modern business enterprise is a complex affair, and, as is the case for so many other issues, there is no definitive answer as to whether stakeholder theory is right or wrong. The approach taken will be intimately bound up with the culture and value

systems of the individual organisation, and the contemporary financial manager must be aware of the issues involved.

In conclusion, stakeholder theory requires the interests and objectives of a wide diversity of groups or constituencies to be reflected in the activities and goals of the entity. The interests of these various stakeholders will frequently compete and conflict. The task of trying to reconcile the respective interests of such divergent groups is clearly a complex management issue for any organisation, yet it is one which is vital to future success.

This all-inclusive approach to management is, according to the RSA's Inquiry *Tomorrow's Company,* the key to future sustainable success and what differentiates tomorrow's companies from yesterday's companies (RSA 1995).

CORPORATE GOVERNANCE

CONDUCT UNBECOMING?

> I regard this as a quite exceptional case [and a] gross, wilful and disgraceful breach of confidence… It was inevitable that this bid would be stopped as soon as it was apparent that it was based on iniquitous conduct on the part of those making it.

These were the comments of Mr Justice Lightman, the High Court judge who in April 1997 granted a High Court injunction to the Co-operative Wholesale Society (CWS). The injunction banned the use of illicitly obtained confidential information about the CWS's business by leading City of London financial institutions and blue chip companies. The CWS was also awarded costs and damages estimated in millions of pounds.

The confidential information had been obtained by Mr Andrew Regan, an entrepreneur mounting a £1.2bn takeover bid for the CWS, from Mr Allan Green, at the time the CWS's controller of retailing. The information was extremely detailed and included trading forecasts, budgets and membership details. Having obtained the information illegally, Regan passed it to Hambros Bank, his financial adviser in the takeover bid. The bank in turn circulated it to other major financial institutions, accountancy firms and blue chip companies such as Sainsbury's.

It should be said that, on learning how the information was obtained, some of these companies immediately returned it.

The agency relationship is only one aspect of the much broader, and in recent years the

very controversial issue of corporate governance. Corporate governance is to do with the standards of behaviour and conduct expected from directors and other senior executives (including the financial manager) in directing and controlling the affairs of a company. Monks and Minow (1995) define corporate governance as: 'the relationship among various participants in determining the direction and performance of corporations'. Thus

Figure 2.3 The scope of corporate governance

corporate governance not only concerns the relationships between managers and shareholders but is expanded to include the relationships between the board, senior executives, shareholders, other stakeholders (such as customers, suppliers and employees), regulators (e.g. the Stock Exchange) and the firm's auditors.

According to Bain and Band (1996) 'the central concern of governance is to add value to as many organisational stakeholders as is practicable…that by having appropriate standards of governance the long-term performance is raised and total shareholder return is enhanced'.

The scope of governance is shown in Figure 2.3. Although our primary concern is with commercial companies, the principles and practices of corporate governance apply equally well to other, not-for-profit organisations.

A historical perspective

As discussed previously in relation to agency theory, directors have a legal duty to exercise reasonable care and skill in the management of the company and to act in the best interests of the company. Despite the legal framework a number of major financial scandals and company failures occurred during the 1980s and early 1990s as a result of the actions of directors and other managers.

Some of the more notorious and spectacular examples of defective and damaging corporate governance in recent years in the UK include: the attempted takeover of the CWS (referred to in the 'Conduct Unbecoming?' vignette); the crash of Barings Bank in 1995; the so-called 'dirty tricks' campaign waged by British Airways against Virgin Airlines during 1993; the failure of the Bank of Credit and Commerce International (BCCI) in 1991; the underwriting irregularities at Lloyds of London; the collapse of Polly Peck in 1991 involving financial irregularities that were not revealed in the company's accounts; and the loss of employee pension funds at Maxwell Communications Corporation which were only revealed when the company collapsed in 1991.

Such scandals have not been confined to the UK, there have been many similar (and even more excessive) cases in the USA and Japan such as the Sumitomo copper trading scandal. In the US there has been the collapse of Drexel, Burnham, Lambert as a result of insider trading and fraud, the collapse of the savings and loan (S&L) industry and the attempts by Salomon Brothers' (an investment banking firm) to rig the US Treasury bill market are just a few examples.

The Cadbury report on corporate governance

Such scandals created widespread concern (not only in the business community, but in governments and the public at large) about the apparently degenerating standards in the behaviour of the top management of leading companies. Many people had lost considerable amounts of money as a result of director misconduct.

One response in the UK was the establishment by the Financial Reporting Council (FRC), the London Stock Exchange and the accountancy profession, in May 1991, of the Committee on The Financial Aspects of Corporate Governance. The committee is commonly known as the 'Cadbury Committee' after its Chairman Sir Adrian Cadbury, a leading international authority on corporate governance. Sir Adrian Cadbury's credentials in relation to corporate governance extend back in history, his grandfather refused to supply Cadbury's chocolate to the British army in South Africa in protest at the Boer War at the start of the twentieth century.

Sir Adrian stated the aim of the 'Cadbury Committee' was: 'to bring forward proposals to promote good financial corporate governance, without stifling entrepreneurial drive or impairing companies' competitiveness'.

The Committee's sponsors were concerned at: 'the perceived low level of confidence both in financial reporting and in the ability of auditors to provide safeguards which the users of company reports sought and expected'. It should be noted that the Committee's brief was limited to dealing with only the 'financial aspects' of corporate governance.

The committee produced its *final* report in December 1993, which is sometimes referred to as 'Cadbury Two'. The first report by the committee in December 1992 was considered by many to be 'irrelevant and ineffective' and was criticised for its lack of 'prescription for carrying it forward' (Morris 1995).

Central to the final report's recommendations was that boards of all listed companies registered in the UK should comply with the *Code of Best Practice* as set out in the report. The code is given added weight by the **disclosure requirement of the London Stock Exchange** that companies must state in their annual report whether they are complying with the code and to give reasons for any aspects on non-compliance.

Code of best practice

At the time of publication of the Committee's final report Sir Adrian Cadbury said:

> The planks on which the code is based are the need for disclosure and for checks and balances. Disclosure ensures that all those with a legitimate interest in a company have the information they need in order to exercise their rights

and responsibilities towards it. In addition, openness by companies is the basis of public confidence in the corporate system. Checks and balances guard against undue concentrations of power and make certain that all the interests which boards have a duty to consider are properly taken into account.

The code recommendations consist of 19 points set out under the headings of: **(1) The Board of Directors; (2) Non-Executive Directors; (3) Executive Directors;** and **(4) Reporting and Controls.** The main points are summarised as follows:

The board of directors

1 'The board should meet regularly, retain full and effective control over the company and monitor the executive management.'
2 'There should be a clearly accepted division of responsibilities at the head of the company, which will ensure a balance of power and authority, such that no one individual has unfettered powers of decision.' Ideally the roles of Chairman and Chief Executive should be separated, although this may not always be practical, in which case there 'should be a strong and independent element on the board'.
3 The board should include non-executive directors 'of sufficient calibre and number for their views to carry significant weight in the board's decisions'.

Non-executive directors (NXDs)

1 Non-executive, or 'outside' directors as the committee's chairman preferred to call them, should 'bring an independent judgment to bear on issues of strategy, performance, resources, including key appointments and standards of conduct'.
2 The majority of non-executive directors (NXDs) should be 'independent of management and free from any business or other relationship which could materially interfere with the exercise of their independent judgment, apart from their fees and shareholding'.
3 Non-executive directors (NXDs) should be appointed by a formal process and their appointment should be a matter for the board as a whole. Appointments should be for specified terms and reappointment should not be automatic.

Executive directors

1 Directors' service contracts should not exceed three years without shareholders' approval.
2 Directors' pay and emoluments, including pension contributions and stock options and the amount and the basis for any performance-related element, should be fully disclosed and subject to the recommendations of a *remuneration committee* consisting mainly or wholly of non-executive directors and preferably chaired by a non-executive director.

Reporting and controls

1 'It is the board's duty to present a balanced and understandable assessment of the company's position.'
2 'The board should ensure that an objective and professional relationship is maintained with the auditors.'
3 The board should establish an *audit committee* which should consist of at least three non-executive directors. Originally the committee referred to the annual audit as 'one of the cornerstones of corporate governance'.
4 'The directors should report on the effectiveness of the company's system of internal control.'
5 'The directors should report that the business is a going concern, with supporting assumptions or qualifications as necessary.'

You will note that the Cadbury Code highlights *the key role of the non-executive director (NXD)* in ensuring that high standards of financial reporting, practices and conduct are maintained.

As mentioned above, UK registered listed companies should include in their annual reports **a statement of compliance** with the Code of Best Practice and a review by the external auditors of corporate governance disclosures.

The Greenbury report

A particularly contentious aspect of corporate governance in recent years has been that of **executive pay.** In 1994/95 the seemingly endless escalation in executive pay, particularly in the newly privatised public utilities such as British Gas, caused a public outcry in the UK. It forced the British Prime Minister at the time, John Major, to denounce 'unjustifiable' increases in company executive pay in the House of Commons in November 1994.

In response to such public concern, the Confederation of British Industry (CBI) recruited a committee of 11 top managers (mainly chairmen) from UK leading companies such as BP, BT, GKN, Boots and Marks & Spencer plc to conduct an inquiry into directors' remuneration. The committee was chaired by Sir Richard Greenbury executive chairman of Marks & Spencer and became known as the Greenbury Committee. Its brief was: 'To identify good practice in determining Directors' remuneration and prepare a Code of such practice for use by UK PLCs.'

The committee published its report on 17 July 1995 and its key themes were: 'accountability, responsibility, full disclosure, alignment of Director and shareholder interests, and improved company performance' (*Directors' Remuneration:* Greenbury 1995).

The central aim of the Greenbury report was to secure ***greater disclosure and transparency*** in the determination of directors' remuneration and thus seek to restore public and investor confidence in the process. It aimed to achieve this by introducing greater independence into the pay determination process, through making it the responsibility of a remuneration committee composed of non-executive directors. The

remuneration committee would then be required to make an annual report on directors' pay to the shareholders.

In all the Greenbury report contained some 20 recommendations, the key elements of which are summarised below:

1 **Remuneration committees** should consist only of non-executive directors. This should avoid pay being determined by directors with a direct financial interest. Remuneration committees should:

- publish an annual report giving full disclosure of all the elements (basic pay, bonuses, share options, pensions and so on);
- relate incentives to demanding performance targets, in order to 'align directors' and shareholders' interests';
- explain pay policy to shareholders and justify any unusual or exceptional awards;
- have the committee chairman attend the AGM to respond to shareholders' questions.

2 **Long-term incentive schemes** to be approved by shareholders.
3 **Discounted share options.** No longer should directors be awarded share options at a discount to the prevailing market price.

As with the Cadbury Code, Greenbury emphasises the role of *the non-executive director* in setting executive pay. The Greenbury recommendations have in effect superseded section 3 of the Cadbury Code relating to executive remuneration and have been included in the Stock Exchange's Listing Rules (the 'Yellow Book') with effect from 31 December 1995. The Listing Rules now require the financial statements of UK listed companies (the rules do not apply to overseas companies) to:

1 **disclose information** relating to directors' remuneration;
2 make a **statement of compliance** with the best practice provisions regarding remuneration committees; and
3 make a **statement that full consideration** has been given to the best practice provisions relating to remuneration policy, service contracts and compensation.

The requirements on directors' remuneration are set out in detail in the Stock Exchange's Listing Rules and a statement about a firm's compliance or otherwise must also be included in the auditors' report.

The Hampel report

On 28 January 1998 the Hampel Committee, led by Sir Ronald Hampel, Chairman of ICI, and established to review all aspects of corporate governance, published its final report. The report recommended the continuation of a voluntary or self-regulation, rather than a statutory, approach to corporate governance.

While the Cadbury and Greenbury reports were produced in response to widespread concerns about particular aspects of corporate governance, namely corporate fraud and excessive executive pay, the Committee's brief was to review the operation of corporate

governance in general.

The Committee essentially opted for a broad statement of principles, reasserting some of those already advanced in the Cadbury and Greenbury reports, rather than detailed prescription.

Some of the additional (to the Cadbury and Greenbury reports) recommendations set out in the Hampel Report are as follows:

- Companies should state in their annual reports how they apply the Hampel principles.
- Any departures from best practice should be justified.
- New directors should receive appropriate induction and training.
- Nomination of a senior non-executive director to whom shareholders can express their concerns directly.
- Greater disclosure on the independence of non-executive directors and publication of their biographical details.
- The final decision on executive pay should rest with the board of directors.
- Institutional investors should exercise their voting rights on behalf of the clients they represent.
- The audit committee should review on an ongoing basis 'the overall financial relationship between the company and its auditors to ensure a balance between the maintenance of objectivity and value for money'.

Similar to the Cadbury and Greenbury reports, when published, the Hampel report received a mixed response. It was variously described as 'a missed opportunity', 'disappointing', 'weak', and likely to prompt legislation as a result. Other commentators considered it to be tougher than it first appeared.

As with the Cadbury and Greenbury reports, the Hampel recommendations have also become part of the Stock Exchange's Listing Rules. The London Stock Exchange, and other institutions, have indicated a desire to combine all the above reports, Cadbury, Greenbury, and Hampel, into a single governance 'supercode'.

As a key aspect of modern business, corporate governance will continue to evolve. The government has reviewed corporate governance arrangements as part of its general review of company law, and is considering the possibility of incorporating some aspects of governance into new company legislation.

It should be noted there is by no means unanimous agreement amongst the financial and investment community about the appropriateness or efficacy of these codes of practice. Some financial analysts and fund managers believe that codes of best practice by themselves will not transform bad management teams into good ones, or guarantee that all companies to whom they apply will be soundly and competently managed.

> **OILING THE WHEELS OF INDUSTRY**
>
> In making its annual report for 1996 British Petroleum (BP) announced that, in accordance with the executive Long Term Performance Plan (LTP), directors' total remuneration had increased

from £4.51m to £13.1m. The LTP was introduced in 1991 to 'link a significant part of participants' future remuneration to the creation of long-term value for shareholders'.

The 1996 pay awards included some very substantial increases for individual executives. The company's chief executive, for example, was awarded the largest increase, taking his total remuneration package from £635,000 to £2.472m. This consisted of a basic salary of £425,000, bonuses and benefits of £327,000 and shares worth £1.72m in line with the LTP scheme.

The company stated that the pay awards were merited because the company had 'clearly outperformed the other major oil companies… achieving growth in total shareholder return of 63 per cent above the growth in the UK market', and added that it had achieved the highest return on capital of 17 per cent in the oil industry in 1996.

How did this relate to increases in shareholder value? BP's share price performance since 1992, when it dipped below £2.00, has been remarkable. In March 1997 the shares were trading around £7.00, an increase over the five years of approximately 250 per cent.

As for the shareholders' reaction to the executive pay package, some of the company's institutional investors conceded the apparent generosity of the awards but maintained they were justified in terms of the company's profit performance. Although they did raise the question of a limit or ceiling on such reward packages. [5]

EXERCISE 5 —CORPORATE GOVERNANCE

Assume you are the financial director of a public company which has been experiencing a decline in financial performance. At a board meeting it is being proposed that all directors and senior managers receive a substantial increase in pay and bonuses. One director has stated that the figures can be masked, legitimately, in the annual report and accounts.

It has also been proposed not to increase the dividend to shareholders, stating that the money is needed for essential investment. The company does have assets which are in need of replacement. What do you think about these proposals? Do they suggest good, bad, or indifferent corporate governance?

We will now move away from the more financially oriented aspects of corporate governance to look at the wider and more complex role of ethics in business today.

ETHICS

> An ethical company is one that does what it believes in, and if it does it well, then shareholders will benefit. People will work better, and the company will be respected by everyone including customers and clients.
>
> (Charles Handy 1995)

PSSST, WANNA BUY A PERSONAL PENSION PLAN?

In 1987 when personal pensions were first created in the UK, all the major insurance companies developed personal pension 'products' and rushed to sell them. In the process the insurance companies advised many hundreds of thousands of individuals that they would be better off leaving their existing company or occupational pension schemes and joining one of their new personal pension plans.

Several years later a major scandal broke when it emerged that many of the insurance industry's personal pension products had been 'mis-sold' and that almost 600,000 people had been incorrectly advised by the insurance companies to leave their existing company or occupational pension schemes.

In March 1997, three years after the mis-selling scandal broke, the House of Commons parliamentary committee investigating the failure of the financial services regulators to resolve the débâcle over compensation payments, learned that out of 560,000 cases considered as 'urgent', only 6,810 people have been paid compensation. Moreover, as at March 1997, 18,472 individuals who bought into personal pensions had died since the review by the industry regulators began in 1994.

The Cadbury, Greenbury and Hampel reports have addressed specific, high-profile, mainly finance-related issues in relation to the behaviour of company directors. How directors and senior managers behave in more general terms in conducting their business affairs and relationships, and what codes or standards they follow is more a question of business ethics.

Ethics today is an immensely important and challenging issue for the business and finance professions, just as it is for the medical, legal and other professions. The previous sections which dealt with the agency problem, corporate governance, and executive pay, all reflect attempts to deal with specific aspects, predominantly financial aspects, of the wider issue of business ethics.

In the business and financial world, ethics has become a major issue. The particular

connection between financial management and ethics is hardly surprising, since a major motivation for much unethical behaviour is to make money.

Ethical awareness and behaviour have come to the fore, not only because of the numerous and dramatic cases of improper and corrupt behaviour of some company directors and managers, but also because in recent years there has been an ever increasing awareness and proactivity among consumers worldwide about the ethical conduct and value systems of companies.

For instance, according to a 1995 report on 'Responsible Retailing' by the Co-operative Wholesale Society (CWS)—the company mentioned in the 'Conduct Unbecoming?' vignette—57 per cent of consumers in the UK were more concerned about the ethics surrounding products they purchased than they were five years before, and approximately 33 per cent stated that they had boycotted shops and products for ethical reasons.

High-profile ethical dilemmas in business continue to surface almost on a daily basis. Some of the more topical ethical debates in recent years have concerned the failed £1.2bn takeover of the Co-operative Wholesale Society (CWS) by Galileo in 1997, the mis-selling of personal pension plans by insurance companies, and the marketing of 'Alcopops', with allegations that they encouraged under-age drinking.

There have also been controversies about leading brand footballs being manufactured by child labour overseas and concerns about the 'ethics' which certain food manufacturers and processors have employed in using genetically modified food ingredients. The volume and frequency of such incidents tend to foster the notion that 'good' ethics and 'good' business are incompatible.

Before progressing it will be helpful to clarify what is meant by 'ethics'.

What is ethics?

Ethics is easier to define than to interpret. Dictionary definitions usually refer to ethics as: 'sets of moral principles or moral values held by individuals or groups'. Something is ethical if it is 'in accordance with principles of conduct that are considered correct, especially those of a given profession or group'. [6]

Essentially ethics means *'doing the right thing'*. However, the problem is determining what is the right thing to do, what are the principles of conduct that are considered correct in a given set of circumstances? This is because each one of us, as a result of our individual backgrounds, cultures, value and belief systems, can interpret and judge a particular action and behaviour in different ways, and from differing ethical viewpoints.

In business, ethics evaluates managerial decisions and actions with reference to moral standards. Ethics offers a moral framework within which to make judgements and decisions when confronted with difficult business choices and dilemmas.

We should be clear that unethical behaviour does not necessarily mean illegal behaviour. Unethical behaviour is that which is seen to contravene some generally accepted code or standard of behaviour, not necessarily a law. However, laws, such as those prohibiting insider trading in stock markets, are often derived from controversy and debate about certain unethical actions and behaviours.

For companies an added difficulty is that scrutiny of its ethical behaviour is not

confined to domestic operations, it is increasingly the case that a company's behaviour overseas is also closely scrutinised, for example in the way a firm's overseas suppliers may employ and use labour.

This can compound problems for a company in its domestic market, because what may be acceptable, customary and legal business practice in an overseas country in which it operates may not be acceptable at home (e.g. the use of child labour by overseas contractors or subsidiaries to manufacture clothing and sports wear).

Common ethical issues in business

Examples of some common ethical issues in business include:

- giving out misleading, but not deceptive, information about a company's products and services (e.g. mis-selling of personal pension plans). Other instances would relate to product performance or safety features, for example, in the selling of cars, cosmetics, food and toys;
- not disclosing relevant information to the public in relation to its products (e.g. misselling of personal pension plans);
- the firm's employment policies and practices;
- how the firm deals with environmental matters;
- how the company carries on business in foreign countries;
- the giving and receiving of gifts by the firm's personnel ('greed and graft').

As can be observed, many ethical issues in business tend revolve around marketing and selling practices.

What are the consequences for a company which adopts unethical but not illegal practices in the pursuit of maximising shareholder value?

What are the consequences of unethical behaviour?

While a firm may consider itself to benefit from some dubious practices in the short term, inevitably the consequences of unethical behaviour usually prove very costly, even disastrous for a firm and its shareholders in the longer term. Typically these consequences include:

- quickly terminated business careers and a loss of 'reputational capital' for the individual directors and managers concerned;
- loss of public confidence and trust in the company—an erosion of the firm's 'reputational capital';
- loss of business or even complete failure of the company possibly resulting in the loss of many jobs;
- 'the ripple effect', that is, where the directors and executives of other companies in the same line of business but who are not involved in any scandal or deception are then perceived to be 'of the same ilk' as those found guilty of unethical behaviour.

An alternative question is, what are benefits of maintaining good ethics in business?

There are many companies in the UK and elsewhere which are fundamentally ethical

and also financially successful, demonstrating that ethics and financial success are not incompatible. In the UK the Co-op Bank is an example of a very successful and ethical financial institution, but perhaps the most popular example of a UK ethical company is The Body Shop which is listed on the London Stock Exchange's main market.

The Body Shop's ethics

Even The Body Shop International, the UK-based natural cosmetics retailer renowned for its ethical standards and values, is not immune to the difficulties and controversies a firm can experience as a result of ethical issues. The following illustration of some of the difficulties even ethical companies can encounter, is particularly apt because The Body Shop has always promoted itself as maintaining sound ethical standards and values in the way it does business.

In August 1994, Franklin Research, a US ethical investment fund, advised its clients to sell shares in The Body Shop as it feared a forthcoming article in the US magazine *Business Ethics* might prove damaging to the company. When published a few weeks later the article questioned The Body Shop's ethical credentials and made allegations about its treatment of franchisees, the seriousness of its commitment to ethical trade and against animal testing, and its product ingredients.

Even though the criticisms were vigorously denied by The Body Shop, it was a testing and embarrassing time for the company. Other ethical funds later supported The Body Shop and the company weathered the storm; the share price did not appear to have suffered any serious damage as a result.

Clearly if the allegations of ethical misconduct had been substantially upheld against The Body Shop, a company which built itself up on actively promoting ethical values, then the consequences for the company would have been extremely serious, even terminal, and shareholder value would have inevitably suffered.

The Body Shop case illustrates the benefits of having enduring ethical standards— standards that stand up to close and rigorous scrutiny. It also demonstrates the need for senior management to be forever vigilant in ensuring that ethical standards and values are maintained and developed.

Ethical funds

The Body Shop affair also illustrates the increasing willingness of investors to consider the ethical standards and conduct of a company in making their investment decisions. The investment policies and decisions of 'ethical funds', which make investments on their clients' behalf, are in fact guided by the ethical conduct and standards of a company.

An ethical fund will simply not invest in a company or business which falls short of its ethical criteria; not having an appropriate ethical code can therefore make it more difficult for a company to raise funds from the investing community.

Ethical codes

Drawing up and issuing ethical codes is an increasingly frequent practice by companies

in the UK: it is a practice which has for several years been very common in USA companies. According to a report by J.Kelly in the *Financial Times* in April 1995, when the Institute of Business Ethics was established in London in 1987 only about 18 per cent of companies had an ethical code. By 1993 the proportion had risen to 33 per cent and by 1995 it was estimated at 50 per cent.

Some of this activity to incorporate ethical behaviour throughout organisations seems to have been prompted by the fear of legislation: if companies do not self-regulate in an effective way, then government may legislate.

Ethics and shareholder value

We have mentioned some of the consequences of unethical behaviour by a firm's management and clearly this can lead to a significant loss of value or wealth for the firm's shareholders; the share price is likely to fall!

Some investor groups, such as some of the financial institutions, attach a high priority to ethical behaviour and consequently have strict policies and criteria in relation to ethical standards which guide their investments. A firm which is perceived to have a poor ethical track record can find it difficult to establish trust and confidence with potential investors and so make it a tough task to raise fresh capital.

Sound ethical values, codes and practices can produce many clear **strategic benefits** for the business, for example, enhanced corporate image and positive *'reputational capital';* greater *investor confidence and access to capital;* less risk of expensive litigation and substantial compensation payouts; greater loyalty from employees and customers, and so on. All of these increase positive cash flows for the firm increasing its share price and thus shareholder value.

It is argued, therefore, that there is a direct link between a firm's ethical behaviour and its long-term shareholder value. In short, sound ethical behaviour and practices will enhance long-term shareholder value, poor ethical behaviour and practices will reduce it. Thus firms are encouraged to adopt positive ethical values, codes, and practices, if they wish to maximise long-term shareholder value.

EXERCISE 6 —ETHICS

Assume you are the financial director of a company which has been experiencing a decline in financial performance. It is approaching the next annual general meeting

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and the chairman has asked you, as financial director, to devise whatever accounting policies and practices you legitimately can to disguise the company's declining financial performance. The chairman believes that performance will improve next year. What would *you* do?

RECAP

The financial manager or treasurer: The financial manager or treasurer is a key player in the management team contributing substantially to the financial management process and the goal of shareholder wealth maximisation. The respective roles of the **financial manager** and the **treasury function** include: *funds management, risk management, foreign exchange and tax management,* and *investor relations.*

The key issues: The key issues of **agency, stakeholding, corporate governance** and **ethics** are all related, and exercise a profound influence on the financial management and the conduct of the financial manager in a modern business enterprise. They are all to do with who controls or governs a company, in whose interests they do it, and the standards or codes of behaviour they employ.

Conflicting interests: In pursuing the goal of shareholder wealth maximisation, agency and stakeholder issues, together with ethics and corporate governance all concern attempts to reconcile conflicting interests between diverse groups, all of whom might reasonably expect to have a legitimate 'stake' in the control and wealth of the enterprise.

REVIEW QUESTIONS

Concept review questions

1 (a) What are the key activities of the financial manager? (b) What is the goal of these activities?
2 (a) What is meant by the terms *agency problem* and *agency costs?* (b) How may the agency problem be managed or resolved?
3 Apart from the shareholders, who are a commercial firm's other stakeholders? What are the benefits to an organisation (public or private sector) of considering the interests of other stakeholders?
4 What do you understand by the term 'corporate governance'? What are its aims and objectives?
5 Why do you think ethics has become such a prominent issue for business managers in recent years?

Test questions

6 **The treasury function.** ABC plc is a UK-based service company with a number of wholly-owned subsidiaries and interests in associated companies throughout the world. In response to the rapid growth of the company, the Managing Director has ordered a review of the company's organisation structure, particularly the finance function. The Managing Director holds the opinion that a separate treasury

department should be established. At present, treasury functions are the responsibility of the Chief Accountant.

Describe the main responsibilities of a treasury department in a company such as ABC plc and explain the benefits which might accrue from the establishment of a separate treasury function.

7   **The goal of the firm.** The primary financial objective of companies is usually said to be the maximisation of shareholders' wealth. Discuss whether this objective is realistic in a world where corporate ownership and control are often separate, and environmental and social factors are increasingly affecting business decisions.

8   **Corporate governance.** Discuss the arguments for and against the introduction of statutory controls on corporate governance.

9   **Agency theory.** Agency theory presents the firm as a combination of competing interest groups, two of which are shareholders and management.

You are required to discuss how the firm's attitude to risk might vary depending on whether shareholder objectives or management-oriented goals predominate in the firm's planning.

10 **Treasury management.** Glass Industries Ltd manufactures glass containers for the food, drinks, and pharmaceutical industries. The company's summarised profit and loss account for the current year just ended, together with forecast profit and loss accounts for the next three years are set out below.

Currently the company is all equity financed, it has no borrowings. Management is planning to build a new production plant which will require an estimated total investment of £2.5 million, to be phased over the next three years. £1 million investment expenditure is planned for each of years 1 and 2, and the remaining £0.5 million will be spent in year 3.

The owners are reluctant to raise any long-term borrowings but are willing to arrange bank overdraft facilities to borrow up to a maximum of £500,000 on a short-term basis.

(a) As Glass Industries' treasurer you are required, based on the financial plans as presented, to:

(i)   calculate the company's current and forecast free cash flow;
(ii) determine if it is feasible for the project to be funded within the constraints imposed by the owners.
      (b) How would you define *risk* in the context of this investment project?
      (c) What additional financial information might be helpful to decision-making in this case?

Glass Industries		Forecast		
Year	Current	1	2	3
	£000	£000	£000	£000
Turnover	6,458	7,750	9,300	11,159
Cost of sales	4,198	5,037	6,045	7,253
Gross profit	2,260	2,713	3,255	3,906
Operating costs	1,582	1,899	2,278	2,734

Depreciation	190	228	273	328
Operating profit	*488*	*586*	*704*	*844*
Taxation	151	182	218	262

Profit after tax	*337*	*404*	*486*	*582*
Dividends	111	133	160	192
Retained profits	*226*	*271*	*326*	*390*

Practical project

Obtain a copy of the most recent annual report and accounts for two companies in a business sector relevant to your studies. Annual reports for many of the leading companies can be obtained free of charge from the Financial Times Annual Reports Service, or by contacting the company directly. Most leading companies also have an online service where company information, including annual reports and accounts, is available on the Internet. In addition survey the financial media for current information relevant to your companies.

Compare and contrast the two reports with reference to the information they provide about the following:

- treasury management policies;
- shareholders and other stakeholders;
- ethics;
- executive pay;
- corporate governance;
- environmental and/or social issues.

Keep your reports and analysis for future reference.

NOTES

1 Annual Report 1997.
2 Annual Report 1997.
3 Unilever Annual Report 1996.
4 To avoid undue repetition, the term managers includes directors.
5 Source: BP Annual Report 1996 and various financial media March 1997.
6 *Collins Dictionary.*

FURTHER READING

The role of the financial manager

For an appreciation of how the financial manager's role is changing see:
- 'World Class Financial Management—The Financial Manager's Role—1.' Sheridan, T., *Management Accounting ,* April 1996.
- 'World Class Financial Management—The Financial Manager's Role—2. How financial Managers are Responding to the New Pressures.' Sheridan, T., *Management Accounting ,* May 1996.
- 'The Changing Shape of the Finance Function.' Sheridan, T., *Management Accounting ,* January 1998.
- 'The Role of the Finance Director.' Carroll, T. *Financial Times ,* Pitman Publishing, 1997.

Treasury management

For insights into treasury management see:
- *Financial and Treasury Management .* Collier, P.A., Cooke, T.E. and Glynn, J.J., CIMA, 1988.
- 'The Evolving Role of the Corporate Treasurer.' Bryant, M., *Management Accounting ,* January 1998.
    On aspects of risk management see:
Hedging—an Obstacle or a Blessing?' Barnes, R., *Mastering Finance. ,* Issue 4, Financial Times, 1997.
    An interesting and informative case study on the operation of corporate treasury is:
Re-engineering Corporate Treasury—a Case Study , MacCallan, M., available from the Association of Corporate Treasurers (see below).
    Students wishing to explore treasury management further, perhaps as a possible career choice, should contact the Association of Corporate Treasurers (ACT), 12 Devereux Court, London WC2R 3JJ.

Business and society

An interesting and thought-provoking article on business and society is:
- 'A Nobel Prize for Business.' *The Economist ,* 15 October 1994.

The agency issue

For what is probably regarded as the classic discussion of agency theory see:
- 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure.' Jensen, M.C. and Meckling, W.H., *Journal of Financial Economics ,* October 1976.
    See also:

• 'An Alternative to Maximization of Shareholders' Wealth in Capital Budgeting Decisions.' Grinyer, J.R., *Accounting and Business Research* , Autumn 1986.
   On managerial performance and pay refer to:
Corporate Governance . Monks, R. and Minow, N., Blackwell Business, 1995, particularly Chapter 4.
   For further insights into share ownership and control see:
Why It's Worth Being in Control.' Zingales, L., *Mastering Finance* , Issue 5, Financial Times, 1997.

Stakeholder theory

For an excellent and comprehensive analysis of stakeholder theory refer to:
• *The Stakeholder Corporation: A Blueprint for Maximising Stakeholder Value* . Wheeler, D. and Sillanpää, M., Pitman Publishing, 1997.

Corporate governance

A comprehensive review of corporate governance issues, although it is essentially discussed in an American context is:
• *Corporate Governance* . Monks, R. and Minow, N., Blackwell Business, 1995.
   An excellent practical UK book on corporate governance is:
Winning Ways Through Corporate Governance . Bain, N. and Band, D., Macmillan Business, 1996.

Business ethics

There are many excellent texts on business ethics one of which is:
• *Business Ethics* . Sorell T. and Hendry, J., Butterworth/Heinemann, 1994.
   A shorter book on the topic is:
The Essence of Business Ethics . Pratley, P., Prentice-Hall, 1995.

REFERENCES

Bain, N. and Band, D. *Winning Ways Through Corporate Governance* . Macmillan Business, 1996.
Brittan, S. 'The Snares of Stakeholding,' *Financial Times* , 1 February 1996, p. 20.

Chartered Institute of Management Accountants (CIMA). *Management Accounting Official Terminology* . CIMA, 1996.
Committee on Corporate Governance—Final Report . Gee Publishing Ltd, 28 January 1998.

Directors' Remuneration, Report of a Study Group chaired by Sir Richard Greenbury . The Study Group on Directors' Remuneration and Gee Publishing Ltd July 1995.

Fama, E.F. 'Agency Problems and the Theory of the Firm.' *Journal of Political Economy ,* February-June 1980.

Hayden, T. *The American Future: New Visions Beyond Old Frontiers .* South End Press, 1980.

Jensen, M.C. and Meckling, W.H. 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure.*' Journal of Financial Economics ,* October 1976.

Kelly, J. 'Making High Ideals Work on the Ground.' *Financial Times ,* 6 April 1995.

Martinson, J. 'Shares in the action.' *Financial Times , 27* April 1998, p. 21.
Monks, R. and Minow, N. *Corporate Governance .* Blackwell Business, 1995
Morris, R. 'Cracking the Cadbury Code.' *Management Today ,* April 1995.

Report of the Committee on the Financial Aspects of Corporate Governance . The Code of Best Practice . The Committee on the Financial Aspects of Corporate Governance and Gee and Co. Ltd December 1992.
RSA Inquiry. *Tomorrow's Company: The Role of Business in a Changing World . Final Report .* Gower, 6 June 1995.

Thomas, C.D. *Company Law for Accountants .* Butterworths, 1992.

3
THE FINANCIAL ENVIRONMENT

This chapter provides an introduction to the role and functioning of the financial environment in which a modern business firm operates. It covers the following topics:

an overview of the financial environment;
financial markets, financial institutions and financial instruments;
the role of the financial manager in the financial environment.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the nature and role of the financial environment;
2 discuss the respective roles of financial markets, financial institutions and financial instruments;
3 define the role of the financial manager in the financial environment.

OVERVIEW

The **financial environment** forms part of the dynamic business and economic environment in which the corporate firm today operates. Events in the financial environment will be directly influenced by events in the wider economic environment, and these will in turn impact on the firm's investing and financing decisions.

For example, changes in interest rates, as a result of wider economic developments, are likely to have a direct bearing on the financial manager's choice of long-term financing (debt or equity). When interest rates are low the financial manager may prefer to raise long-term loans to take advantage of low rates.

The financial environment consists of **financial markets, financial institutions** and **financial instruments,** all of which are interrelated. The **financial manager** will need to interact with the financial environment in performing the investing and financing activities of the firm, and therefore will require a clear understanding of its role and function.

The structure of the financial environment, the role each constituent part plays, and the overall regulatory framework are continually changing. For example, the role of financial

institutions and the nature of the services they offer, continue to change and develop almost on a daily basis. Clearly the financial manager will need to be aware of, and adapt to, changes in the financial environment in order to take advantage of their opportunities and minimise their risks.

In recent years the financial environment worldwide has undergone (and continues to undergo) very dramatic changes: it has become increasingly **globalised** and **liberalised.** In addition, financial markets, institutions and instruments have become more closely **integrated.**

Spectacular advances in communications and information technology have contributed significantly towards market integration: the transmission of information across the **global financial network** is now virtually instantaneous. Indeed, the overall structure and functioning of financial markets and financial institutions are today so closely integrated that the arrangement is often referred to as that of a **'global financial village'.** [1]

This global financial environment offers the financial manager numerous alternatives and extensive scope for managing the investment and financing decisions of the firm. The effective financial management of the firm requires the financial manager to have a sound understanding and appreciation of today's complex **international financial environment** in order to effectively evaluate the profitable investment and financing opportunities it offers and the risks it carries. International borrowers and lenders need to be aware of the different dimensions of risk such as *market risk, foreign exchange risk, interest rate risk* and *political risk.*

Our approach will be to examine in turn the respective roles and workings of each of the main constituents of the financial environment, highlighting key changes and trends. We will begin by exploring the workings and role of the financial markets. This will be followed by an examination of financial institutions, financial instruments, the role of the financial manager, and finally market regulation.

FINANCIAL MARKETS

In our opening Coffee Ventures scenario, we alluded to the key role of financial markets in: (1) providing a source of finance for a growing company, and (2) in the valuation of a company's securities. In this section, and also in Chapter 4, we will explore the role and function of financial markets more fully. Chapter 4 deals specifically with capital markets and the question of market efficiency (see below).

A financial market is similar to a market for any other commodity, to function it must bring together at least two different parties, a buyer and a seller, who have a need to trade in the commodity in question—in this case, finance. This trading or exchange process between two interested parties, who both believe that the transaction is to their mutual benefit, is central to any market. If a transaction is not considered mutually beneficial then it will not take place.

In financial markets the respective parties are known as **demanders of funds** (borrowers) and **suppliers of funds** (lenders) and they come together to trade in order to meet their respective financial needs. It is in the financial markets that the firm or

corporation raises the funds it needs to invest in productive assets, and that investment opportunities are provided for profit-seeking investors.

The key participants in the financial markets are *firms, financial institutions, governments* and *individuals.* Financial institutions, business corporations and governments create financial instruments (e.g. equities and government bonds) which are traded in financial markets.

The exchange process between demanders and suppliers of funds involves the creation and transfer of **financial assets** and **financial liabilities.** When, for example, a firm demands (borrows) money from a bank to purchase machinery, a new financial liability or claim on the assets of the firm is created and the loan will appear as a liability on the firm's balance sheet until it is repaid. Similarly, the balance sheet of the supplier (lender) of the funds will show a new financial asset as the firm becomes a debtor in the books of the bank.

Sometimes borrowers and lenders can deal directly with each other, but more often than not the effective matching of the needs of borrowers and lenders will require the intervention of a **financial intermediary** (e.g. a bank). For example, when the financial manager negotiates a bank loan for the firm, then he/she is clearly interacting in the financial marketplace through a financial intermediary.

Financial markets and the value of the firm

It is through the activities of the financial markets, the buying and selling of corporate securities, that the value of a firm is determined. Securities are financial instruments, such as shares and debentures, which represent claims by their holders on the assets of the company.

Financial transactions determine the price or value of the asset(s) being traded. It is the active trading between buyers and sellers that determines the all-important price of a firm's securities in the market, and consequently the financial markets establish **the market value of the firm.** Clearly if a firm's securities, for example, in the case a private company, are not actively traded in a financial market then the task of valuation is much more difficult.

Thus, in addition to enabling mutually beneficial financial transactions to take place, financial markets also provide critical financial information about a firm, that is *they place a value on a firm's securities.* Without this information it would be much more difficult to determine the effect on the firm's value of its investment and financing decisions and to judge the effectiveness of its management.

The prices of securities in the financial markets tend to respond very promptly to new information, good or bad, about a firm's future prospects. Supposing an engineering firm secures a substantial new contract, or a pharmaceutical company discovers a cure for a major form of cancer, then the stock market is likely to respond very rapidly (usually within minutes) to reflect this new information in the company's share price. In this scenario traders in the market will immediately mark up the value of the company's shares to reflect their new assessment of the value of its future returns.

This is an example of stock markets being **informationally efficient,** that is new, relevant information about a firm's future prospects is rapidly reflected in its share price

by the financial markets. We shall examine the question of stock market efficiency in the next chapter.

Financial markets are future oriented and continually assess the future expectations of companies. Their very essence is investors and traders competing with each other for information which will enable them to profit by making a more accurate assessment of a company's future than their rivals.

The economic role of financial markets

Financial markets play an important role in an economy because they bring together parties who have surplus or excess funds (e.g. savers) available for investment and those who have a shortage of funds for investment (e.g. corporations), all of which makes for a more productive and efficient use of a country's resources.

Financial institutions act in the markets to combine the savings funds of many individuals into financial products (e.g. loans and bonds) to meet the investment needs of firms.

Trends and changes in financial markets

Financial markets worldwide have undergone radical changes in recent years as a result of greater **deregulation** and **globalisation,** advances in **technology** (particularly computing and communications) and the increasing rate of **financial innovation** as demonstrated by the proliferation in the range of financial products on offer (e.g. derivatives). These trends will continue to bring about even greater future changes in financial markets. As a result, financial markets today are characterised by greater **volatility** and rapidity of change.

Money markets and capital markets

Traditionally financial markets are divided into **money markets** and **capital markets.** The markets are conventionally distinguished by the *maturity* (the time to repayment or realisation) of the financial instruments or securities in which they trade.

Money markets

These involve the trading of securities with a ***short-term maturity,*** (usually less than a year to maturity), such as Treasury bills (Tbs) and bills of exchange (BOEs).

Money markets are mainly *wholesale markets* dealing in large volume low-cost transactions. They include such markets as the ***London sterling money markets*** which deal, for example, in the trading of sterling between banks (i.e. the inter-bank market) and the ***discount market*** which deals in Treasury bills and bills of exchange.

Capital markets

In contrast, these involve the trading of securities with a ***long-term maturity,*** (normally

more than a year to maturity), such as bonds, debentures, and shares.

The **London Stock Exchange,** which trades in company shares and bonds, is perhaps the most famous example of a capital market. The role and functioning of capital markets, particularly those in the UK, will be dealt with more fully in Chapter 4.

The structure of financial markets is illustrated in Figure 3.1.

Figure 3.1 The structure of financial markets

Primary and secondary markets

Financial markets can also be categorised as **primary** or **secondary** markets. When a security is issued for the first time it is issued in the primary market and this is the only time the finance raised by the sale of the security goes directly to the issuer, whether that issuer is a firm or government.

Once the security is traded again it enters the secondary market and this time it does not raise any money for the issuer, the buying and selling of the security are directly between investors in the marketplace.

Thus the primary market involves the issue of new securities and provides capital for the original issuer. In contrast the secondary market can be viewed as a 'used' or 'second-hand' securities market and is simply a market for the trading of existing securities—no new money is raised for the issuer. The lion's share of stock market trading takes place in the secondary market, it is by far the dominant market.

Primary market issues can be subdivided into *seasoned* and *unseasoned* issues. In the case of a company, a seasoned issue involves the issue of more of an existing security which is already trading in the market. For example, if a company such as Airtours, BT, or Cadbury Schweppes was to issue more of its ordinary shares then this would be termed a seasoned issued. The shares are already very well known to investors and traders in the marketplace, and they have an established track record.

Unseasoned issues, on the other hand, have no track record. They are issues of completely new securities and are often referred to as **initial public offerings (IPOs).** As unseasoned issues have no established trading history in the markets they are more difficult to value than seasoned issues.

Partly because of this lack of information, and also a desire for a successful issue, unseasoned issues or IPOs in general seem to be consistently underpriced (by approximately 15 per cent on average) by the merchant or investment bank which is underwriting the issue.

Other more cynical reasons for the underpricing of IPOs suggest favouritism on behalf

of the underwriters to their special clients. The underwriters, it has been suggested, allocate their favoured clients sizeable portions of the underpriced issue, thus allowing them to sell at a significant profit when the issue starts trading in the markets.

The primary-secondary market classification pertains to both capital and money markets.

EXERCISE 1 —FINANCIAL MARKETS
Summarise the main functions of financial markets in relation to the corporate firm.

The main financial markets in the UK

The City of London remains the leading European financial centre (although it is facing increasing competition from other European centres), and the London Stock Exchange is the largest capital market in Western Europe, although the US capital markets are the largest in the world. London also retains a vast share of the world's cross-border equity (share) trading and is a major centre for the international fund-management industry.

The London Stock Exchange

Probably the most famous of the capital markets and operates as a UK registered company—London Stock Exchange Limited. The London Stock Exchange's history can be traced back as far as 1553 when the first joint stock company (where the public could buy equal shares in the company in return for a share in the profits), was formed.

As a capital market, the London Stock Exchange is the major market in the UK for dealing in long-term securities such as equities (i.e. shares) and loan stock (e.g. bonds). The role of the London Stock Exchange will be discussed more fully in Chapter 4.

The London International Financial Futures and Options Exchange (LIFFE)

A very specialised type of financial market which opened in 1982. It is known as a financial futures market which means that the prices that will apply to a future transaction (say three months from now) can be fixed today. It was the first market for financial futures in Europe.

The financial manager can trade in this market to protect or *hedge* the firm against future financial risks such as adverse interest rate movements by using, for example, interest rate futures contracts. LIFFE can also be used for trading in equity options (i.e. shares and share indices).

The Foreign Exchange (FOREX) market

This is the largest financial market in the world and its purpose is to facilitate the exchanging (buying and selling) of different currencies. It is where the conversion of

currencies (e.g. sterling into US dollars) takes place and where the **foreign exchange rate,** the price of one currency relative to another, is determined. The foreign exchange market operates worldwide with trading taking place continuously 24 hours every working day across international time-zones.

Although the foreign exchange market is an international market, London is the pre-eminent international centre for foreign exchange trading, dealing in about US$300 billion worth of turnover per day, compared with the USA at about US$200 billion and Japan at US$130 billion turnover per day. All of the UK's dealings in foreign exchange are channelled through the UK foreign exchange market which is located in London.

The foreign exchange market is an example of an **OTC market,** (see below). Trading is carried out by computer, phone, Reuters, telexes, Telerate screens and SWIFT (Society for Worldwide Inter-Bank Financial Telecommunications) which is a computerised payments system centred in Brussels.

The over-the-counter (OTC) market

An OTC market began to emerge in the UK about 1972. It remained a relatively small, unregulated capital market for the purchase and sale of securities and operated independently of any official stock exchange.

OTC markets are *not organised stock exchanges* but are rather *intangible markets* for the buying and selling of securities that are not listed on official stock exchanges. There is no longer an OTC market in the UK, however, in the USA the OTC market or exchange is a very vibrant and—by UK standards—a relatively large market accounting for about 28 per cent of the total dollar volume of US domestic shares traded.

Another example of a vibrant OTC market is the **OTC option market** which can be used by the financial manager to protect against currency risk in the international financial markets.

The London sterling money markets

These are short-term money markets which act as an important interface between the Bank of England and the commercial banks by helping to smooth out the daily flows of cash in the money markets and influence interest rates. The sterling money markets include:

1 The discount market—the oldest of the money markets—in which government instruments such as Treasury bills are traded between the Bank of England and the discount houses. Non-government instruments such as bills of exchange are also widely traded in this market.

2 The parallel money markets which operate alongside the discount market. They include: the *inter-bank market,* (i.e. the borrowing and lending of sterling between banks) with a minimum trade of £500,000; the *sterling certificates of deposit (CDs) market* —CDs are basically short-term negotiable instruments issued by a bank certifying that a certain sum of money, at least £50,000, has been deposited with the bank; and the *local authority deposits market* —bills issued by local authorities for short-term financing.

The internationalisation of financial markets

Financial markets have become increasingly internationalised or *'globalised'* as a result of: greater deregulation of markets; more efficient and sophisticated information technology, telecommunications and transport facilities; and privatisation by governments who wish to sell large blocks of their privatisation issues overseas.

International capital and money markets, which have the distinct advantage over domestic markets in that they are largely unregulated, allow a company or business in one country to borrow from a lender in another country, and the transaction may even be in the currency of a third country.

Euromarkets

The euromarkets are extremely large and important international financial markets in which borrowers and lenders can trade in currencies outside their country of origin. The financial manager or treasurer in an multinational company (MNC) may use the euromarkets to raise funds for the firm or to invest excess cash.

Surprisingly the prefix 'euro' does not mean European, (although it originated with the trading of US dollars in Paris and London in the reconstruction of Europe after World War Two), nor should it be confused with 'the Euro'—the planned single currency of the EU. The euro prefix means that the funds in the market are held in currencies outside their country of origin, such as US dollars held on deposit in a bank in London or Paris.

Euromarkets are classified as *'offshore' financial markets* because the currency in which a financial transaction is denominated (e.g. French francs) may not be the official currency of the country in which the transaction originates (e.g. the UK).

Euromarket transactions

The types of transactions which take place in the euromarkets are essentially the same as those which take place in the domestic markets (e.g. deposits, loans and commercial paper transactions), except that euromarkets offer financiers *greater scope and flexibility* in their financing activities because they are *less regulated* than domestic markets.

Euromarket attractions

The key attractions of the euromarkets, for investors and borrowers, are related to *size, competitiveness, flexibility* and *freedom from controls.* Because of their size and scale euromarkets provide companies and investors with greater investment and financing opportunities than domestic markets.

Euromarkets generally offer more competitive interest rates on loans and deposits than the domestic markets. They are also free from any government control and regulation, a factor which provides anonymity and taxation advantages for investors. In addition, very large transactions tend to be arranged more speedily than in domestic markets.

For the financial manager (or treasurer) in an multinational company (MNC) the euromarkets provide an external opportunity (i.e. outside the control of the central bank which issues the currency) to borrow or lend funds *free from any government regulation.*

Currencies traded

The US dollar is still the dominant currency in the euromarkets although trading in other major currencies such as the D-mark, sterling, Japanese yen, the Swiss and French franc and the European Currency Unit (ECU) has grown at a much faster rate than trading involving the US dollar.

Euromarket participants

Trading in the euromarkets is confined to large well-established corporations and institutions and governments as the deals usually involve very substantial sums of money. Deals in the eurocurrency market, for example, are usually for amounts in excess of US$1 million.

Offshore centres

Euromarkets also include what are called offshore centres. These are cities and states around the world (Bahamas, Bahrain, Cayman Islands, Hong Kong, Luxembourg and Singapore) which because of improved communications, transport facilities, lower costs, together with taxation, banking and time zone advantages have achieved importance as centres for euromarket business.

Euromarket sectors

There are four key sectors in the euromarkets: the **eurocurrency** and **eurocredit** markets which involve trading in international bank borrowing and lending; and the **eurobond** and **euronote** markets in which international debt instruments are traded.

The eurocurrency market

Of the euromarket sectors this is the largest and is the international counterpart of the domestic money market. As such it is a **short- to medium-term money market** in which an easily convertible currency (e.g. Sterling, US dollar, D-Mark, Japanese yen) can be deposited in a bank outside that currency's country of origin. It is important to note that the eurocurrency markets are money markets for trading in short- to medium-term loans and deposits, *they are not foreign exchange markets.*

An example of a eurocurrency market transaction would be the financial manager of a multinational corporation (MNC) depositing US dollars with the branch of an American or UK bank in London. This would create what is known as a **eurodollar deposit**— 'euro' because it is made outside the jurisdiction of the institution issuing the dollar.

London has traditionally been, and still is, the main centre for the eurocurrency market. However, today the market really *operates on a global basis* with other major cities in Europe and outside Europe, such as New York and Tokyo, dealing in substantial volumes of eurocurrency trading.

Virtually all eurocurrency loans are priced in relation to **LIBOR (London Inter-Bank Offer Rate).** LIBOR is essentially the mean rate of interest offered each business morning on short-term deposits to the London clearing banks by the group of reference banks (which includes key foreign banks, such as the Banque National de Paris, Deutsche Bank and Bank of Tokyo, as well as the National Westminster Bank). Once determined,

LIBOR is then used as the benchmark or reference rate for sterling wholesale money transactions in the inter-bank market.

The eurobond market

This is an international **capital market** and as such deals in long-term financial instruments. The eurobond market is the largest and oldest international bond market.

A bond is a long-term debt instrument which is used by both business and governments to raise very substantial sums of money, usually from syndicates (a diverse group of lenders). Eurobonds are thus at the 'long end' of the eurosecurities market in terms of maturity.

A **eurobond** is an international bond raised and underwritten by an international group or syndicate of lenders. For example, a US company could issue or 'float' a dollar-denominated (eurodollar) bond for sale in the UK and other European financial centres. The bond would typically be underwritten by an international syndicate with the interest and principal being paid in US dollars.

While eurobonds can be issued in any of the major currencies, typically in any one year although it varies, about half of the eurobond market is denominated in US dollars. Eurobond issues are for very large amounts, anything under $100m is unusual.

The eurobond market, like the other sectors of the euromarkets, is an **'offshore' market** and is therefore free from any government control or regulation, a key factor in accounting for the growth and popularity of all euromarkets.

As eurobonds are **anonymous 'bearer' bonds** they are not registered with any regulatory bodies. With interest on the bonds being paid to investors on a gross basis (i.e. without deduction of tax) it is open to unscrupulous investors to evade paying tax on the interest. There is also an active secondary market in the trading of eurobonds, mainly in the London Stock Exchange.

During 1997 UK companies in general raised much more of their long-term financing (almost four times as much) through the London Stock Exchange in the form of eurobonds than in the form of equities. In 1997 UK companies raised £43.6 billion from eurobonds, compared to £11.8 billion from equity finance. [2]

AN AFFORDABLE LUXURY?

In August 1997 Porsche International Finance—the treasury division of Porsche the German luxury car manufacturer based in the International Financial Services Centre (IFSC) in Dublin—raised DM200m (equivalent to £74m at the time) to finance future growth through a eurobond issue. This was the first time in its history that Porsche had used the international capital markets to raise finance for its business. The eurobond issue was led by Deutsche Bank, Germany's largest bank, and supported by a consortium of other banks.

The eurocredit market

Eurocredits are **medium- to long-term international bank loans and credit lines.** A

credit line is almost like a bank overdraft, in that the borrower is permitted—not obliged—by the lender to use the agreed facility either in full or in part.

The credit line is simply drawn on if and when it is needed. Interest is only charged on the portion actually used, although a commitment fee of 0.25 to 1 per cent per annum is usually charged on the unused portion.

The euronote market

In this sector a wide range of **short- to medium-term debt instruments** are traded. These instruments are typically of two to five years maturity and are issued in a variety of currencies, at fixed or floating interest rates.

An example is *eurocommercial paper (ECP)* which refers to a variety of short-term securities (one to twelve months maturity) issued by large private companies, with excellent credit ratings. The securities are issued direct to institutional investors promising to pay them a specified sum of money on at an agreed future date. ECP is thus a form of **disintermediation** (see later in this chapter) as the deal is done directly between borrower and lender.

The international equity market

An international equity issue involves a simultaneous issue of shares in several international stock markets such as a UK company simultaneously issuing equity on the London, Frankfurt, Paris, New York and other international sock exchanges. A company making an international equity issue will probably use a large international securities house or several securities houses to arrange and market the issue.

An international issue offers the advantages of increased **marketability** for a company's shares, an enhanced international **financial image** and **cheaper capital** through making a larger issue than would be possible in a single domestic market. On the downside, synchronising all the arrangements for an international issue can be **difficult** and **costly.**

In addition, maintaining multiple stock exchange listings in several countries and complying with multiple regulatory systems can be very expensive—a listing on the Tokyo exchange for example can cost as much as $500,000 per annum to maintain—so it is only an economic proposition for the major international corporations. There has also been a tendency for international equity to be sold back to the domestic market—a practice known as *flowback.*

Despite some of the difficulties referred to with the international market, multinational companies still find it advantageous to raise equity capital through the international equity markets by selling large blocks of shares simultaneously to investors (mainly institutional investors) in several different countries.

The international equity market is very active and has gone from strength to strength over the past decade, largely as a result of the deregulation and liberalisation of the equity markets in many countries. The international equity market allows a major corporation access to far greater amounts of equity capital than would be available in any single domestic equity market.

The growth of the international equity market has been stimulated not only by the

increasing deregulation of international markets but also by the practice of many governments of privatising large parts of the public sector. These privatisation issues have involved very sizable amounts of money and therefore probably required the support of international investors to succeed.

The leading international equity market is the **London Stock Exchange** with its **Stock Exchange Automatic Quotation (SEAQ)** international trading system. Over 500 non-UK companies are quoted on the London Stock Exchange.

A euroequity issue

A euroequity issue involves a simultaneous issue of shares in several international stock markets outside the issuer's country of origin, such as a UK company simultaneously issuing equity on the Frankfurt, Paris, New York and other international stock exchanges.

Example 1 —Orange plc—global offer

By way of example of an international equity offer, when Orange plc, a digital personal communications network (PCN) operator, became a public company in April 1996 it did so through a 'Global Offer' and admission to listing on the London Stock Exchange.

The company issued 357.5 million ordinary shares at 205p per share of which 178.75 million (50 per cent) were offered to institutional and other investors in Europe and the UK, including approximately 26 million (7 per cent) allocated to the public in the UK, 143 million (40 per cent) were offered in the United States and Canada and 35.75 million (10 per cent) were offered in the rest of the world.

EXERCISE 2 —TREASURY MANAGEMENT

Explain why a corporate treasury department may prefer to issue securities in the euromarkets rather than domestic markets.

The drawbacks of international financial markets

The twin trends of globalisation and liberalisation of financial markets, while generally accepted to have provided tremendous benefits and stimulus to international trade and investment, also have their drawbacks, as was so acutely demonstrated with the worldwide stock market crash in October 1987 and the collapse of Barings Bank in the UK in February 1995.

International markets are now so closely integrated through computing and communications technology that information, political and economic (good and bad), which may significantly affect one domestic market is transmitted rapidly through the international system—the 'rapid ripple effect'. This is what happened when the

international stock markets crashed on Monday 19 October 1987, a day which has become known as 'Black Monday'—'the day the roof fell in' as one journalist reported it.

A sudden and dramatic fall in share prices was triggered off worldwide, for no apparent underlying economic reason. In America the Dow Jones Industrial Average—the most common market index in the US—fell by an unprecedented 22 per cent in one day, London dropped by 20 per cent, the Tokyo market fell by 17 per cent and Australia by 28 per cent. The rate and scale of the fall in prices became so great at one stage that the Hong Kong markets were forced to close temporarily and a minor run on the Hong Kong banks ensued.

The scale and size of the crash was in part technology based. The computerised trading systems in place at the time relied on programmed preset price levels which automatically generated selling orders when a share's price dropped to the preprogrammed limit. As share prices began to fall more sell orders were generated and eventually panic selling of shares on a global basis set in.

New control systems and procedures have since been put in place and trading systems have been modified to prevent a recurrence. Nonetheless, international financial markets are now so closely networked and integrated that economic and political events affecting any particular domestic market are almost instantaneously reflected in the markets worldwide.

This phenomenon was clearly demonstrated in October 1997 (almost exactly coinciding with the tenth anniversary of the 1987 crash) when, at one stage, it seemed that another worldwide stockmarket crash was imminent. Underlying economic problems in the often called 'tiger' economies of south-east Asia began to significantly depress their domestic stock markets.

The financial depression in Asia reverberated, almost instantaneously, throughout the global economy and most international stock markets suffered dramatic falls as a result. The recovery, which began in the US market, was transmitted almost as quickly throughout most major western markets. Western stock markets recovered sufficiently, within a few days, to avert a major international financial crisis.

Emerging markets

These are really the financial markets of the less-developed countries (LDCs), which are considered to have considerable potential for economic growth. Examples include Africa, Asia (e.g. China, India, Korea and Malaysia), countries of Latin America (e.g. Argentina, Brazil, Chile and Mexico) and countries in Eastern Europe (e.g. Czech Republic, Hungary, Poland and Russia).

Emerging markets while offering greater financial and business opportunities for investors are also high risk and have problems in relation to internal competition, different cultures and business practices.

At the end of 1997 there were 162 companies from emerging markets listed on the London Stock Exchange. The largest number (57) being from South Africa, with Indian companies (17) forming the second largest group.

FINANCIAL INSTITUTIONS

Financial institutions (banks, building societies, insurance companies, pension funds, and so on) function as **financial intermediaries,** receiving funds from savers to lend to borrowers (individuals and corporate) through the capital and money markets.

Financial institutions (which may be domestic or foreign) are major and vital players in the capital and money markets acting as both suppliers and demanders of funds. In many cases there are specific legal rules and regulations governing the operation of financial institutions, of which, in the UK, the Financial Services Act 1986, the Building Societies Act 1986 and the Banking Act 1987 are just a few.

The role of financial institutions

Financial intermediaries or institutions fulfil a number of important roles. First is their **brokerage role** through which they bring borrowers and lenders together. Second is their **funds transformation role,** and third is their **risk transformation** or risk reduction role.

Their second role involves attracting funds from individuals, businesses and governments and then repackaging them as financial products (e.g. loans) which reflect the differing needs of savers and borrowers in relation to the volume of funds, risk levels and maturities required.

For example, a bank or building society may collect a number of small savings accounts and rebundle them into a single larger amount such as a mortgage for lending. In this case there is both *volume transformation* of funds—transforming several smaller amounts into a single larger amount—and *maturity transformation* of funds—borrowing short-term and lending long-term.

It is possible for banks and building societies to do this because sufficient numbers of small savers actually leave their funds on deposit on a long-term basis and those that do withdraw their savings are replaced by new depositors.

A third key aspect of the financial intermediary's role is **risk reduction.** Financial intermediaries enable savers to reduce risk by *risk-spreading* and *risk-pooling.* Risk-spreading allows financial intermediaries to lay off or spread particularly risky investments across a large number of other intermediaries or clients. Thus if an investment fails the loss is shared among a group or syndicate of intermediaries.

Risk-pooling allows financial intermediaries to reduce risk by creating sophisticated portfolios of diversified assets, that is, they are able to balance investments in risky assets with those in less risky assets.

Most small individual savers or investors could simply not achieve the same degree of risk reduction for themselves. Moreover, they would find the tasks and costs of risk-spreading and risk-pooling uneconomic. For example, to achieve significant risk reduction an individual investor would have to maintain a fairly large portfolio, probably 20–30 investments. This would involve considerable costs, time and effort to manage effectively.

Net suppliers and net demanders of funds

Individuals, in aggregate, are **net suppliers** of funds to the institutions as overall they save more than they borrow: whereas businesses are **net demanders** of funds, borrowing more than they save. Governments too are usually net borrowers of funds, mainly to finance budget deficits. Although governments do not borrow directly from financial institutions they do borrow indirectly by selling their securities to the institutions.

Financial institutions or intermediaries can essentially be classified as either *banking institutions* or *non-banking institutions,* although due to the rapid changes taking place in the financial environment the distinctions between the traditional banking and non-banking institutions are gradually disappearing. Alternatively, financial institutions acting as financial intermediaries may classified as set out in Figure 3.2:

Financial institutions

Deposit-taking institutions	Contractual savings institutions	Other financial institutions
– Clearing banks – Merchant and investment banks – Building societies – Finance houses – Accepting and discount houses	– Insurance companies – Pension funds	– Unit trusts – Investment trusts – Specialised institutions e.g venture capital groups and investment houses

Figure 3.2 Financial institutions/intermediaries

EXERCISE 3 —FINANCIAL INTERMEDIARIES

What do you consider would be some of the difficulties for suppliers and demanders of funds in the absence of financial intermediaries?

We can proceed to review the relevant role of the main institutions beginning with a group generically referred to as deposit-taking institutions.

Deposit-taking Institutions

Clearing banks

These are the familiar high street banks (domestic and foreign owned) which provide a *retail banking service.* They operate personal and business bank accounts on behalf of their private and corporate customers. They accept deposits, large and small, from, and make loans, large and small,—in the form of overdrafts and/or term loans—to their customers, private and corporate.

An important role of the commercial banks is the creation of finance in the economy

by providing credit (bank overdrafts and loans) to consumers and businesses.

Merchant and investment banks

In contrast to the clearing banks, merchant and investment banks operate as *wholesale banks* dealing mainly with the corporate and financial sectors. Merchant banking originated with, and derived its name from, the activities of wealthy merchants who provided credit for the trading ventures (especially international ventures) of their smaller and less wealthy merchant colleagues before the establishment of any kind of international banking system.

Investment banking is essentially the American equivalent of merchant banking in the UK, although since the 'Big Bang' stock market reforms in October 1986 many of the traditional UK merchant banks have been taken over by American and other foreign banks and are now frequently referred to as investment banks.

Merchant and investment banks include such firms as HSBC Investment Banking and ING Barings. These banks provide services such as:

- *Corporate financing* —they arrange financing for companies.
- *Expert advice* —they provide expert investment and financing advice to their corporate customers.
- *Investment fund management* —they manage investment funds on behalf of their clients (e.g. the management of pension funds).
- *Investment analysis* —they help their customers analyse and evaluate investment opportunities.
- *Merger/acquisition activities* —they advise clients on merger/acquisition deals (e.g. they would be involved in formulating takeover plans and bids, ensuring compliance with city codes on mergers and acquisitions, or alternatively formulating takeover defence tactics).

The key role of merchant and investment banks is in arranging finance to meet strategic corporate financing needs, they do not necessarily provide finance. However, as many merchant and investment banks are subsidiaries of the major clearing banks they will usually arrange financing through their parent clearing bank.

A classic function of merchant and investment banks is to help companies raise capital (debt or equity) in the financial markets. Normally when a company needs to raise substantial additional finance through the capital markets it is likely to seek the expert help and advice of a merchant or investment banking firm. The role of the merchant or investment bank will typically involve:

- analysing the company's financial needs;
- advising on the appropriate means of financing;
- coordinating the role of other specialists such as accountants and corporate lawyers;
- syndicating the underwriting of any issue;
- advising on its price and timing;
- fulfilling the legal requirements; and
- promoting the issue and distributing it to subscribers.

Merchant and investment banks have developed into integrated **securities houses,** by

taking over market making and stockbroking firms, investment management firms, and so on. They issue securities, underwrite security issues, buy and sell securities and advise on investment in securities.

The clearing, merchant and investment banks are actively involved as key players in the international banking, euro and international financial markets and have a presence in most of the major international financial centres.

Building societies

These organisations started out as mutual societies, that is institutions owned by their savers rather than shareholders, with the aim of helping their members (savers) to purchase their own homes. Traditionally they have been saving and mortgage lending institutions. Members deposit their savings with the societies and these are in turn combined, repackaged and lent to other members in the form of mortgages to enable them to acquire their homes.

Over the last decade or more, *deregulation and liberalisation of the financial services sector* have allowed building societies to increase their range of financial activities and enabled them to compete more effectively with the high street banks. Many societies now provide an almost complete range of retail banking services. However, building societies are still subject to certain endemic restrictions, for example, in relation to the proportion of their funds that must come from personal savings and the proportion of their lending that must be housing related.

Many societies have responded to changes in the financial services marketplace by 'demutualising' and becoming a public limited company (plc) owned by shareholders rather than savers. The Abbey National Building Society (now Abbey National plc) was the first society to take this pioneering step in 1989 when the society abandoned its mutual status and acquired bank status. Most other major societies, such as the Alliance and Leicester, the Halifax, and the Woolwich have since followed suit with members gaining substantial 'windfall' financial payouts in the process.

The reasons often cited for building societies demutualising include greater freedom in raising funds (e.g. by issuing their own shares or by dealing in the money markets) and the need to respond effectively to increased competition from the banks and other financial institutions for mortgages and loans. The Societies argue that under the Building Societies Act 1986 they could not undertake these and other initiatives.

These changes reflect an increasing trend globally away from mutuality by financial institutions. For example, AMP, Australia's largest insurer, and Swiss Life, one of the major mutual institutions in Europe, have both demutualised.

Finance houses

These institutions provide specialised financial services to both the personal and business sectors. Services such as *instalment credit* and *leasing finance* for the acquisition of fixed assets and finance in relation to the *factoring of debtors.* Many finance houses are subsidiaries of other financial intermediaries such as the clearing banks. Their activities are regulated by the Consumer Credit Act 1974 and by the Director of Fair Trading.

Accepting houses

These are in fact merchant banking firms which deal in acceptance business, which essentially means that they will guarantee (i.e. accept) bills of exchange to finance trade. They may subsequently discount or 'cash in' these bills in the discount market. Originally the prime activity of merchant banks was acceptance business.

Discount houses

These institutions fulfil an important and unique role in the UK economy. In addition to providing cash for bills of exchange, they will actively participate in *the discount market,* trading in Treasury bills, commercial bills, certificates of deposit and a variety of other short-term financial—predominantly sterling—instruments. Their key role is in stabilising the activities of the secondary money markets and in providing liquidity to the UK banking system; they in effect act as a financial buffer between the Bank of England and the retail banking sector.

Contractual savings institutions

Pension funds

These funds collect, manage and invest the regular pension contributions of both employers and employees in order to meet the current and future obligations of the pension scheme to its members. Some individual pension funds are extremely large, such, as the Post Office pension fund, and all the pension funds combined have an enormous amount of finance available for investment purposes.

In total, pension funds form the largest group of investors in UK equities, accounting for almost 35 per cent of UK equity share ownership and pension fund managers can exert considerably influence on corporate decision-making. Pension funds hold diversified investment portfolios, from risk-free assets, such as government securities, to property investments and high risk investments such as venture capital.

Insurance companies

These institutions form the second largest group of investors in UK equities accounting for over 21 per cent of UK equity share ownership. The insurance companies and pension funds taken together clearly form a formidable body of investors as combined they own approximately 50 per cent of UK equity investment.

Insurance companies receive their income in the form of regular premium payments from policyholders for a multiplicity of insurance services (e.g. life assurance, pension plans, endowment/savings plans and general insurance). Like pension funds they too have enormous amounts of finance available for investment purposes.

As institutional investors, insurance companies and pension funds also actively invest through participating in the underwriting of syndicated loans and other syndicated credit facilities in the domestic and international financial markets.

Some insurance companies are PLCs listed on the London Stock Exchange, others are mutuals owned by their policyholders. Following the trend established by the building societies, some mutual insurance companies are also demutualising by becoming PLCs.

Other financial institutions

Unit trusts

These are **legal trusts** which receive cash from a wide variety of investors. The first unit trust to be launched in the UK was by M&G in 1931. The cash which unit trusts receive is pooled and used to buy shares in companies. The shares purchased are in turn divided into 'units' in strict proportion to the amount invested. Today unit trusts have extended their investments beyond shares on the stock market and now their investment holdings range from cash deposits to international bonds, property and financial derivatives.

Unit trusts enable the private investor to achieve risk reduction through *diversification.* The units purchased represent a diverse range of securities, in other words the individual investor receives a ready-made portfolio. Unit trusts are a relatively *affordable* and *liquid* investment as they can easily be cashed in or liquidated—although at a price. These are just some of the reasons which have made unit trusts an extremely popular form of investment medium for individual investors.

There are over 1,500 registered unit trusts in the UK, however, the past performance of many of them has not been impressive. Over 160 companies are involved in the unit trust market, including banks, building societies and specialist fund managers. The Unit Trust Association, to which many fund managers belong, is a trade association which operates a code of conduct on the management of trusts.

Investment trusts

Investment trust companies—usually shortened to investment trusts—originating in the 1860s, are an older form of investment than unit trusts. Investment trusts are different from unit trusts in that **they are companies, not legal trusts,** which have been formed specifically to invest in the shares of other companies. They are usually quoted on the stock market similar to other public companies and their shares can normally only be bought and sold through stockbrokers.

Specialised institutions

Examples of specialised institutions include **venture capital companies (VCCs)** and **independent investment houses.**

Venture capital companies (VCCs) These institutions provide equity and long-term loan capital to businesses which do not have easy access to the capital markets. As the name suggests, the capital provided is for high-risk business ventures and consequently venture capital investors will require high returns. Required returns in the region of 30–40 per cent of capital invested are not uncommon. Some 'pure' venture capital firms will seek a trebling in value of their investment over a four- to five-year period.

As part of their investing arrangement venture capitalists will normally require an equity stake in the investee company and representation on the board of directors.

Venture capitalists may invest in start-up, or more preferably small-growing, high-risk companies which find it difficult to attract investment capital from the more traditional sources. The firms to which venture capitalists are attracted, while high risk, will typically have the potential for generating high returns. This is a key investment criterion on the part of venture capitalists.

If you recall our Coffee Ventures business scenario, then a possible financing route to expand and develop this venture, which is high risk, may be through a venture capital company. If Coffee Ventures owns proprietary technology for enhancing the flavour of coffee, and has the potential for generating high future returns, then it may be an attractive investment for a venture capital investor. Although, if the investment needed is less than £100,000, or £250,000 in some cases, then venture capital companies may not be interested.

For example, a popular technology area for venture capital companies in recent years has been the biotechnology industry. Biotechnology companies require substantial and sustained investment in research, development, clinical testing and so forth. The risk of failure is high—too high for many traditional investing groups—but so too are the potential returns if the company should discover a new medical drug or therapy.

Another major role for venture capital companies is in financing management buy-outs (MBOs). An MBO occurs when a team of managers decide buy part or all of a business enterprise from its owners.

If part of an enterprise is being purchased this may, for example, be a division, unit, or subsidiary which is being disposed of by a large company, perhaps as part of a restructuring or 'downsizing' strategy. Alternatively an owner who is retiring may wish to sell the business to the managers and employees (a MEBO—management and employee buy-out). In any event the management team may approach a venture capital company, in addition to others sources, to assist in financing the buy-out.

Alternatively, a buy-out may be initiated and controlled by a venture capital company rather than a management team. In this case the venture capitalist deals directly with a business seller—this is referred to as an institutional buy-out (IBO) and is a growing trend, particularly in relation to larger buy-outs.

Venture capital organisations include such firms as 3i Group plc, and the venture capital arms of other financial intermediaries such as the major banks (e.g. NatWest Ventures) and insurance companies (e.g. Legal & General Ventures Limited). They may also consist of private groups of professional investors. Many venture capital companies are members of the British Venture Capital Association (BVCA). In a wider context there is also the European Venture Capital Association (EVCA) based in Belgium.

The investment period for venture capitalists is 5–10 years, with an average of around 7 years. Their objective is normally to 'exit' the investee company and realise their investment at some future stage by seeing the company float on a stock market, domestic or foreign (see next chapter), or by arranging a trade sale.

It should be said that of all the applications that are made for venture capital finance, only a small proportion, approximately 25 per cent, are actually accepted for further scrutiny. Of this 25 per cent only 3–4 per cent are eventually accepted as suitable investments. In other words only about 1 per cent of venture capital applications actually receive financing.

In 1995 venture capital trusts (VCTs) were introduced as a means of stimulating investment in smaller companies. A VCT is an investment trust which is formed to invest mainly in unquoted companies, although the VCT itself should be quoted on the stock exchange. VCTs are limited in both the amounts (usually up to £1 million in any one company) and types of companies in which they can invest. For example, farming and

market gardening, property development, the operation and management of hotels and private nursing homes are excluded.

Investors in VCTs obtain certain tax breaks, for example tax relief on dividends, providing they hold their investments for a qualifying period, currently five years.
Independent investment houses Regarding independent investment houses, these institutions manage assets on behalf of clients which will typically include pension funds and insurance companies. They will also actively invest in companies by providing venture and development capital.

EXERCISE 4 —RISK REDUCTION
Can you think of an example of how the financial system enables:

(a) an individual investor to reduce investment risk?
(b) an individual or company to share or transfer risks?

Disintermediation and securitisation

Disintermediation essentially means dispensing with financial intermediaries, 'cutting out the middle man', and having a direct relationship between borrower and lender. If a company decides to raise funds from investors directly, rather than involve a financial institution such as a bank, then this is a form of disintermediation. When companies borrow and lend funds between themselves, without involving an intermediary, then this is another example of disintermediation.
The advantages of disintermediation, to the borrower, are usually cited as: lower cost, more quickly arranged and more flexible finance as the bank is virtually eliminated from the process. The investor, on the other hand, may receive a higher rate of return than from simply investing in a bank or building society deposit account. The investor will also, in most cases, hold a marketable security which can easily be liquidated if required.
Securitisation is closely related to disintermediation. Instead of raising loans direct from a financial institution a company *creates and issues its own securities* through intermediaries to investors. This usually takes the form of marketable debt, for example eurocommercial paper (which may be secured against the company's assets— *asset securitisation* —or against future earnings). This technique is really only available to large corporations with excellent credit ratings. The following is an example of how securitisation can be used in an innovative way to finance acquisitions.

Example 2 —Securitisation
In October 1996, Stagecoach plc, a bus and rail transportation group, became the first publicly quoted company in the UK to finance an acquisition by converting corporate debt into bonds for sale to international investors. The sum involved in the bond transaction amounted to £545 million.

> The arrangement works as follows. Stagecoach acquired Porterbrook Leasing, a railway rolling-stock company, by using contract lease payments due to Porterbrook by UK train operating companies as security for the bonds. Stagecoach finances the fixed interest payments on the bonds from the income stream from the leasing contracts with the train operating companies (TOCs). The TOCs are about 80 per cent backed by the UK government, a feature which makes the bonds a relatively low-risk investment for investors.

In the US, the securitisation market is huge whereas in the UK the market is still underdeveloped. Banks and building societies in the UK have begun to experiment with the technique. Barclays Bank and the National Westminster Bank are two examples of financial institutions which have used the technique in connection with mortgage and personal loans.

Innovations such as disintermediation and securitisation have helped create, particularly for large companies, a more flexible financial market.

The internationalisation of financial institutions

Just as financial markets are increasingly internationalised so too are financial institutions. In recent years the banking and financial services sector in the UK has been transformed by mergers and acquisitions. Many UK banks, particularly merchant banks, have been taken over by American, German, and Japanese financial services groups.

'Make no mistake about it, we're now in a new era, we're moving into a truly global banking model.' [3] This was the observation made by Robert Albertson of Goldman Sachs bank in New York, when Citicorp (a major US banking group) and Travelers Group (a giant US financial services company) merged in April 1998 to form the largest financial firm (and the largest ever merger) in the world, with assets, at the time, valued at $700 billion.

While UK and US banks continue to play a very significant role in the global financial markets, other financial giants from Europe, Japan and Asia have also become major players. Three of the top twelve financial companies in the world, measured in terms of asset values, are Japanese, four are European, and five are American (including the merged Citicorp-Travelers group, which then became the largest).

A further insight into the rationale for globalisation of financial services was provided in 1995/96 when Mitsubishi Bank and Bank of Tokyo, two of Japan's largest financial institutions, merged to create what (until the Citicorp-Travelers merger) was the world's largest bank with assets of £514bn—at the time of the merger. The rationale for the merger was the growth in competition in Japanese and international capital markets.

When the merger was announced, the president of the Bank of Tokyo, Mr Tasuku Takagaki said: 'The new bank is needed since the economy is becoming borderless because of internationalisation, liberalisation, the evolution of technology, and the development of information services.'

Since the Citicorp-Travelers merger, the Bank of Tokyo Mitsubishi, as the merged

Japanese group was called, was then relegated to the second largest banking/financial services company in the world.

Financial conglomerates

In the context of financial institutions, a financial conglomerate is a really large and powerful financial institution or **securities house,** domestic or foreign, which provides a diverse range of financial activities.

These activities range from retail banking, merchant and investment banking, investment management, corporate finance, market making, and so on. For example, Citigroup (the merged Citicorp-Travelers Group) provides commercial banking, investment banking, insurance services, fund management, and securities trading on a global basis.

In certain instances, in the UK, as we shall see later, some of these activities have to be carried on independently under financial services legislation, even within the same organisation, through various internal structural arrangements.

FINANCIAL INSTRUMENTS

Financial instruments consist of **cash** (coins, notes and demand bank deposits), **shares/equities** and **debt** (short-term debt such as bank loans and trade credit and long-term debt in the form of loans and debentures). Financial instruments, be they debt or equity, which are traded in the financial markets are collectively referred to as **securities.**

Securities is a generic term covering all types of financial instruments traded in the financial markets. More precisely a security represents a claim by the holder on the future income or assets of the party issuing the security. For example, an ordinary company share represents a claim by the shareholder on the earnings and assets of the company.

Securities can be ***short-term,*** such as 3-month Treasury bills (Tbs), or ***long-term,*** such as corporate bonds and equities. Short-term securities will be traded in the money markets: long-term securities will be traded in the capital markets.

Capital market securities

The main categories of securities traded in the capital markets are:

1 *shares*—which include both ordinary and preference shares; and
2 *debt instruments* of a long-term nature such as bonds and debentures.

Shares

Shares are units of ownership in a company and shareholders are the legal owners of the company. Shareholders have a right to participate in a company's profits (they usually receive dividends which are distributions of after-tax profits) and in its decision-making. However, day-to-day decision-making is usually delegated to the company's directors and managers—the agency relationship which we discussed in Chapter 2. Shares can be

either **ordinary** or **preference.**

Ordinary shares

Ordinary share capital provides a permanent source of funding for a company. Holders of ordinary shares normally receive a return on their investment by way of *dividends,* which are periodic and variable distributions of a company's earnings. Ordinary shareholders will also receive a return by way of a *capital gain,* if the company is successful and the market value of the share increases.

Ordinary shareholders will only receive their share of the profits (dividends) after the company has satisfied all its other financial obligations such as interest on debt, taxes, and preference dividends.

In the event of a liquidation, all creditors, secured and unsecured, will rank prior to the ordinary shareholders in the distribution of a company's assets. Thus ordinary shareholders come at the end of the financial obligations queue. They are the firm's **residual risk bearers** and consequently they will expect a return commensurate with this level of risk.

It is the equity of a company (equity equals total assets minus total liabilities) which belongs to the ordinary shareholders, thus ordinary shares are frequently called 'equities'.

Preference shares

Preference shares are often described as **hybrid securities,** that is, they are considered neither equity or debt securities—they possess certain characteristics of both.

Preference shares resemble ordinary equity shares in that the holder is entitled to a dividend but of a limited or fixed amount which is paid, as the name implies, in preference to any ordinary dividend out of a company's after tax profits. Preference shareholders may also rank ahead of ordinary shareholders for a distribution of a company's assets in the event of a liquidation.

Because the payments to preference shareholders are 'for a limited amount that is not calculated by reference to the company's assets or profits or the dividends on any class of equity share', preference shares are classed as **non-equity shares.** [4]

There are two main types of preference shares, *cumulative* and *non-cumulative.* Holders of cumulative preference shares will be entitled to receive any arrears of dividend which may occur in years when a company is unable to pay the full, or any, preference dividend. Non-cumulative preference shareholders will not be entitled to any arrears of dividend.

It is also possible for a company, if permitted by its Articles of Association, to issue *convertible preference shares* (e.g. Airtours plc). Holders then have the option, according to the terms of the issue, of converting their non-equity preference shares into equity shares at a specified conversion rate.

Preference shares may also be *redeemable* or *irredeemable,* but most commonly they are irredeemable and represent a permanent source of financing just like equities.

Debt instruments

Companies use long-term debt instruments, such as bonds and debentures, to raise substantial sums of loan or debt capital. A **bond** is a long-term debt instrument which can

be used by companies (or governments) to raise very substantial sums of money. A **debenture** is any document which sets out the terms and conditions under which a company has borrowed money—it is a written acknowledgement of a debt, usually given under the company's seal.

To avoid undue repetition we will use the term 'bond' in a generic sense to cover all forms of long-term, tradeable corporate debt (including debentures).

When a company issues a new bond (or any new security) it will initially be sold in the primary market and the issue proceeds, net of issue costs, (e.g. underwriters' fees and commissions) will go to the company. Subsequently the bond will be traded in the secondary market and its price will fluctuate over its lifetime.

Types of bonds

There are two broad categories of bonds traded in the capital markets: those issued by governments **(government bonds)** and those issued by companies **(corporate bonds).** Bonds issued by governments to raise money are often referred to as *'gilts'* or gilt-edged bonds. So called because there is, in democratic and developed capitalist economies, virtually no risk of a government defaulting on its bonds. Defaulting means being unable at some stage to make the interest and principal payments on the bonds issued.

Our primary interest, however, is in corporate bonds, of which there are today many different types (e.g. eurobonds, zero coupon bonds, and 'junk' bonds) each with its own particular characteristics. The risk of companies defaulting on their bonds is greater than that of governments and consequently the returns required by investors from corporate bonds are generally higher.

Unlike shareholders, corporate bond holders are not owners of the company, they are **creditors,** and as creditors their claim on the assets, or future earnings, of the company may be *secured* or *unsecured.*

Corporate bonds which are secured on assets of a company are technically known as *debentures* or *debenture loan stock.* Bonds which are not so secured are known as *subordinated debentures* or *unsecured loan stock.* Unsecured bonds will be more risky than secured bonds, therefore investors will typically expect a higher return in the form of a higher interest rate. Should a company go into liquidation, secured creditors will be paid from the sale proceeds of the secured asset(s) in preference to unsecured creditors.

The traditional form of debenture is where a company borrows a substantial sum of money directly from a single financial institution, such as an insurance company or pension fund, for a period of 20–30 years. The loan will be secured on specific assets of the company, typically fixed assets such as land and property. This type of debenture is known as a *mortgage debenture.*

Debenture loan stock, in contrast, is where the lump sum will be borrowed by splitting it into smaller tradeable units and selling them in the stock market. In the UK loan stock is usually traded in units with a par or face value of £100.

For example, if a company wishes to raise £100m of long-term debt, it could issue in the stock market 1,000,000 debenture loan stock units of £100 nominal value each. In the case of a large company, debenture loan stock is likely to be raised via a **syndicate,** that is, a diverse group of lenders, rather than from a single financial institution.

Bonds can also be broadly classified as **redeemable** or **irredeemable.** A redeemable

bond is one which over its lifetime makes regular interest payments to the holder and which will be bought back (redeemed), usually for a specified value, by the issuer at some stated time in the future.

The time of redemption is normally quoted as occurring over a defined number of years at some time in the future such as 2012–2015. This means that the bond can be redeemed at any time during the period 2012–2015 rather than on a single specified date. For this reason redeemable bonds are often referred to as 'dated' bonds.

In contrast an irredeemable or perpetual bond is 'undated', that is, it has no specified time for capital repayment (redemption) and instead is treated as paying only interest in perpetuity. A bond which pays interest in perpetuity and is never to be redeemed is called a ***consol.***

By way of illustration, Tesco plc, a leading food retailing company, is partly financed by the following bonds:

Tesco plc	*£m*
1 10 3/8% bonds 2002	200
2 8 3/4% bonds 2003	200

The 10 3/8% bonds are redeemable at a par value of £200m in 2002, and the $8_{3/4}$% bonds are redeemable at a par value of £200m in 2003. (*Source:* Tesco plc annual accounts.)

Characteristics of bonds

Bonds have a **face** or **par value** and carry a **coupon** which is the interest rate payable at regular intervals. Bondholders receive periodic interest payments, of a known amount, during the period of the loan and the principal is repaid when the stock reaches maturity—if the issuer does not default.

The interest paid on bonds may be at a fixed or floating interest rate and, unlike dividend payments, interest is a tax-deductible expense. A company is allowed to charge the interest on debt against profits. This tax benefit tends to make debt a cheaper source of long-term financing than equity.

Bonds can be traded in the stock market in the same way as equity capital, or they may be held until **maturity** or **redemption** at which time the holder will be repaid the bond's par value. If a bond is being sold in the market above its par value it is trading at a **premium:** conversely if it is being sold in the market below its par value it is trading at a **discount.**

Like equity prices, bond prices can rise or fall on the bond market depending upon the movement in the general level of interest rates. Thus a bondholder may incur a capital gain or loss if the bond is sold in the open market before maturity. Example 3 illustrates the characteristics of a corporate bond.

Bond prices are quoted daily in the companies and markets section of the *Financial Times.* The prices are given for UK gilts, and for other international government and corporate bonds.

Example 3 *—A Corporate Bond*

Component Enterprises plc, a computer component manufacturer, has issued a 10 year bond, with a 7 per cent coupon at £100 par. Providing the company does not at any time default on the terms of the issue, a bondholder will receive:

1 an annual interest payment of £7—usually in two semi-annual payments of £3.50—over the 10-year period; and
2 a repayment of the £100 at maturity, that is at the end of the 10-year period.

If you buy a bond now for £100 and sell it for £110 in five years time, you will have made a *capital gain* of £10—the bond would be trading at a premium. Alternatively, if the bond is only trading for £90 in five years time you will have made a *capital loss* of £10, In this case the bond would be trading at a discount.

Convertible debt

There are times when a company may decide to finance its long-term operations by issuing **convertible debt.** Convertible debt (e.g. convertible debentures or convertible loan stock) is a form of hybrid debt finance where the holder of the debt instrument has the option to convert the debt into equity at a pre-specified rate of conversion, usually a predetermined number of equity shares per £100 of debt held.

Normally the terms of the convertible issue will specify a defined period of time, called the *conversion period,* over which holders may or may not exercise their rights to convert. When a convertible issue is made, the conversion period will not normally commence until some years into the future.

The rate of return on convertible debt is usually lower than on non-convertible debt as the convertible holder enjoys the right to acquire equity shares, usually at a favourable rate. Thus from the issuing company's point of view, this right to equity participation or 'equity incentive' tends to make convertible debt a cheaper form of debt financing than a conventional loan.

The risk for the investor with convertible debt is that it implies growth in the issuing company's share price. For example, if a convertible bond is issued at £100 par when the company's share price at the time of issue is £2.00 and the conversion price is set at £2.50, then the conversion rate or ratio is £100/£2.50=40. Thus on conversion a bondholder will receive 40 equity shares for each £100 of debt held.

Should the share price rise to £2.75 during the conversion period and bondholders covert, they will actually receive £110 worth of equity (£40 equity shares valued at £2.75 each) for every £100 worth of debt.

Conversely, should the share price fall, then the bondholder will receive a lower value of equity. This is the risk investors take when they subscribe to a convertible debt issue.

With convertible debt or loan stock a ***conversion premium*** indicates that the underlying share price is not sufficient to justify conversion. In other words, it is more expensive to buy the convertibles than the equivalent number of ordinary shares. For example, if convertible debt or loan stock is quoted in the market at £110 and the debt is convertible into 100 ordinary shares which are trading at £1.00 each, the conversion premium would be 10 per cent.

Conversely, a ***conversion discount*** indicates that the price of the convertible is lower than the equivalent number of ordinary shares.

Warrants

Warrants are similar to convertible debt. They are options which give the holder the right to purchase a specified number of equity shares in a company at a predetermined share price. As with convertible debt there is usually a defined period of time over which the option may be exercised. When an issue of warrants takes place it is usually tied to a debt issue.

While warrants have similar characteristics to convertible debt they differ in that when debt-holders exercise their rights to convert to equity the original debt is eliminated, it is swapped for equity. Also, with a warrant, the holder subscribes additional cash to the company if the option is exercised. This not the case in converting debt to equity, where one type of security is exchanged for another.

Warrants entitle the holder to subscribe for equity shares at a predetermined (normally favourable) share price, known as the exercise price. If a company performs well then its share price in the market is likely to exceed the exercise price. In which case warrant holders will either exercise or sell their options.

If the option to purchase is exercised, *the company receives additional equity finance,* but in this case the original debt is not retired, it remains outstanding until maturity when it will be redeemed by the company.

Mezzanine finance

Mezzanine finance is an intermediate type of finance, it falls between conventional debt and equity finance. It is generally high-risk, high-interest bearing debt with a convertible equity property, for example it may be issued with warrants.

Mezzanine finance is high risk because it ranks low in the order of priority for repayment in the event of a liquidation and for this reason it is often referred to as *subordinated* debt. To compensate for the risk the debt is usually 'priced' at several percentage points, about 4–5 per cent, above normal interest rates.

Mezzanine finance is typically used to finance mergers, acquisitions, and management buy-outs (MBOs).

Sources of company capital

Table 3.1 presents the main sources of capital funds for industrial and commercial companies, in percentage terms. As Table 3.1 indicates, the largest single source of company financing is internally generated funds, column 2 although this has declined in relative terms in recent years.

In the early 1990s, a time of economic recession and record company insolvencies in

the United Kingdom, companies were more reliant on internal financing and reluctant to borrow from banks. This was due to the risk of banks foreclosing on loans, which many did, if a company got into financial difficulties during the recession. In fact, over the period 1992 to 1994 the trend was for companies to have net repayments on their borrowings to banks, as indicated by negative figures in column 3 of Table 3.1.

EXERCISE 5 —LONG-TERM FINANCING

What are the main forms of long-term capital which a company can raise? How do their characteristics compare?

Money market securities

Most transactions in the money markets involve **marketable securities.** These are short-term, easily liquidated securities such as *Treasury bills (Tbs), Certificates of Deposit (CDs),* and *commercial paper (CP).* These securities can be issued and traded by businesses, government and financial institutions depending upon the type of instrument involved.

Table 3.1 Sources of company capital (%)

1	2	3	4	5	6	7	8
Sources of capital funds of industrial and commercial companies							
Year	*Internal*	*Bank loans*	*Other loans*[a]	*Debens and pref. shares*	*Ord. shares*	*Other*[b]	*Total*
1992	68.3	−3.6[c]	−1.7	6.2	13.8	16.9	100[d]
1993	64.3	−14.7	5.0	7.0	18.0	20.3	100
1994	72.9	−5.8	3.5	9.5	13.9	6.2	100
1995	53.4	13.1	2.7	11.6	11.8	7.6	100
1996	49.3	12.7	6.6	4.3	10.8	16.3	100

Source: Financial Statistics, September 1997, Office for National Statistics—adapted.

Notes: [a] 'Other loans' also include mortgages. [b] 'Other' category includes other capital issues and other overseas investment. [c] Negative figures represent net repayments. [d]Rows may not sum exactly due to statistical roundings.

Treasury bills (Tbs)

For reasons which we will shortly explain Treasury bills (Tbs) are a key money market instrument. Only governments can issue Treasury bills. They will sell Treasury bills in the financial markets to raise funds to finance public expenditure. Treasury bills are sold at a discount to their nominal value. Rather than pay interest, Treasury bills are issued at a discount to their face or nominal value, although a rate of interest is implied by the level of discount offered.

For example, in the UK 3-month Treasury bills may be sold in the markets at a price of £98, a discount of £2 on their nominal £100 value.

The government will then buy back the bills on maturity from the holder at their £100 nominal value. In this case the investor earns a return of £2 on an investment of £98 over a three-month period. This would be approximately equal to an annualised rate of return (or implied interest rate) of:

$$(£2/£98×12/3)x100=8.16\%$$

Thus £2 is being earned on £98 over a three-month period and there are four three-month periods in a year (12/3). We will see in later chapters how to calculate annualised rates of return more accurately.

To a corporate treasurer Treasury bills have the attractions as short-term investments of being highly liquid, there is a highly developed secondary market, and because they are government securities, their risk, in developed countries, is non-existent. The corporate treasurer can invest surplus funds in Treasury bills through the firm's bank.

The market price of Treasury bills will be directly related to short-term interest rates. If short-term interest rates rise, the price of a bill will fall. Conversely, if short-term interest rates fall, the price of a bill will rise. It is their close connection with short-term interest rates that makes Treasury bills one of the most important short-term money market securities.

As we will explain in more depth in Chapter 6, there is an *inverse relationship* between an asset's return and its price in the markets. When an asset's market price increases, its return falls and vice versa.

EXERCISE 6 —TREASURY BILLS

If the market price of a Treasury bill falls to £97, calculate the annualised rate of return. Before attempting the calculation, do you think the rate of return will be higher or lower than that previously illustrated?

Certificates of Deposit (CDs)

For a corporate treasurer with surplus funds to invest on a short-term basis Certificates of Deposit (CDs) are also a suitable form of financial instrument. A Certificate of Deposit (CD) is a written acknowledgement (certificate) issued by a financial institution, normally a bank, stating that a specified sum of money has been placed on deposit for a defined period of time. The certificate will stipulate the rate of interest to be paid and the maturity date. CDs are typically issued with maturity periods of three or six months.

Negotiable CDs can be sold in the money markets before maturity. Thus a corporate treasurer investing in negotiable CDs has the option to sell the securities in the markets should the funds be needed by the firm.

CDs issued by the major financial institutions have the attractions of being marketable,

offering a guaranteed rate of return, and are low risk.

Commercial paper (CP)

Commercial paper (CP) is an unsecured promissory note issued by a corporation to raise short-term finance in the money markets, as an alternative to raising money (overdraft or short-term loan) direct from a financial institution. A promissory note is simply a written promise to pay.

The paper is usually issued by large companies with sound credit ratings and with access to bank credit facilities to cover the issue. The paper can have a maturity period of from about 7 days up to one year, but 30–60 day paper is more common. When the paper matures it can be refinanced by the company issuing new paper to replace it.

Similar to Treasury bills, commercial paper is sold at a discount in the markets and the rate of interest is implied in the discount offered.

Corporations with short-term funds to invest can buy commercial paper and perhaps obtain a slightly better return than that available from a short-term bank deposit.

Commercial paper is a form of securitisation as the funds are raised on the back of a short-term security issued direct by a company, rather than by a financial institution. See also eurocommercial paper (ECP) which we referred to earlier.

Financial innovation

In recent years **financial innovation** and **financial engineering** have produced a rapid proliferation in the range of new financial instruments available in the financial markets. One reason for this has been an attempt to refine the nature of existing financial instruments so that they more closely meet the mutual needs of borrowers, lenders and intermediaries in the rapidly changing environment of the international marketplace. Another has been the creation of new financial instruments (e.g. derivatives) in an effort to circumvent some countries' market regulations.

Derivatives

Derivatives are financial instruments whose value is derived from underlying or **primary assets** such as shares, bonds, commodities (e.g. coca and copper) and property. When the value of the underlying or primary asset changes, so too does the value of the derivative. Thus the performance of a derivative is tied to the performance of the primary asset. Derivatives can be used as either *hedging* (risk protection) or *speculative investment* instruments.

Broadly speaking, there are two main forms of derivatives, **futures** and **options,** although a multiplicity of instruments has developed around these. There are, for example, various combinations of forward and options contracts, various types of debt instruments with flexible characteristics in terms of interest rates, currency denominations and maturities and other types of interest rate and currency swaps—to mention but a few! The main derivatives can be defined as follows:

Futures

Essentially a future is a contract between two parties (a buyer and a seller) to exchange a specified asset (e.g. a commodity, a financial instrument or currency) on an agreed date in the future for a price which is agreed now. Notice that they are actually formal contracts between two trading parties. These contracts can then be traded in recognised futures exchanges such as LIFFE and IFOX (see below) which form a *futures market.*

Options

An options contract gives the holder the right, but not the obligation, to buy or sell a specified asset at an agreed price on or before a specified expiration date. With an options contract the buyer or holder has a choice, he/she can exercise or not exercise the options as desired. An option to buy is termed a **call option** and an option to sell is termed a **put option.**

Futures and options are traded through organised exchanges such as LIFFE (The London International Financial Futures and Options Exchange) in the UK, IFOX (The Irish Futures and Options Exchange) in Ireland and the Chicago Board Options Exchange (CBOE) in the US.

Derivative markets move very rapidly and trading in derivatives can be very costly or in some cases even fatal for a company or institution; they carry very heavy risks. Many of the implications of using the more complex derivatives are not yet fully understood and they are also very difficult to monitor.

In the past some corporate treasury departments have experienced heavy losses through the use of derivatives. In 1993/94 Germany's Metallgesellschaft (a large manufacturing MNC) had to be rescued by its banks when one of its subsidiaries ran up losses of around $1 billion in using oil derivatives.

Other major companies such as Allied Domecq (formerly Allied Lyons), Hong Kong & Shanghai Banking Corporation (HSBC), NatWest (the investment banking arm of the National Westminster Bank), Procter & Gamble, and Shell, have also incurred heavy losses in the past by using derivatives.

NatWest, for example, lost an estimated £50m in options trading in 1996, Procter & Gamble was reported to have incurred a $100 million after-tax loss in swaps in 1993/94, and HSBC lost a reported £93 million in derivatives in 1994. Speculation in derivatives also caused the insolvency of Orange County in California—the richest county in the richest state in the USA—in 1994!

But the most famous case associated with the trading in derivatives was the collapse of Barings Bank—the City of London's oldest merchant bank—and the speed with which it happened, over a period of a few days in February 1995. The full story behind the bank's collapse remains to be told.

One of the greatest difficulties in the Barings Bank case proved to be in trying to quantify the actual amount of the losses—estimated at more than $900m (£566m)—from derivative trades. At one point, just days before it collapsed, Barings had an estimated $27bn (£17.7bn) of futures positions on the Nikkei 225 index (in Tokyo), and was exposed to further losses of $280m for each 4 per cent drop in the index.

Derivatives can therefore be very complex and high-risk instruments. As derivative markets tend to move very rapidly large losses/gains can accumulate in a very short space

of time as was dramatically demonstrated in the Barings Bank case.

In the early to mid-1990s derivatives undoubtedly had a 'bad press' but despite the more dramatic instances of losses and failures associated with them, they are nonetheless very useful instruments for risk protection—if used prudently!

One of the key problems of derivatives concerns actually assessing their affect on a company's financial status—they are analogous to a financial 'black hole' in a balance sheet. Finance Reporting Standard (FRS) 13 'Derivatives and Other Financial Disclosures', issued by the Accounting Standards Board (ASB), prescribes the reporting and disclosure requirements in relation to derivatives.

FINANCIAL MANAGER

The financial manager today operates in a rapidly changing and uncertain financial environment. Financial markets move rapidly, there is volatility of interest and exchange rates and an increasing rate of financial innovation.

The challenge for the financial manager is to respond and adapt effectively to changes in the financial environment, being able to *exploit profitable investment and financing opportunities* and *minimise risks.* The effective financial management of the firm therefore requires the financial manager to have a sound understanding and appreciation of today's complex financial environment.
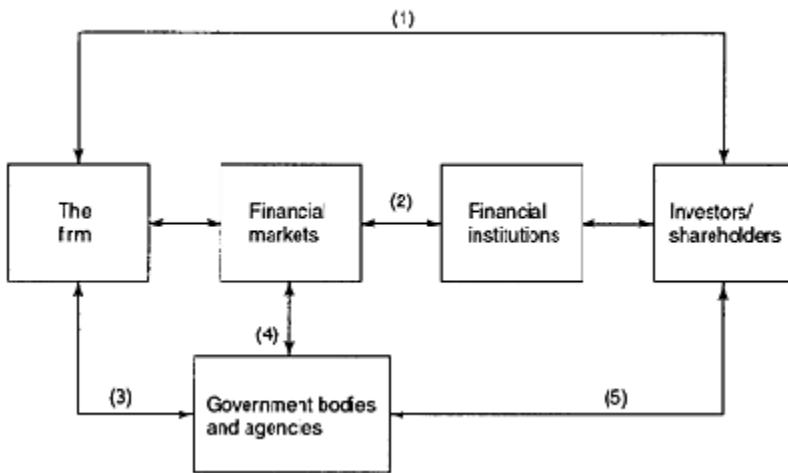
THE FLOW OF FUNDS

Figure 3.3 The flow of funds

Figure 3.3 illustrates the main financial relationships between key players and the flow of funds in the financial environment. In order to avoid undue complexity the illustration of

funds flows has been simplified. To demonstrate all possible combinations of funds flows would make the diagram unwieldy and overly complex. Our focus is primarily on the flows of funds to and from the firm.

Figure 3.3 illustrates essentially five main flows of funds as follows:

1 direct flows of funds between the firm and investors (including shareholders);
2 indirect flows of funds between the firm and investors via financial intermediaries and financial markets;
3 direct flows between the firm and government bodies/agencies;
4 indirect flows between investors (which may also include the firm) and government bodies/agencies; and
5 direct flows between investors and government bodies/agencies.

We can examine these funds flow relationships a little more closely.

1 This represents the *direct* two-way flow of funds between the firm and investors (disintermediation). Investors (who may be other businesses or individuals, domestic or foreign) may supply funds directly to the firm, for example, by subscribing for its securities (shares, debentures, etc.) or by providing loans. The firm in turn will make returns direct to investors in the form of dividends, interest and loan payments.

2 This illustrates the *indirect* flows of funds between the firm and investors via the financial institutions and the financial markets. Investors may invest their funds with financial institutions (e.g. savings/investment accounts, insurance and pension plans) who in turn invest these funds in aggregate in the financial markets, perhaps also buying the firm's securities or providing it with loans.

The firm will make returns to investing financial institutions by way of, for example, dividends, interest and loan payments. The financial institutions will make payments to investors. These payments may take many forms, for example, interest on investment accounts, insurance and pension payments, or withdrawal/maturity of investments.

3 The firm will also make payments directly to government bodies and agencies, for example, corporation tax payments to the Inland Revenue and value added tax payments to Customs and Excise.

Government bodies and agencies, such as industrial development agencies and local authorities, may make grants and other forms of financial assistance available to qualifying firms.

4 Investors and financial institutions may also provide funds to government bodies and agencies. For example, by purchasing government securities such as Treasury bills in the financial markets, and by paying taxes.

5 There is also a direct relationship between government bodies/agencies and investors. Investors, for example, may pay their taxes and other financial commitments direct to government bodies.

Irrespective of whether it is a business firm or government which is issuing a financial instrument (demanding funds) or purchasing a financial instrument (supplying funds) the parties to the transaction will either deal directly with each other or deal through a financial intermediary such as a broker or merchant bank.

The financial manager and the firm will fall into the category of either supplier or demander of funds depending upon the financial requirements of the firm at the time. For

example, when raising funds (short- or long-term) the financial manager will in effect be selling claims on the firm's existing or future assets (or earnings) in return for the receipt of funds. These funds may then be used by the firm to invest in new assets (fixed or current) to assist the future growth and development of the firm.

If the firm is generating positive cash flows, these will be used to meet the firm's existing financial obligations (e.g. interest, dividend, tax and loan payments). Any surplus cash may be reinvested in the operations of the firm or in an appropriate interest-earning financial instrument such as a bank deposit account.

In making investment and financing decisions directed at maximising shareholder wealth, the financial manager will clearly be required to understand the workings and nature of the financial environment. He/she must be able to interact effectively with the key players in a way which is consistent with achieving the firm's primary goal of shareholder wealth maximisation.

RECAP

Financial environment: This is part of the overall dynamic business environment in which the financial manager and the firm operates and in which investment and financing decisions are made.

The financial environment consists of *financial markets, financial institutions* and *financial instruments* and is increasingly of a global nature. It is a complex and forever changing environment, characterised by rapid change in structures and systems, innovations in financial products and volatility in interest and exchange rates.

Financial markets: These bring suppliers and demanders of funds together in order to meet their respective financial needs. They enable mutually beneficial financial transactions to take place, provide a source of capital for companies and **value a firm's securities.** Financial markets include:

- the primary market, for the trading of new securities;
- the secondary market, for the trading of second-hand securities;
- the capital market, for the trading of long-term securities such as shares and bonds;
- the money market, for the trading of short-term securities, such as Treasury bills.

Financial markets move very rapidly and are characterised by increasing *globalisation, liberalisation* and *integration;* they now essentially function on a global basis.

Financial institutions: These participate in the financial markets acting as **financial intermediaries** between suppliers and demanders of funds. Institutions are both suppliers and demanders of funds as they receive funds from and channel funds to businesses, governments and individuals. The two key functions of financial institutions are *brokerage* and *funds transformation.*

Financial instruments: These consist of cash (coins, notes and demand bank

deposits), shares/equities and debt (short-term debt such as bank loans and marketable securities and long-term debt in the form of loans and debentures). Financial instruments which are traded in the financial markets are collectively referred to as **securities.** A security represents a claim by the holder on the future income or assets of the party issuing the security.

Financial instruments include the fast-growing area of derivatives, such as futures and options, which give greater scope and flexibility in financial market trading. However, their use is unregulated and they do present great risks for users.

Financial manager: The financial manager operates in a rapidly changing and uncertain financial environment. Financial markets move rapidly, there is volatility of interest and exchange rates, and an increasing rate of financial innovation. The challenge for the financial manager is to respond and adapt effectively to changes in the financial environment, being able to exploit profitable investment and financing opportunities and minimise risks.

In summary, the financial manager must be able to interact effectively with the financial environment in a way which is consistent with achieving the firm's primary goal of shareholder wealth maximisation. Clearly this requires the financial manager to have a sound understanding and appreciation of today's complex international financial environment.

APPENDIX I MARKET REGULATION

In this section we will examine how financial markets and the financial services industry in general are regulated.

The financial services sector today in the UK (as in many other developed countries) is immense and has a very substantial influence on the economy. The UK financial services sector accounts for around 7 per cent of gross national product (GDP), around 30 per cent of the value of FTSE100 companies, and employs approximately one million people—nearly 5 per cent of the country's workforce.

Moreover, in excess of 80 per cent of UK households have a bank or building society account, approximately 70 per cent contribute to life insurance or pension schemes, and more than 25 per cent of adults own shares or unit trusts. [5] Thus the importance of efficient and effective market regulation has an impact on most of the population, either directly or indirectly.

Regulation is a fundamental requirement for the **fair and orderly operation and conduct** of the financial sector and for **investor protection,** but the extent to which the financial sector should be regulated (including *self-regulation* and *legislation*) is a subject of frequent debate in the financial and investment community, the media, and in Parliament.

To legislate or not to legislate?

Some groups advocate more legislation to control financial markets and institutions saying that self-regulation has proved ineffective in view of the many catastrophes and

scandals. Other groups advocate a greater degree of self-regulation, while others still would prefer less regulation claiming that the sector is over-regulated.

After each financial catastrophe or scandal (e.g. Guinness, Lloyds of London, Maxwell Corporation, BCCI and Barings Bank) the debate is revitalised and the calls for further and tougher regulation (particularly legislation) intensify.

The Pensions Act 1995, for example, which came into force in 1997, is a response to the Maxwell pensions fraud in 1991, in which more than £400m of the Maxwell Group's pension fund assets disappeared. Many consider that the Pensions Act still falls short of what is required in terms of regulation of the pensions industry—an area of the financial services market which was largely unregulated until after the Maxwell scandal.

In essence, the arguments for and against regulation and legislation in the financial markets are as follows:

Arguments for

- necessary for the operation of orderly and fair markets;
- necessary for investor confidence and protection;
- current systems of self-regulation and legislation have not proved effective.

Arguments against

- markets become too rigid and inflexible and are unable to respond quickly enough to market changes and new opportunities;
- over-regulation of UK markets will make them uncompetitive internationally;
- systems of regulation and legislation are costly to operate and control;
- it is impossible to legislate against crime (e.g. fraud).

In summary, regulation is essentially **a question of balance** in the marketplace, too little or ineffective regulation leaves markets open to abuse, too much regulation makes markets rigid, costly to operate and uncompetitive.

The pace of technological and financial innovation in financial markets makes it extremely difficult for regulators to keep pace. There is always a time lag (and sometimes a lengthy one) between when new innovations are introduced to the markets and when their full effects and regulatory implications become apparent, for example the explosive development of financial derivatives.

The present system of regulation in the UK

The present system of regulation and control in the UK financial sector is a combination **of legislation** and **self-regulation.** The 1980s was an important decade in which several new and substantial pieces of legislation were introduced to control the financial sector, to provide orderly markets and to afford investors greater protection. There were, for example, **the Companies Acts 1985** and **1989, the Financial Services Act 1986 (FSA)** and **the Banking Act 1987.** At the time of their drafting many groups lobbied to have the scope and provisions of these Acts extended and strengthened.

While the various Companies Acts, enforced by the **Department of Trade and Industry (DTI),** address the nature of the relationships between a company, its shareholders and its creditors, the FSA 1986 and the Banking Act 1987 provide the legal framework for the control of the financial markets and financial institutions in the UK.

T**he Bank of England,** the central bank in the UK, has a key role in many areas of the financial sector. It has responsibilities relating to *supervision* of: the banking system, the wholesale money market, the foreign exchange markets, interest rate controls and the gilt market. Many of these responsibilities are defined by the Banking Act 1987.

The Financial Services Act 1986

The 1986 Financial Services Act (FSA) was a major piece of legislation which introduced radical and widesweeping reform into the financial services industry. The FSA allows for a system of **self-regulation** of the securities markets to operate within a **statutory framework** and requires all those involved in the **'investment business'** (as defined by the Act—in very broad terms) to be properly authorised. It is a criminal offence to carry on investment business without authorisation or exemption.

The alphabet soup of market regulation

Under the FSA (1986), a **Securities and Investment Board (SIB)** was established, as a private company, and given the statutory responsibility and powers to regulate the UK financial markets. Its powers were wide-ranging and enabled it to take action against firms practising without authorisation. The SIB was accountable to Parliament through the Treasury.

The SIB has since been replaced (October 1997) by the Financial Services Authority (FSA), a company limited by guarantee and also confusingly referred to as the FSA. To help avoid confusion, in this text when referring to the 1986 Financial Services Act we will show the FSA acronym followed immediately by (1986).

At the time of writing (Summer 1998) financial services regulation is going through a transition and consultation stage. The government intends to ultimately have a single regulator, namely the FSA, responsible for regulating the full range of financial services. The FSA, for example, will eventually assume responsibility for many of the functions currently carried out by some of the organisations (e.g. SROs and RPBs) described below.

In addition, responsibility for supervising banks, listed money market institutions and related clearing houses will transfer to the FSA. Legislation to enact most of the proposed changes is expected to appear on the statute book around late 1999.

The FSA has three broad aims:

1 **to protect consumers of financial services;**
2 **to promote clean and orderly markets; and**
3 **to maintain confidence in the financial system.**

Currently (Summer 1998) the regulatory structure is broadly as follows.

At the next lower level, accountable to the FSA, is a number of **Self-Regulating**

Organisations (SROs), each of which is responsible for the investment activities of its members. The **Recognised Professional Bodies (RPBs)** (e.g. for accountants and lawyers) fulfil the same role as an SRO for these groups of professional organisations, and are answerable to the FSA.

The **Recognised Investment Exchanges (RIEs),** of which the London Stock Exchange is one, are similarly accountable to the FSA. As an RIE the London Stock Exchange is responsible for regulating the users of its markets, ensuring the orderly operation of its markets and providing proper protection to investors.
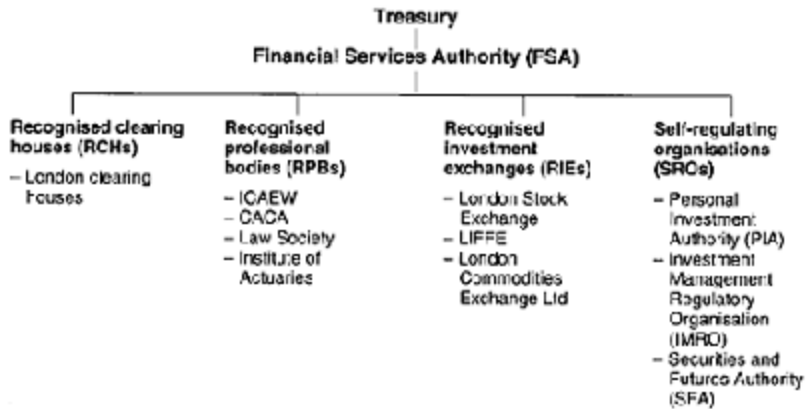
Figure 3.4 Regulatory structure of the UK financial services industry

The **European Union's Investment Services Directive (ISD),** together with the various banking directives, provide the framework for the single European market in financial services and permit authorised firms to operate throughout Europe on the basis of a single authorisation.

Figure 3.4 illustrates the regulatory structure of the investment industry in the UK. The costs of operating this extensive regulatory system, which are not inconsiderable, are borne by the financial community itself. Thus the FSA will be funded by charging fees to the bodies and firms it regulates.

We will now look briefly at the role of some SROs.

Self-regulating organisations (SROs)

- *The Personal Investment Authority (PIA):* The PIA regulates the activities of the *retail sector* of the financial services industry. It regulates, for example, financial intermediaries, independent financial advisers, brokers and others, and the financial products they sell.
- *The Securities and Futures Authority (SFA):* This SRO essentially regulates the activities of the securities markets, including the futures markets (financial and commodities).

- *The Investment Management Regulatory Organisation (IMRO):* IMRO regulates those involved in the management of *pooled investment funds* such as pension funds, investment and unit trusts.

ANOTHER FINE MESS?

In April 1997 IMRO imposed a fine of £2m plus £1m in costs, the highest fine ever levied by a UK financial services regulator, on Morgan Grenfell Asset Management (MGAM) a major UK asset management group owned by Deutsche Bank (Germany's largest bank). MGAM was fined for serious breaches of IMRO rules, including the failure to prevent one of its key fund managers from making secret investments with clients' money and to disclose its difficulties when discovered to IMRO.

Approximately 90,000 investors in three of MGAM's investment funds were affected by the mismanagement. The financial scandal is reported by Deutsche Bank to have cost it around £430m, including approximately £200m of compensation for investors.

Regulation of takeovers and mergers

The regulation of takeovers and mergers is mentioned here as one of the better examples of the operation of *self-regulation* in the financial sector. Admittedly some areas of takeovers and mergers are governed by the Companies Acts but our focus here is on how the self-regulatory aspects operate.

Takeover and merger activity is a major and a lucrative source of business for the financial community, not only for the institutions such as the merchant and investment banks but the related professions such as accountants and lawyers, all of whom earn sizable fees for their involvement. The lure of substantial fees and commissions can lead to abuse and malpractice.

To regulate this activity the City of London operates a **City Code on Takeovers and Mergers**—the **'Takeover Code'** which was first drawn up in 1968 by the Stock Exchange and other City institutions. The City Code is administered and enforced by the **Panel on Takeovers and Mergers**—the **'Takeover Panel',** which is a non-statutory body.

The Takeover Panel is not part of the regulatory structure illustrated above but its activities are supported by the FSA and other SROs. The Panel's role is essentially to police takeovers and mergers, to ensure that the rules have been followed, and in particular to ensure that shareholders have received fair treatment.

The future of financial services regulation

As indicated above, after more than eleven years in operation, the government is planning to streamline the supervisory structure of the financial services industry. The structure as outlined above has often been criticised for being too cumbersome, and there have been internal disagreements between some of the regulatory bodies.

A new Financial Services Act, and possibly a new Companies Act, are anticipated in late 1999. Whatever the final decisions on the changes to be made, an evolutionary, rather than a revolutionary, approach to reforming market regulation is envisaged.

There will also be further changes to financial services regulation instigated by the European Union. In the longer term, the European Union aims to have a common regulatory framework for financial services.

REVIEW QUESTIONS

Concept review questions

1 (a) Describe the financial environment in which the business firm operates, (b) Explain the financial manager's role in this environment.
2 (a) What are financial markets? (b) Discuss their role in the financial management of the firm, (c) Distinguish between (i) money and capital markets and (ii) primary and secondary markets.
3 Explain the role and function of merchant and investment banks.
4 Explain the following terms: derivatives; disintermediation; euromarkets; eurocurrency market; eurobond; securitisation.

Test questions

5 **Financial intermediaries.** Explain the functions of financial intermediaries in bringing together individual borrowers and savers.
6 **Financial regulation,** (a) What are the arguments for and against the introduction of greater statutory controls to regulate financial markets? (b) Briefly describe the role and function of the Personal Investment Authority (PIA) and the Securities and Futures Authority (SFA).
7 **Venture capital,** (a) What is a venture capital company (VCC)? (b) Explain the role of a venture capital company.

NOTES

1 The term 'global village' was coined by Marshall McLuhan more than thirty years ago.
2 London Stock Exchange Fact File 1998.
3 *The Independent,* 7 April 1998.

4 Financial Reporting Standard 4—Capital Instruments.
5 The Financial Services Authority.

FURTHER READING

General

A useful introduction to financial markets is provided by:
• *Financial Markets: An Introduction* . Dixon, R. and Holmes. P., Chapman & Hall, 1992.
   A more extensive, and relatively non-technical, treatment of financial institutions, markets and instruments is provided in:
• *Finance and Financial Markets* . Pilbeam, K., Macmillan Business, 1998.
• 'The Many Roles of Financial Markets.' Naik, N., *Mastering Finance ,* Issue 1, Financial Times, 1997.
   For a review of the operation of UK financial markets and institutions see:
British Financial Markets and Institutions: An International Perspective . Piesse, J., Peasnell, K. and Ward, C., Prentice Hall, 1995.

International financial markets and institutions

Excellent coverage of international financial markets and institutions is provided in:
• *Financial Management for International Business* . Demirag, I. and Goddard, S., McGraw-Hill, 1994.
• *Multinational Finance* . Buckley, A., 3rd edition, Prentice Hall, 1996.
• *An Introduction to Global Financial Markets* . Valdez, S., 2nd edition, Macmillan Business, 1997.

Financial derivatives

For students interested in exploring financial derivatives the following texts provide a very helpful introduction:
• *An Introduction to Derivatives* . Chance, D.M., 4th edition, The Dryden Press, 1998.
• *Financial Derivatives* . Kolb, R.W., 2nd edition, Blackwell, 1996.

Financial services regulation

Information on the role of the FSA and the changing face of regulation in the financial services sector can be obtained from the Financial Services Authority, 25 The North Colonnade, Canary Wharf, London.

4
CAPITAL MARKETS

This chapter builds on the introduction to financial markets in Chapter 3 by providing a more in-depth examination of the nature and role of capital markets, primarily those in the UK. It covers the following topics:

an overview of capital markets;
the nature of securities markets, including the London Stock Exchange;
the gilt-edged and fixed interest markets;
stock market trading systems;
market efficiency;
the capital markets and small firms financing.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the nature and role of capital markets;
2 define the respective roles of securities markets;
3 understand the importance of market efficiency;
4 explain the difficulties experienced by small firms in raising capital in the markets.

OVERVIEW

As introduced in Chapter 3, capital markets are for trading in **long-term securities,** that is those which have a maturity of at least a year such as bonds, debentures and shares. Thus they bring together demanders and suppliers of long-term capital.

The primary functions of capital markets are:

1 to enable companies to raise essential long-term financing by issuing securities; and
2 to provide a market in which these securities can be (fairly) valued and easily traded.

The markets should perform these functions *efficiently.* If capital markets work efficiently, then financial resources will be directed to their most productive uses in the economy and the securities of firms will be fairly valued.

Developed countries each have their own capital markets. In the United States, for example, the main capital market is the New York Stock Exchange (NYSE), the largest capital market in the world. In the United Kingdom the capital markets include **the main market of the London Stock Exchange Limited,** which is the market for trading in the securities of large companies, and **the Alternative Investment Market (AIM)** which is the market for dealing in the securities of smaller, emerging companies.

We will begin by examining the role and function of **securities, or stock, markets** and progress to examine the important concept of **market efficiency.** We will conclude with a review and discussion of the particular problems encountered by small firms in gaining access to capital in the markets.

SECURITIES MARKETS

A securities market (or exchange) [1] serves three main functions:

1 **it allows companies to raise new capital (debt and equity);**
2 **it provides a market in which investors can buy and sell securities; and**
3 **it values a company's securities.**

Companies can raise new capital in the stock market by issuing shares (ordinary or preference) and/or debentures.

By providing a forum in which demanders (companies) and suppliers (investors) of funds can transact business directly and easily, a stock exchange fulfils a vital role in a market economy. This is one reason why many of the countries in eastern Europe, which desire to convert to a market economy, have established stock exchanges.

Issues of capital in securities markets

Tables 4.1 and 4.2 present summaries of the issues of capital, net of redemptions, by UK listed public companies over the five-year period 1991 to 1995. Table 4.1 shows the absolute monetary value of net issues, that is the net capital raised by listed public companies in the UK markets, in £ million.

Table 4.2 presents the same information only in percentage format, showing the relative proportions of the forms of capital raised in the markets. The bulk of capital issues are largely in the form of either equity (ordinary shares) or loan capital.

Preference shares remain the least popular form of issue, companies frequently choose to issue loan capital instead. Preference shares are a fixed rate of return security, that is they carry a fixed rate of dividend which is paid out of *after tax profits.* In contrast the interest payable on loan capital can be charged against corporate profits, this makes debt a cheaper form of financing than preference shares.

Table 4.1 Capital issues (net) by UK listed public companies (£m)

Year	Loan capital	Preference shares	Ordinary shares	Total
1991	11,846	1,138	11,004	23,988
1992	7,948	625	6,400	14,973
1993	11,136	1,459	16,589	29,184
1994	12,215	328	14,885	27,428
1993	4,075	2,407	7,481	13,963

Table 4.2 Capital issues (net) by UK listed public companies (%)

Year	Loan capital	Preference shares	Ordinary shares	Total
1991	49.4	4.7	45.9	100
1992	53.1	4.2	42.8	100
1993	38.2	5.0	56.8	100
1994	44.5	1.2	54.3	100
1995	29.2	17.2	53.6	100

Source: Annual Abstract of Statistics 1997, Office for National Statistics—adapted.
Notes: Row totals do not sum exactly due to statistical roundings. Figures
represent net capital issues, i.e. gross capital issues less gross redemptions.
Redemptions exclude share buybacks.

The importance of market liquidity

For any securities market or stock exchange to be successful it must be possible for
investors to easily liquidate or cash in their investments, otherwise they would demand a
premium for tying up their capital, or avoid investing in the stock market altogether.
Clearly such a situation would make it extremely difficult for companies to raise essential
capital. Thus the liquidity of a stock market, that is, the ease with which investors can
buy and sell shares, is critical to its success. One of the reasons often cited for the
ultimate failure of the London Stock Exchange's Unlisted Securities Market (USM) in
the UK (see below) was its relative lack of liquidity.

EXERCISE 1 —SECURITIES MARKETS
Briefly explain the role of a securities market.

The London Stock Exchange Limited

The London Stock Exchange Limited is the registered company name for the London
Stock Exchange, which is the oldest and most famous capital market in the world. The
London Stock Exchange has its origins in merchant trading in the sixteenth century when
the first joint-stock company (where the public could subscribe to ownership in equal

shares) was formed.

The Exchange has undergone considerable change in recent years, most notable of which was the 'Big Bang' series of reforms in 1986: called 'Big Bang' because all the main changes were implemented in the same day, 27 October 1986.

The radical changes swept away the old traditional 'gentleman's club' approach to doing business, abolished demarcation lines and introduced a more competitive trading environment. The changes were essentially forced upon the Exchange by the government, which threatened to take the Exchange to court in the early 1980s if it did not reform what the government claimed were unfair and restrictive practices.

The London Stock Exchange is the principal securities market in the UK and provides the mechanism for raising capital for UK and foreign companies, government securities, eurobonds and depositary receipts (negotiable certificates showing ownership of a company's shares).

Since November 1986 the Exchange has operated as a private limited company. Until 8 December 1995 it was known as 'The International Stock Exchange of the United Kingdom and the Republic of Ireland Limited'. However, in accordance with the EU Investment Services Directive (ISD), which requires each member state to have its own statutory regulation, the Irish Stock Exchange separated from the London Stock Exchange on 8 December 1995 after a 200-year association.

As a limited company the London Stock Exchange now has its own Memorandum and Articles of Association (replacing the 1875 Deed of Settlement) and a Board of Directors. The Irish Stock Exchange is now similarly a limited company called The Irish Stock Exchange Limited.

The Exchange is made up of member firms, consisting of **market makers and broker-dealers,** who are shareholders of the Exchange with each member firm having a single vote. The all-party House of Commons Treasury Select Committee would wish to see the Exchange itself become a public listed company, arguing that as presently constituted it does not reflect the interests of the market as a whole.

The Exchange derives its income from a range of activities such as listing and membership fees, settlement operations, and the sale of information services.

Primary aim

The London Stock Exchange's stated primary aim is: 'to provide an environment in which both the domestic and international markets can flourish'. [2] It does this by ensuring that the necessary infrastructure is in place to regulate and operate its markets efficiently and to provide the required services to market users.

Key activities

The London Stock Exchange's key activities are:

- helping companies to raise capital;
- organising and regulating the UK central market in securities;
- organising and regulating the international equity market in international securities;
- providing settlement facilities for transactions in UK equities.

Type of securities traded

The securities listed and traded on the London Stock Exchange are of four basic types:

1 *UK or domestic equities* —ordinary shares issued by UK companies;
2 *overseas equities* —ordinary shares issued by non-UK companies;
3 *UK gilts* —securities issued by the UK government to raise money; and
4 *bonds or fixed interest stocks* —usually issued by companies or local authorities.

The markets of the London Stock Exchange

The London Stock Exchange operates two stock markets, **the main market** and **the Alternative Investment Market (AIM)**. The main market is for trading in the securities of large UK and international companies and the Alternative Investment Market (AIM) is for trading in the securities of smaller, young and fast-growing companies.

At the end of 1997 there were 2,683 companies listed on the London Stock Exchange's main market (2,157 UK and 526 international) and 308 companies on the Alternative Investment Market. [3]

In 1997 UK companies raised £57.9 billion of capital through the London Stock Exchange—£11.8 billion in the form of equity finance, £43.6 billion in the form of eurobonds, and £2.3 billion from other fixed interest securities. This included over £7.4 billion raised by companies coming new to the market—£7.1 billion from the main market and £0.3 billion from AIM. [4]

We will now take a closer look at the role and functioning of each market starting with the main market and how a company may gain access to it.

Admission to the Stock Exchange's main market

To gain admission to the Stock Exchange's main market a company must apply for a place on the Exchange's **'Official List'.** This process of applying for admission to the Exchange is also known as *'going public'* or *'flotation'* on the main market.

Any company applying to the Exchange for a listing must fulfil certain requirements. It must give full details of the company, including its financial and trading histories, directors and management, recent developments and future prospects. The Exchange's listing requirements are set out in detail in **'The Listing Rules',** commonly called the **'Yellow Book'.** The listing requirements comply with European Union directives on listing and standards of disclosure.

There are several methods by which a company can join the main market:

- **an introduction;**
- **placing;**
- **intermediaries offer;**
- **offer for sale;**
- **offer for subscription.**

Bearing in mind the Stock Exchange's rules, it is a matter for each company and its

advisers to decide which method is most appropriate and more will be said about each method later.

The company will also need to appoint a **sponsor** to assist with its application. The sponsor may be an accountant, banker, broker, lawyer or other approved financial adviser who is experienced in bringing companies to the market.

Following admission to the Official List the company's ordinary shares will be traded on the domestic equity market, which is operated and regulated by the Exchange. The company must comply with the **Continuing Obligations of Listing** making public any information which may affect the price of the company's shares, referred to as *'price-sensitive' information.*

The 'Yellow Book' rules

For a company seeking a listing on the Stock Exchange's main market the full conditions are set out in Chapter 3, 'Conditions for Listing', of the Stock Exchange's 'Yellow Book'. The following are just some of the conditions which a company seeking a main market listing must fulfil:

1 *Incorporation.* An applicant must be duly incorporated.
2 *Accounts.* The company must have published audited and unqualified accounts which cover at least three years, with the latest accounts being less than six months old at the date of listing.
3 *Nature and duration of business activities.* The company must be carrying on a revenue-earning business and must have done so for the period covered by the accounts.
4 *Market capitalisation.* The aggregate market value of all securities listed must be at least the minimum capital value required by the Exchange. Although in some cases a lower value may be admitted if the Exchange is satisfied that there is an adequate market for the company's securities. The minimum capitalisation requirements are from time to time revised by the Exchange.
5 *Directors.* The directors of the applicant company must have collectively appropriate experience and expertise in the management of the business.
6 *Shares in public hands.* At least 25 per cent of the class of shares for listing must be in the hands of the public in one or more EU member states.
7 *Prospectus.* The company is legally required to issue a prospectus providing details of the offer and disclosing forecast, and pro forma financial statements.

There are other conditions, for example, in relation to directors, management, and any controlling shareholder, but it is not necessary to know these in detail.

In summary, the applicant company must have a successful trading history of at least three years, have a market capitalisation which meets the minimum Exchange requirement, and must make at least 25 per cent of its shares available to the public.

The advantages and disadvantages of a listing on the main market

For a company which is considering a listing on the main market, management will need

to weigh up the respective advantages and disadvantages which are summarised as follows:

Advantages

- greater access to new capital (reducing reliance on debt finance);
- reduction in the overall cost of capital;
- additional fund raising is easier;
- greater marketability of shares;
- enhanced credibility and public image;
- allows strategic decisions to be implemented (e.g. easier to finance acquisitions);
- easier valuation of the company;
- greater reassurance and confidence for other stakeholders (e.g. bankers, customers and suppliers);
- company can take advantage of share incentive schemes for employees.

The key advantages for a company are the greater *marketability of the company's shares* and the easier *access to capital* for the expansion of the business.

Disadvantages

- costs of flotation (it can be an expensive process);
- a greater burden of administration;
- dilution of ownership control (flotation involves a much wider share ownership);
- much closer public scrutiny of the company's affairs;
- pressures from the investing community over performance (e.g. levels of earnings, dividends and capital growth);
- company can become a takeover target;
- more demanding responsibilities for directors in ensuring compliance with the rules and regulations of the Stock Exchange.

The key disadvantages are likely to concern the *dilution of ownership control,* the *increased public scrutiny and pressures from investors and the City* about short-term performance.

The Alternative Investment Market (AIM)

As an alternative to the main market the London Stock Exchange also operates the **Alternative Investment Market (AIM)** which was launched on 19 June 1995—sometimes referred to as 'the junior market'. It was created by the Stock Exchange specifically to provide a source of raising capital for smaller and dynamic young companies as an alternative to the main market reliance on debt finance and venture capital.

AIM is thus a different and distinct market from the Official List as it is specifically for smaller, emerging companies. These may be young venture capital-backed companies, management buy-outs (MBOs), or family businesses.

For reasons explained in the previous chapter in relation to venture capital companies

(VCCs), a medium- to longer-term objective for venture capitalists who finance a small high-risk company is for that company to secure a flotation on a stock market—joining AIM is a logical progression. Flotation allows the venture capital investors an 'exit route' from their investment, that is, they have the opportunity to realise all or part of their investment by selling their shares.

The Alternative Investment Market replaces the former Unlisted Securities Market (USM), which was established by the Stock Exchange in 1980, and was designed to fulfil essentially the same role as AIM today. However, for a variety of reasons, including the illiquidity of shares on the USM and the easing of requirements to get listed on the main market, the USM's popularity and specific advantages gradually diminished. The USM closed at the end of 1996.

The advantages and disadvantages of joining AIM

For a private company which may be contemplating a listing on AIM, the directors will need to consider essentially the same key factors as apply to the main market in deciding whether AIM is appropriate for the company. However, compared to the main market AIM has less stringent listing requirements and a listing on AIM is less expensive.

AIM's rules and regulations

As for the main market, there are rules and regulations which a company listed on AIM must follow. These are set out below:

- to make public any information which may affect the price of the company's shares (referred to as 'price sensitive' information);
- publish annual audited accounts within six months of the financial year end; and
- disclose any major shareholdings and changes thereto.

The company must satisfy the conditions of the **Model Code** for AIM companies at all times once its shares have been admitted to AIM.

Criteria for admission to AIM

One distinct feature of AIM (compared with the former USM and the main market) is the absence of any specific qualifying restrictions in relation to capitalisation, length of trading history or the proportion of shares which must be in public hands.

Procedures for joining AIM

To join AIM the company will need to draw up a **prospectus,** giving full disclosure of the company's affairs. This will include details of its principal activities, capital, financial information, the directors and management, and recent developments and prospects.

The company must also appoint a **qualified adviser** and a **broker** to assist with the admission procedures and to meet the ongoing requirements of the Exchange. The qualified or nominated adviser ('nomad'), who must be **approved by the Exchange,** can

be an accountant, banker, lawyer, stockbroker or other financial adviser. However, a stockbroker, who must be a member of the London Stock Exchange, will be required to assist investors trade in the shares.

A company cannot remain on AIM without a nominated adviser and a broker. Should one of these resign for any reason (which has happened on several occasions) then the company's shares will be suspended and it will have to find a new one within a month or its shares will be de-listed on the market.

A formal **application form** signed by the directors and a **declaration** by the nominated adviser will also be required as part of the admissions procedure.

Transferring to the Official List

If it wishes, the company can apply to join the Official List once its shares have been traded on AIM for a period of at least two years.

Will AIM succeed where its predecessors have failed?

Given the failure of previous attempts to provide a vibrant 'junior' stock market for smaller companies, is AIM likely to succeed? After its first few years of operation, AIM seemed to be proving popular with investors and the number of companies seeking to join continues to grow.

At the end of 1997 there were 308 companies listed which combined had a total equity market value of £5.7 billion. This, however, covers a wide spread of capitalisations. Some companies on AIM (9 at the end of 1997) have market capitalisations in excess of £100 million, while others (24 at the end of 1997) have market capitalisation of less than £2 million. The majority (221, or 72 per cent at the end of 1997) are capitalised at between £2 million and £20 million. [5]

Since its inception, companies listed on AIM have raised in excess of £1.6 billion, of which £694.5 million was raised in 1997. This includes capital raised in the form of new and further issues of equity. [6]

As for any stock market, the key to AIM's success will lie in its **liquidity**—the ease with which a company's shares can be traded. Investors will avoid the market if they find it difficult and costly (in terms of the reduced value of their share holdings) to sell. The shares of many AIM companies are 'tightly traded'. In other words there is a very restricted market in which the shares can be traded and some investors could therefore find that when they wish to sell their shares, they may have to do so for less than their quoted value.

In any event, the general conclusion on AIM's performance to date seems to be, so far so good, but AIM's real mettle remains to be tested, particularly in a bear, that is, a falling market.

In addition, AIM is facing increased competition from a growing number of international stock markets which specialise in young, growing companies. There is, for example, the pan-European stock market EASDAQ (European Association of Securities Dealers Automated Quotation), formally created in June 1996. EASDAQ is a regulated market dedicated to meeting the capital needs of fast growing companies with

international aspirations. Its North American counterpart is NASDAQ (National Association of Securities Dealers Automated Quotation).

Other directly competing capital markets include: the Developing Companies Market in Dublin, the Nouveau Marché in France, and the Neuer Markt in Germany.

OFEX

OFEX is an *unofficial stock exchange* for dealing in the shares of unquoted companies. It is run by J.P.Jenkins Ltd. a firm of brokers and a member firm of the London Stock Exchange. OFEX is *not regulated* by the Stock Exchange and shares traded on OFEX are regarded as high-risk investments. However, some very familiar companies such as Arsenal FC Plc, National Parking Corporation Ltd., and Weetabix Ltd. are traded on OFEX.

The gilt-edged and fixed interest markets

The gilt-edged market

Gilt-edged securities, known as **gilts,** are securities with interest and repayment guaranteed by the British government. It is through the gilt market that the government is able to raise money by issuing loan stock through the Bank of England.

Similar to equities, the gilt market operates through the competing market maker trading system. However, market makers in gilts have to be approved by the Bank of England and must register in all gilts.

In addition to the primary market, the Stock Exchange provides a vibrant secondary market in which investors can buy and sell gilts.

The UK fixed interest or bond market

This market allows companies to borrow money directly from investors. The loans raised are known as fixed interest stocks or bonds and trading is done through the competing market maker system.

The grey market

This is not a formal market, it is the market in which new security issues (mainly equities and gilts) are traded *before* they are officially available on the market. It is the rights to ownership which are traded in the grey market, dealers buy and sell the rights to ownership of the securities. For example, sellers of the rights in the grey market must therefore buy the securities when official trading commences in order to meet their obligations to the buyers of the rights.

Methods of listing securities

As already mentioned there are a variety of methods available to a company which wishes to have its securities listed on the stock market. The company may be an unquoted company coming new to the market, or it may be a company with securities already listed. As we shall see there are some differences in the methods available in each case. Deciding which method is most appropriate will depend upon the nature of the company and its particular circumstances.

Since 1 January 1996 the Stock Exchange's Listing Rules have been significantly relaxed. For example, the monetary thresholds (less than £25m, £25−£50m and over £50m) on the total value of the equity shares being offered, which used to govern the method of issue, have been abolished. The Listing Rules now also permit a new applicant and its advisers to effectively select any method they wish to bring securities to listing, subject to certain disclosure rules.

A company *without* shares already listed

For a company which is coming new to the stock market and does not have shares already listed on the exchange, a listing or flotation can be achieved by any of the following methods, the first two are generically referred to as ***initial public offerings (IPOs):***

- **placing;**
- **offer for sale;**
- **offer for subscription;**
- **intermediaries offer;**
- **introduction;**
- **such other method as may be accepted by the Exchange either generally or in any particular case**.

Whichever method is adopted, the Exchange requires the securities in issue to be sufficiently widely held so that when listed their marketability can be assumed.

Placing

A placing is the most common method of listing and involves the marketing of shares already in issue but not listed, or not yet issued, to ***specified investors.*** While it is the most commonly used method of obtaining a listing, it not the method by which most of the value of equity capital in the stock market is raised. In terms of the value of capital raised, it is the offer for sale (see below) which has the number one ranking.

The investors will typically be private clients of the company's sponsor and are likely to be institutional investors such as insurance companies and pension funds. The shares are thus 'placed', usually at a fixed price, with such investors and are not offered to the general public or existing shareholders. Although once the shares are allowed to trade in the secondary market anyone can buy them in the usual way.

From the company's point of view, particularly small companies, a placing has the advantages of being *less expensive* than an offer (see below) and of *reducing uncertainty.*

A placing will be underwritten and the company only has to deal and negotiate with a known small—but nonetheless powerful—group of shareholders rather than the public at large. However, if the shares are placed in large blocks with just a few institutions this could restrict their liquidity.

Figure 4.1 illustrates the typical 'tombstone' type of advertisement which companies place in the financial press in relation to a stock market listing. This advertisement relates to a placing by AB Airlines Plc, an independent airline which has been operating in the UK since October 1993.

Notice that the advertisement specifies the method of listing, in this case a placing, the number of shares to be placed and the placing price. The names of the sponsor, underwriter, and stockbroker (which in this case are all the one company) are also given.

The purpose of the placing, which was fully underwritten by the company's sponsor, was to raise £8.3 million (after expenses) to acquire new aircraft and to fund the development of new and existing routes. If the company is placing 9,473,684 shares at 95p per share (see Figure 4.1) this will raise £9 million in total, but flotation expenses will consume around £700,000, equivalent to 7.8 per cent of the total issue proceeds. The number of ordinary shares in issue following the placing is 26,616,596, giving a market capitalisation (that is, the market value) of the company, at the placing price, of £25.3 million.

The directors considered that the company had reached a stage in its development where a listing on the London Stock Exchange would enhance the company's profile within the airline industry, and with current and potential customers. In addition, the directors considered that being a listed company would also enhance the company's position when negotiating contracts with third party suppliers and aircraft manufacturers.

Offer for sale

This is an offer *to the public and to investing institutions* to purchase shares which are already in issue. It can take the form of *a fixed-price offer* or of *an invitation to tender* at or above a stated minimum price. In this case the company is not issuing more shares, it is simply making its existing shares more widely marketable and giving existing shareholders the opportunity to sell or cash in some or all of their shareholding.

Offer for subscription

This too is an offer *to the public and to investing institutions* to subscribe for shares which are *not already in issue*. This method can also be in the form of *an invitation to tender* at or above a stated minimum price or in the form of a *fixed-price offer.* The company can also fix a minimum subscription level which if not achieved the company can withdraw the offer. In this case *new capital is being raised* and all the company's shares (new and existing) will now be listed on the market, if the offer succeeds.

Both an offer for sale and an offer for subscription increase the marketability of a company's shares; the offer for subscription in addition raises fresh capital for the company. In both methods, the offers will be advertised in the national press and must include the prospectus and an application form.

Application has been made to the London Stock Exchange for the whole of the ordinary share capital of AB Airlines PLC in issue immediately following the Placing to be admitted to the Official List. It is expected that Admission will become effective and that dealings in the Ordinary Shares will commence on 23 April 1998.

The Directors, whose names appear on page 6 of this document, accept responsibility for the information contained in this document. To the best of the knowledge and belief of the Directors (who have taken all reasonable care to ensure that such is the case) the information contained in this document is in accordance with the facts and does not omit anything likely to affect the import of such information.

A copy of this document, which comprises a prospectus relating to AB Airlines PLC prepared in accordance with the listing rules made under Section 142 of the Financial Services Act 1986, has been delivered to the Registrar of Companies in England and Wales in accordance with Section 149 of that Act.

AB AIRLINES

AB AIRLINES PLC

(Incorporated and registered in England and Wales with registered number 3521682)

Placing

of 9,473,684 Ordinary Shares at 95p per share

and Admission to the Official List.

Sponsored and Underwritten by

Peel, Hunt & Company Limited

Share capital immediately following the Placing

Authorised			Issued and fully paid	
Number	Amount		Number	Amount
41,800,000	£1,230,000	Ordinary Shares of 3p each	26,516,596	£798,498

The Ordinary Shares now being placed will, on Admission, rank pari passu in all respects with the Ordinary Shares then in issue and will have the right to receive all dividends and other distributions declared, made or paid on the issued ordinary share capital of the Company.

Peel, Hunt & Company Limited is acting exclusively for AB Airlines PLC in connection with the Placing and no one else and will not regard any other person as its customer or be responsible to any other person for providing protections afforded to customers of Peel, Hunt & Company Limited or for providing advice in relation to the Placing.

Figure 4.1 Placing: AB Airlines plc

Both types of offer can be made in the form of **an invitation to tender.** This method is useful where a company's shares are particularly difficult to value, perhaps because no similar type of company is already listed on the market.

With a tender offer potential investors are invited to subscribe for shares at or above a specified minimum price. The shares are in effect auctioned at or above the minimum price. On the basis of the tenders received a *striking price* is determined, this is the price at which sponsors estimate the entire offer can be sold. Applications at or above the striking price will receive an allocation of shares at the striking price, applications below the striking price will be rejected.

A tender offer may raise more money than a fixed-price offer or placing, but for small companies, tender offers would not be economic. Tender offers are really only suitable with very large issues to very large markets, such as the privatisation issues for public sector utilities.

Intermediaries offer

In this case shares already, or not yet, in issue are offered to financial intermediaries for them in turn to allocate to their own clients. This is essentially a *placing with financial intermediaries* and, similar to a placing, the shares do not become widely available until trading on the market commences. Private investors can, however, apply for shares through their stockbroker when the offer is made.

Introduction

This method, which is probably the least common of the five methods, does not involve a marketing of new or existing securities. It is simply a method of admitting to the official list shares which are already widely held by the public. The shares must be already of such an amount and so widely held so as to be deemed marketable in accordance with stock exchange requirements. It should be noted that **no fresh capital is raised** by this method; the company, for whatever reason, simply wishes its shares to be traded in the market.

Underwriting

Initial public offerings or new issues are generally underwritten. In the event of an offer not being fully taken up by investors, that is, it is undersubscribed, large investors such as the financial institutions will agree, for a fee (of around 2 per cent of the issue value), to act as underwriters for the issue and to buy up any unsold shares at the issue price. This reduces the uncertainty for the company over the amount of capital it will raise by selling its shares, but clearly increases the costs of the issue.

A company *with* shares already listed

For a company which has already its securities listed on the Exchange, the methods available for listing include those already explained above—with the exception of an introduction—and in addition the following:

- **a rights issue;**
- **an open offer;**

- **a capitalisation issue;**
- **an issue for cash;**
- **such other method as may be accepted by the Exchange either generally or in any particular case.**

These main methods will now be reviewed.

Rights issue

Also known as a rights offer, this is a preferential offer of new shares to, in the first instance, *existing shareholders.* Existing shareholders are thus given first refusal, they have the first 'right' under UK company law to subscribe for further shares in a company in proportion to their existing shareholding, unless they have agreed, at a legally constituted meeting, to waive this right. A rights issue is an extremely popular method of raising additional equity finance.

For example, a one-for-four rights issue at £3.00 would entitle existing shareholders to take up one new share at a price of £3.00 for every four shares they currently hold. Because the shares are issued in proportion to existing shareholdings the control over the company (voting rights etc.) does not change.

This gives the existing shareholders **pre-emption rights,** which allows them to maintain their relative or proportionate ownership control of the company. Pre-emption rights are an aspect of corporate financing which many consider to be a form of restrictive practice and is one which is currently being reviewed.

The issue is made by means of a renounceable letter (or other negotiable instrument) which can be traded in the market at any time before payment is due. The offer must remain open for acceptance for at least 21 days and shareholders may exercise their rights, sell them, or let them expire during that period.

Until shortly before the offer closes, someone who purchases the shares will be entitled to the rights and the share will be trading *cum rights.* After the offer closes the share price normally falls to reflect its *ex-rights* value. Anyone buying the shares after closure will not be entitled to the rights.

To make the offer attractive to shareholders the subscription price for the issue will be set at a **discount** to the current market price. How much of a discount will depend *on current sentiment* in the market towards rights issues, the *earnings expected,* and the *size of the offering.* A discount of around 20 per cent would not be uncommon.

As mentioned above, rights issues are a very important and popular method of raising additional equity capital for a company. The main reasons being:

- *Cost.* A rights issue is a *cheaper* source of equity than an offer for sale or subscription, largely because there is less administrative work involved (e.g. no prospectus needs to be published) and professional fees (e.g. arrangement and underwriting fees) are lower.
- *Flexibility.* Shareholders can either take up their rights and pay for them or sell them in the market. Either way the company receives the cash for the issue. If the shareholder does nothing and allows the rights to lapse, the company must sell the rights to another investor and forward the proceeds to the shareholder.
- *Risk.* The proceeds of the rights issue can be used in part or in full to reduce a firm's

gearing or financial risk, in other words, the proceeds can be used to reduce the firm's borrowings. Remember from Chapter 1 that gearing or leverage is a measure of the ratio of debt to equity finance or financial risk in a firm's capital structure. The higher the level of debt in relation to equity, the higher the firm's financial risk.

EXERCISE 2 —RIGHTS ISSUES

Hoseknit Clothing has 9 million £1 ordinary shares in issue. The shares are currently trading in the stock market at £3.75. The directors wish to raise a further £4.5 million for expansion and a rights issue has been suggested. The company's advisers have indicated that an issue price of £3.00 would be appropriate. You are required to calculate:

(a) the number of shares to be issued.
(b) the number of shares which a shareholder must presently own to be entitled to subscribe for a single new share.
(c) the discount to the current market price.

Value of a right

If new shares are being issued at a price below the current market price, then it may be expected that normal market pressures will cause the market price to fall following the rights issue. This effect is illustrated in Example 1.

Example 1 —Valuing a right

The directors of Company A are proposing a one-for-four rights offer to raise additional equity capital. The company's shares are currently trading at £2.00 in the market and new shares are being offered at £1.60.

The effect of the rights issue on the market price can be determined as a weighted average of the before and after issue price as follows:

	£
Value of shareholding before rights issue (£2×4)	8.00
Value of a rights share	1.60
	9.60
Theoretical ex-rights price=£9.60/5	=1.92
Value of shareholding after rights issue (£1.92×5)	=9.60

In theory, the market value of a share after the issue should fall to £1.92. However, notice that the aggregate value of the shareholder's wealth should not change as a result of the rights issue. Before the rights issue a shareholder would own four shares valued at £2.00 each, plus cash of £1.60. After the issue the shareholder will own five

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shares valued at £1.92 each.

The price of the share after the issue, £1.92, is known as the *theoretical ex-rights price.* The value of the right to buy another share is the difference between the *rights subscription price* and the theoretical ex-rights price. For Company A this is as follows:

	£
Theoretical ex-rights price	1.92
Subscription price of rights share	1.60
Value of rights	0.32

You may notice that the theoretical value of a right *for each share* is £0.08, that is £0.32/4. In other words, £2.00−£1.92.

What is being determined here are theoretical values. Clearly market conditions and sentiment towards the rights offer can affect actual values.

An open offer

Like a rights issue, this is an invitation **to existing security holders** to apply for new securities in proportion to their existing holdings. However, unlike a rights issue, it does not involve a renounceable letter or other negotiable document (i.e. a right which the existing security holder can sell if he does not wish to take up the offer). Thus a security holder who does not take up the offer has no rights to sell—instead the new shares will be offered to someone else. An open offer may be used along with other methods.

A capitalisation issue

Popularly known as a **'bonus' or 'scrip' issue,** this method involves a capitalisation of the company's reserves. The company uses its accumulated reserves (not current profits) to increase the number of its equity shares in issue *to its existing shareholders.* No cash is involved in the issue. Existing shareholders do not have to pay to take up the additional shares, the new shares are issued as 'fully paid' in proportion to their current holdings.

A capitalisation issue is more of a technical accounting exercise designed to correct an imbalance in the balance sheet, which probably has arisen over time, between the nominal value of the share capital and the total value of accumulated reserves, which together make up the total shareholders' funds as shown on the balance sheet.

The bookkeeping entry is simply to debit (reduce) the reserve account and credit (increase) the share capital account, with the amount involved. This will bring the two items more into line—the total value of shareholders' funds remains unchanged and no extra money has been raised.

Over time a company may have accumulated substantial reserves by ploughing back profits into the business. So much so that the value of the accumulated reserves far exceeds that of the nominal value of share capital and this is reflected in the current market value of the share price, which may be 10, 15, 20 times or more that of the nominal balance sheet value.

After a scrip issue the market value of the share will fall to reflect the greater number

of shares now in issue. For example, if Company A's shares are currently trading in the market at £10 and the nominal value is £0.50, the Company may decide to issue a two-for-one scrip issue, with each existing shareholder receiving two additional shares for each one they currently hold. Every shareholder will then hold three shares worth around £3.33 each instead of just one share previously worth £10. The number of shares in issue has trebled but the total or aggregate shareholding value remains the same.

For example, in 1998 Airtours plc, a major holiday tour operator, made a capitalisation issue in which shareholders received two additional ordinary shares for every share held. Thus after the issue shareholders owned a total of three ordinary shares for every single ordinary share they held before the issue.

EXERCISE 3 —CAPITALISATION ISSUE

If, before the capitalisation issue, Airtours' ordinary shares were trading at £12.35, an increase of 406 per cent in the share's market value over six years, you are required to:

(a) Calculate the estimated after issue share price.
(b) State if this issue should affect the aggregate value of each shareholder's investment in the company.
(c) State what you think were the reasons for Airtour's management making this issue

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An issue for cash

This is an offer of the company's securities for cash to 'persons who are specifically approved by shareholders in general meeting'. It differs from a placing in that the number of subscribers involved is usually small.

Trading in the stock market

In 1997 the average daily turnover in UK equities in the London Stock Exchange was £4 billion, with an average of 52,752 transactions taking place each day. These transactions were carried out by the member firms of the London Stock Exchange which consist of **market makers** and **broker-dealers.** Broker-dealers can apply to the Exchange to register as market makers. The trading of shares on the Exchange is done through a system of **competing market makers.**

Market makers

Market makers must be members of the Stock Exchange and are broker-dealers in the securities in which they are registered. Market makers can act in the capacity of *principals* dealing in securities on their own behalf and in the capacity of *agents* dealing on behalf of clients—known as ***dual capacity trading.***

To prevent unfair advantage and conflicts of interest, firms which trade in both capacities are required to operate these two activities independently in their internal

structural arrangements. They are separated by what are known as 'Chinese walls', that is communication barriers between one department of the organisation and another.

Market makers are obliged to make a market in the securities in which they deal by providing *continuous,* firm, two-way—that is, buying (bid) and selling (offer)—prices to the market throughout each trading day, ***under any trading conditions.*** This latter requirement is considered essential to maintain market liquidity.

Market makers derive their income from the difference (the bid-offer spread) between their buying (bid) and selling (offer) prices: this is their profit margin. They may deal with brokers acting on behalf of clients or they may deal directly with institutional investors. In effect market makers ***make a book*** in the securities in which they deal.

Market makers can also make money by speculating or taking a position in their securities. That is they will sometimes buy securities and hold them in the hope of being able to sell them later at a profit. Alternatively market makers may sell securities which they may not have in the hope of being able to buy them later at a lower price in the market.

This is where the risk lies for a market maker, and is one reason why they are granted certain privileges for risking their capital in the business; they can, for example, delay disclosure of deals above a certain size for up to five days.

It is the consensus view of the market makers about a company's financial condition and future prospects which in effect determines the price of its securities in the market, as it is the market makers who possess the intimate knowledge of the market conditions (e.g. supply and demand) in relation to individual securities.

You should consider the role of market makers in relation to other capital market topics such as **market efficiency** and **market regulation.** For example, the privileges granted to market makers is a matter which was reviewed by the Office of Fair Trading (OFT). In November 1994 the OFT published a report which described these privileges as 'anticompetitive'.

In response the London Stock Exchange proposed a new rule which will require market makers to disclose shareholdings of 3 per cent or more in any FTSE 100 company—a UK Companies Act requirement from which market makers were previously exempt.

Broker-dealers

Broker-dealer firms must also be members of the London Stock Exchange. They provide advice to, and deal on behalf of, their individual clients through market makers: they can also deal on their own account. Unlike market makers, broker-dealers are not obliged to make a continuous market in shares.

Broker-dealers who do not act as market makers and confine their activities to dealing exclusively on behalf of their clients, executing buy and sell orders with market makers and charging a commission, are known as ***agency brokers*** (that is, the activity which is still referred to as stockbroking).

MARKET EFFICIENCY

GOOD NEWS, BAD NEWS

Another sizzling performance?

   On 13 March 1997 the share price of Pizza Express, a restaurant chain, rose 24p to 657 1/2p. This was another high for the company following strong interim results and the announcement of future expansion plans. Combined with the added topping of bid speculation the shares are set to climb further.

Cell shock!

   On 21 May 1997 the share price of Celltech, a leading UK biotechnology company, nosedived when the company announced the surprising and disappointing results of trials on its drug for the treatment of septic shock (a condition in which the body reacts to blood poisoning).

   The news sent the company's share price tumbling from 630p to 290p, a fall of almost 54 per cent, and sent similar shock waves through the rest of the biotechnology sector, although share prices did show some signs of recovering by the end of the day's trading.

How often have you seen press headlines similar to the above, reporting either an extraordinary rise or fall in a company's share price as a result of some new information, good or bad, about its future prospects?

How, for example, do you think the share price of Manchester United, Newcastle United or Tottenham Hotspur Football Clubs (just three of an ever increasing number of football clubs listed on the London Stock Exchange) would react after a major win in a championship competition?

   The share price would be expected to increase. After an important win, the market would expect future earnings (cash flows) to increase, perhaps from an extended run in a domestic and/or European championship competition. Football clubs can earn additional revenues of £millions from participating in European competitions.

   As we are about to see, in financial markets the term 'efficiency' indicates the extent to which the current market price of a security immediately and fully reflects all relevant information about that security.

   Recall from Chapter 1 that the goal of financial management is the maximisation of the shareholders' wealth and that their wealth is simply represented by the market value of their shares at any point in time. The financial and investment decisions taken by a quoted company should lead to an increase in the market price of its shares and thus in

the wealth of its shareholders.

Can shareholders be confident that the quoted market price of their shares is a fair reflection of their wealth? Is the share price a 'true' value? Clearly the question arises as to how accurately or efficiently the stock market values a company's shares. Does the market price at any point in time fairly represent the value of the shares an investor holds? In other words, are financial markets efficient? How good are they at processing information about a company?

EXERCISE 4 —FINANCIAL MARKET EFFICIENCY

Survey the financial press for two examples of companies whose share price has moved in response to new information about the companies becoming known to the financial markets. One example should relate to 'good' news and the other to 'bad' news. How have the markets reacted to the news? Have the markets responded quickly? Has there been any response from the company to the markets' actions?

What is meant by 'market efficiency'?

Economists conventionally describe markets in terms of their allocative, operational and informational efficiency. In relation to financial markets, they are said to be:

1 *Allocatively efficient* when scarce resources, in this case capital, are allocated between competing demands for those resources in a way which leads to their most productive use.
2 *Operationally efficient* when the costs of trading or transacting business in the markets (market makers and broker/dealers fees and commissions) are determined competitively, that is, there are no monopoly profits, and costs are held as low as possible.
3 *Informationally efficient* when the current market price immediately and fully reflects all relevant information. Sometimes also referred to as 'pricing efficiency'.
4 *Perfectly efficient* if they are simultaneously allocatively, operationally and informationally efficient.

The term market efficiency has a special meaning in financial management. In finance if we are discussing a financial market's efficiency then we are essentially referring to its degree of informational efficiency; allocative and operational efficiency are assumed. When a financial market is **informationally efficient,** *the current price of a security in the market fully reflects all known information, any new information is rapidly reflected in the security price and new information arrives in the market in a random and unpredictable manner.*

Moreover, security price movements follow what is referred to as a **'random walk'** (Kendall 1953), meaning that there is no predictable pattern in the way security prices behave: they are as equally likely to go up as go down and one movement is

completely independent of the next.

This randomness is a feature of security market behaviour which has been researched extensively and the conclusions, surprisingly for academic researchers, are virtually unanimous: **past price movements cannot be used as a guide to future price movements.**

KEY LEARNING POINT

A financial market is said to be informationally efficient if the current price of a security in the market fully reflects all known information, any new information is rapidly reflected in the security price and new information arrives in the market in a random and unpredictable manner.

What causes security prices to vary?

Essentially two things cause security prices to vary: one is the individual and independent *buying and selling activities of investors* and the second is *new information.*

In the first case security price movements are caused by the decisions, taken independently, by individual investors, large and small, to buy or sell securities for personal or private reasons (e.g. taxation, cash-raising or profit-taking reasons). This activity can take place randomly, at any time and may or may not affect security prices in a material way.

In the second case prices can also change in reaction to new information. This new information can relate directly to the company itself—it is company specific—such as announcements about its profits. It can relate to the industrial sector in which it operates, such as investigations into alleged anti-competitive practices in the industry by the Monopolies and Mergers Commission (MMC). Alternatively new information can be related to the economy in general such as expected inflation and interest rates.

However, the significance and timing of new information, at any level, in the market is both random and unpredictable.

Why is market efficiency important?

The concept of financial market efficiency is important because it is the share price at any point in time in the market which is used to measure shareholders' wealth and the value of the firm. Therefore it is necessary that the share price should be a fair reflection of the firm's value.

This does not imply that the share price, or the price of any other security traded in the markets, will always be perfectly correct—this would be virtually impossible to verify in any event—but that the market price does at least represent an objective (unbiased) evaluation of the share's 'true' value.

An alternative way of characterising an efficient market is to say that it is one where **the price of a security always reflects its 'true' value and that it is not possible to**

outperform the market *consistently,* except by good luck. If markets are efficient, then, from the financial manager's point of view, the firm's share price will quickly and accurately reflect the effects of good and bad financial decisions: 'good' financial decisions will enhance market value, poor financial decisions will depress market value.

Thus a firm's share price movements, other things being equal (for example there are no extraneous economic factors affecting the share price), provide a good indication of the quality of its management's decision-making.

How does an efficient market work?

An efficient or competitive market implies that if an investor obtains some new important information about a firm's future prospects, that investor will act quickly to benefit from this information (before other competing investors can respond) either by buying or selling the firm's shares.

In a sufficiently competitive market, the firm's share price will not remain over- or undervalued for very long. Other investors will quickly react to take account of any new information which becomes available and either buy or sell the firm's shares until they believe that its market price is close to its true value. The price of the firm's share being determined *(inter alia)* by the demand for and supply of its shares.

As a result of this competitive race between 'wealth maximising' investors striving to maximise their returns for a given level of risk, the share price will quickly rise or fall to take account of the new information.

It is this competition between investors searching for wealth-enhancing investment opportunities which ensures that *the market price of a security appropriately reflects its expected future returns and risks* and consequently the market value of the firm. In such a competitive market it is not possible for any investor to *consistently* earn superior returns.

The concept of efficiency in financial markets is based on the concept of *perfect competition* in product markets. For a financial market to be *perfectly efficient* (or competitive) the following conditions would need to apply:

1 there are no taxes, transaction costs or other barriers to trading;
2 information is symmetrical, that is, every player in the market has equal and free access to the same information at the same time;
3 there are many players, all of whom are rational, and no single player is able to dominate or influence market prices.

Clearly these conditions do not hold in the real financial world. It is a fact of life that imperfections exist. There are indeed taxes, buyers and sellers do in reality incur transaction costs (e.g. brokerage fees and commissions) and some players in the markets do receive information before others. For these reasons financial markets in the real world are not perfectly efficient but they are 'efficient' to some degree.

Market efficiency and the efficient market hypothesis (EMH) [7]

It is essentially the speed with which security prices respond to new information that determines the *degree of market efficiency* and provides the basis for one of the most

important theories in financial management, **the efficient market hypothesis (EMH).**

According to the EMH an efficient market is one in which security prices incorporate new information so rapidly that it is not possible for investors to profit from publicly available information. This is the underlying assumption of the efficient market hypothesis (EMH), that **the stock market immediately adjusts security prices to reflect any new information as soon as it becomes available.**

In developing the EMH, Fama (1970) introduced three degrees or forms of market efficiency, all related to how we define 'information' in each case:

1 **weak form efficiency;**
2 **semi-strong form efficiency;**
3 **strong form efficiency.**

Weak form efficiency

This form of the EMH states that current market prices immediately and fully reflect **all historical information** contained in past security price movements. There is therefore *no advantage (excess profits) to be gained by analysing past security price movements; they are no guide to future price movements.* An investor relying on past security price movements to predict future price movements cannot earn excess returns, consistently.

According to the weak form EMH, just because the share price of Celltech—referred to in the 'Good news, Bad news' vignette—has fallen sharply in the recent past does not mean that the share price will continue to fall tomorrow or the next day.

For practice you may wish to check the current movements in Celltech's share price. Has the price gone up, down, or remained stable? Have there been any new announcements which have affected share price? You will find the share price listed under Pharmaceuticals in the financial press.

A further example is the share price of Zeneca—the UK's third largest pharmaceuticals company—which has behaved very erratically in recent times as market analysts absorb new information on a daily basis trying to assess the company's long-term growth potential. Thus stock trading rules derived from past share price movements will not yield the investor abnormal or excess returns.

Despite what Shakespeare said: 'Figuring the nature of the times deceased' [8] will not make one better able to predict the future. If this is the case then *chartists* and *technical analysts* —investors who believe that they can predict future share price movements by studying an array of charts and graphs of past share price movements—are wasting their time as the current share price already includes all the share's past history.

Chartists and technical analysts make use of, for example, bar charts and point-and-figure graphs in order to discern time series patterns in security price movements. They believe that chart patterns with exotic names such as, 'diamonds', 'double tops', 'triple tops', 'head and shoulders', 'flags' and so forth recur over time.

Once a particular pattern starts to emerge, they claim it can be used to predict future price movements. However, it is also entirely possible for any of these patterns to be created by a random walk process, in which case the beginning of a particular chart formation is really no guide to its eventual shape and thus a security's future price movements.

This random walk process is consistent with weak form efficiency (past security price movements are no guide to future price movements) and since the evidence for weak form efficiency is very strong, it is extremely unlikely therefore that investors who rely solely on these methods could consistently 'beat the market' and earn excessive or abnormal profits. Despite this evidence chartism and technical analysis are widely used.

Semi-strong form efficiency

If the market is in semi-strong form efficiency, then current market prices will immediately and fully reflect **all historical** and **all *relevant* publicly available information.** Publicly available information is that contained in, for example, company annual reports and accounts, interim statements, media reports and analyses, general economic and government reports and statistics, and so on. Thus share prices under this semi-strong form will react to a much wider range of information than the weak form. Once any new information becomes public it is very rapidly absorbed into security prices.

In relation to company earnings and dividend announcements, for example, there is evidence to suggest that most of the adjustment to the share price actually occurs during the twelve months prior to the announcement. Similarly with public announcements at the macroeconomic level, for example by the government and the Bank of England in relation to interest or inflation rate changes, security prices already reflect most of the adjustment before any public announcement is made.

This indicates that, by and large, the market correctly predicts or anticipates future company earnings and dividend changes and interest rate movements before any public announcement is made. There is therefore no opportunity to earn excess returns by relying on public announcements.

Generally speaking, by the time announcements are made it is already too late to profit. This is mainly as a result of investors, analysts, brokers, speculators and other market players continuously seeking out and using economic, company and other information which will help them make their investment decisions. Investors and markets are very future oriented, they are always assessing future prospects and expectations.

If the semi-strong form of market efficiency exists then ***fundamental analysts*** — professional investment analysts who spend their time analysing all this 'fundamental' information in an effort to find over- or undervalued securities—are also wasting their time.

There is no point analysing this information after it has been made public because the market has already factored this into the security's price. It is only those parties (e.g. managers and directors) who have access to the information prior to its release that are in a position to benefit from it by making abnormal profits.

Research has shown that company announcements and information about dividends, earnings, merger/acquisition plans, accounting policy changes, and about the sale or purchase of securities by a firm, are rapidly and accurately reflected in a security's price. These factors support the idea of semi-strong form efficiency and there is no opportunity for investors to earn superior returns by trading in these securities immediately after such information is made public.

Strong form efficiency

Strong form efficiency goes a stage further than the semi-strong form and asserts that current market prices will immediately and fully reflect **all relevant information,** *whether publicly or privately held:* by definition this includes the ***inside information*** possessed by a firm's directors and managers. There is less evidence to support this form of efficiency than the other two.

Directors and managers frequently hold back information from the markets for commercial, competitive or other reasons. If you remember the notion of ***information asymmetry*** in relation to the agency issue, that corporate insiders (directors and managers) possess more information about the corporation's activities and prospects than outsiders, then clearly insiders are better placed to make excessive profits from using privileged information.

Inside information undoubtedly exists but it is illegal (under the Company Securities Act 1985 and the Criminal Justice Act 1993 which implemented the EU directive on insider dealing) to make use of it and engage in **insider trading.**

This tends to make the task of empirically testing strong form efficiency very difficult: who will admit to exploiting inside information if it is a criminal offence? However, it is not illegal to use *private information,* which is information collected legitimately by outsiders as a result of their private research, specialist knowledge, and skills.

Are capital markets efficient?

Having analysed the efficient market hypothesis what is our conclusion? Are capital markets efficient? There is, has been, and will continue to be, considerable debate about market efficiency and the relevance of the EMH. Much empirical research has been undertaken to test its validity, and more remains to be done.

The evidence to date, while not conclusive, does suggest that capital markets in the UK, US, and other countries with developed financial markets and systems, are ***at least weak form efficient, with many studies supporting semi-strong form efficiency.***

This means that current security prices, at least for the larger and more closely followed companies, incorporate all or most of the information *that is publicly available* about these companies and their securities. For those companies whose securities are infrequently traded, market efficiency is more difficult to establish.

By no means everyone subscribes to the efficient market hypothesis. Some investors and academics argue that it is indeed worthwhile to search for under- or overvalued securities, implying that fundamental analysis is of value and can discover the occasional 'gem', but, in general terms, security prices do reflect all publicly available information.

From a purely practical point of view it is evident that the quantum leap advances in all forms of media communication and information technology, and particularly their integration, have allowed capital markets to become like giant super-computers processing, each day, enormous volumes of information virtually instantaneously and impartially.

A vast amount of research has been carried out on capital market efficiency but clearly

more is required before any definitive conclusions can be reached.

The implications of efficient markets

Financial market efficiency has important implications for the investment and financing decisions, not only of individual investors but also of the firm. If, generally speaking, financial markets are considered weak to semi-strong form efficient then a number of important implications follow.

It is impossible for any investor to *consistently* outperform the market

Consistently is the key term here. A security's market price at any point in time is a true reflection of its intrinsic value (that is its fair value as perceived by the investor), thus *in an efficient market* intrinsic value and market value are the same—in other words the price is always right!

In an efficient market it is not possible to accurately predict security price movements

As security prices already incorporate all past and publicly available information, that is, there is semi-strong from efficiency, then prices will only be affected by new, currently unknown information at some stage in the future—if the information was known now it would already be reflected in the security's current price, it would not be 'news'.

If future events are uncertain, random and unpredictable then new information will arrive in the markets in an uncertain, random and unpredictable manner. The corollary of this is that if information about future events is uncertain then so too are future security prices.

The best estimate of a security's value is the consensus view of *a* competitive, efficient market

Thus individual investors performing their own security analysis and trying to beat the market are simply wasting their time.

This does not imply, however, that it is similarly a waste of time for investment firms to engage in security analysis. If this activity were to cease then paradoxically markets would no longer be efficient. In such a scenario the only information being published would perhaps be by the firm itself.

Security analysis by specialist firms—with highly skilled staff, large budgets, sophisticated computer systems and wealthy clients—contributes to market efficiency by making more information and expert analysis available to the market. The point here is that the same activity by the private individual investor is futile. The time, effort and costs of finding a 'pearl', that is a security which is significantly undervalued by the market, are not justified for the individual investor.

Evidence of market efficiency

As evidence of market efficiency it is interesting to note in recent years the growing popularity of **index tracker funds.** These are funds where professional investment fund managers *passively* invest by simply 'buying the index'—they have in other words

abandoned the notion of pursuing superior performance or trying to 'beat the index'.

An indexed share portfolio, for example, is one which consists of the same shares and in the same proportions as those which constitute a particular share index, and which most closely matches the investor's needs. Recall that an index simply measures the percentage change in the value of a variable over a period of time, e.g. Retail Price Index.

Examples of indices which professional fund managers might conceivably track include:

1 the *Financial Times Stock Exchange 100 Share Index* (the FTSE or 'Footsie' index) reflecting the share price movements of the 100 largest companies listed on the London Stock Exchange;
2 the *FTSE Mid 250 Index* which includes those companies just below the qualifying size for the Footsie;
3 the *FTSE SmallCap* which measures the performance of approximately 500 smaller companies; and
4 various *FTSE Eurotrack indices* which track the performance of the major European companies.

These are only a few examples and new indices are being created all the time, it is a growth business!

What are the implications of market efficiency for the financial manager?

The financial markets are a point of contact between the firm's managers, who invest its funds in a collection of assets and projects, and its investors who provide the funds necessary for investment. The investment and financing decisions of the firm and the decisions of investors are connected by the markets.

There are several areas where the efficient market hypothesis will impact on the decisions of the financial manager in a company with securities listed in a stock market:

1 Any change in a company's fortunes which becomes known to the market will quickly and accurately be reflected in the market price of its securities. Thus the markets provide an objective and swift judgement on the performance of management and on the future prospects of the company.
2 If markets are efficient the company's securities will always be correctly priced so the financial manager need not be concerned about **the timing of new security issues** in the market. This is in contrast to the traditional view that new issues should be timed to coincide with favourable market conditions, that is, issue securities when the market is rising and defer issuing securities when the market is falling. In an efficient market, even in weak form, past or current share price movements are not predictors of future price movements. Thus there is, on average, no advantage in basing financing decisions on market cycles, it will not lead to *consistently* superior returns. However, managers may withhold inside information (the market is not strong form efficient) at the time of an issue which when subsequently released may increase or decrease the security's price. There is some empirical research (Loughran and Ritter 1995) which contradicts this

timing view and suggests that by successfully timing new issues managers can indeed earn superior returns. However, it remains to be seen if the conclusions of this research, which is clearly evidence against market efficiency, stand up to future scrutiny.

3 In efficient financial markets accounting or financial transactions alone will rarely enhance shareholder wealth. If securities are fairly priced then, in the main, the company will receive a fair price for any securities issued. It is irrelevant which type of security is issued, equities, bonds or convertibles, or what their respective characteristics and maturities may be.

The more important concern then is not with how, when and what type of securities the firm issues in the markets, but rather with how profitably the actual funds raised will be invested or utilised by the firm. This implies that it is *the quality of the firm's investment decisions* which really matters rather than its financing decisions.

For example, short-term interest rates frequently differ from long-term interest rates. Suppose, for instance, that short-term interest rates are currently lower than long-term interest rates and ignoring any differences for risk, should the company now issue short-term debt instruments to raise necessary long-term funds?

Not if markets are believed to be efficient. The fact that long-term rates are higher implies that the markets expect interest rates to rise in the future. When the time comes to renew or 'roll over' the short-term debt, the financial manager is likely to find—if market expectations hold true—that short-term interest rates will have risen to a level where any apparent interest rate advantage in using short-term debt has been eliminated. In the meantime expensive refinancing costs will have been incurred.

4 In an efficient market the price of a company's securities is not influenced by cosmetic changes in accounting policies or other 'creative accounting' devices which are used to legitimately manipulate accounting profits in the annual accounts; professional analysts and investors will not be deceived by such practices. What matters in the valuation of a company's securities is expected future cash flows not reported accounting profits.

For an interesting analysis of the creative accounting practices which firms can adopt in presenting their annual reports and accounts see Griffiths (1995).

Market anomalies

There are always exceptions to every rule and the EMH is no different in this respect. Some of the more persistent exceptions to the EMH include:

Size effect

The shares of small firms seem to offer better or abnormally positive returns compared to large firms (Keim 1983; Dimson and Marsh 1986). This is partly explained by the higher risk of small firms, but even after allowing for the risk differential excess returns remain.

However, more recent research by professors Dimson and Marsh of the London Business School (published by stockbrokers Hoare Govett in January 1998) suggests that

small companies have failed to maintain their abnormal returns record into the 1990s.

Price earnings (PE) ratio effects

The shares of firms with low PE ratios tend to outperform those with high PE ratios. The price earnings (PE) ratio is a firm's share price divided by its earnings per share (EPS) and indicates, among other things, the market's assessment of the firm's future growth prospects, the higher the PE ratio, the higher the expected growth prospects and vice versa.

The rationale for investing in a portfolio of low PE shares is that while these shares may be out of favour or neglected by the market now, they will eventually 'come good', providing their fundamentals in terms of cash flow, earnings generation and so on continue to be sound.

The PE effect may be related to the size effect above as small firms tend to have low PE ratios but the evidence is not conclusive as to which anomaly, that is size or PE effect, dominates.

Timing effects

The returns on shares seem to vary according to a number of different timing effects. First there is *a seasonal effect* (abnormal returns tend to be earned during the first five days trading in January each year, while October appears to be the worst month for negative returns). Second, there is *a monthly effect,* as higher returns are available in the first half of the month than in the second. Third, *a daily effect* as the final 15 minutes of each trading day seem to be the most profitable and fourth, *a day of the week effect* or *'weekend effect'* with Monday being a high selling low returns day and Friday typically being a day for high returns.

Some of these timing effects may be behavioural, for example traders in the financial markets may wish to reduce their holdings of stocks by offering keener prices just before the close of business each trading day and similarly clearing up business on a Friday for the weekend—symptomatic of 'that Friday feeling'. The Monday effect may be symptomatic of 'Monday morning blues'.

If the EMH is valid and markets are efficient then the above anomalies would not be expected to persist, they would be incorporated into the market thus eliminating any opportunities for earning excess returns. These anomalies are well known and the fact that they have continued seems to suggest that either the markets are not efficient in either the weak and semi-strong form or they are efficient but these anomalies remain and are not considered significant in terms of their potential for earning excess returns.

The stock market crash of 1987

On Monday 19 October 1987, a day that became known as 'Black Monday', international stock markets crashed. A sudden and dramatic fall in share prices was triggered off *worldwide,* for no apparent underlying economic reason.

The economic shockwave started in Tokyo, followed by sharp declines in Hong Kong,

Sydney and then London. In America the Dow Jones Industrial Average (the New York Stock Exchange's leading stock market index) dropped 508 points (approximately 23 per cent), the biggest single points drop in one day ever recorded up to then.

On Tuesday 20 October the reverberations continued, with Tokyo falling more than 13 per cent, the closure of the Hong Kong exchange for the rest of that week and a drop in the London FTSE index of 14 per cent.

How, if markets are efficient, could an event such as this occur, where shares in even the leading stock market companies can 'nosedive' for no apparent reason?

There was no *new information* about these leading stocks that would have explained such a decline. Thus the notion that market prices are a fair reflection of values seemed unsustainable after the crash and the EMH must therefore be invalid, or so the arguments ran at the time.

The October crash cannot be explained by the efficient market hypothesis. Some of the reasons cited for the crash include: irrationally high prices before the crash due to speculative buying creating a **speculative bubble** which eventually burst; irrational reactions to economic events (investors followed the 'herd instinct'); and the closely integrated international computerised trading systems which automatically generated sell orders when share prices fell to preset levels. Whatever the underlying reasons for the crash they are not consistent with the postulates of the EMH.

There is no doubt that the 1987 crash damaged the notion of an efficient market, which was widely accepted up to that point and there is no guarantee that a similar event will not occur in the future. Nonetheless the EMH survives but perhaps with less credibility than before.

It should be noted that the idea of *relative efficiency* still obtains. For example the price of the shares in one company is efficient relative to the price of the shares of another comparable company; in other words share prices are valid indicators of *relative value.* After all it would be virtually impossible to test the 'true' value of an individual company's share without regard to its price.

The stock market crash of 1997—a touch of déjà vu?

Almost exactly ten years after the 1987 crash, on Monday 27 October 1997—another black Monday—stock markets worldwide took another dramatic tumble. In New York the Dow Jones index fell more than 550 points, a greater points fall than the record set on 19 October 1987. However, because the index had risen to a much higher level than in October 1987 it was less of a decline in percentage terms, 7.2 per cent compared with the previous 23 per cent. In London the FTSE 100 dropped 129.5 points or 2.6 per cent, with Paris and Frankfurt experiencing similar falls.

The crisis this time was triggered by underlying economic events in Asian currency markets, which eventually precipitated a crisis in the Hong Kong stock market. This caused virtually all other major stock markets to react in a similar bearish manner.

Fears of a repeat of the 1987 crash, however, subsided when the US market rallied within a day or two. This prompted similar rallies in other major markets.

It is a reflection of the psychology of financial markets—what John Kenneth Galbraith called the 'natural insanity' of financial markets—that in the months and weeks leading

up to the tenth anniversary of the October 1987 crash, there was speculation in financial markets worldwide about the possibility of a repeat crash in October 1997. It was almost as if the markets were trying to create a self-fulfilling prophecy.

Short- termism

Financial markets are often accused of being short-termist in their outlook, that is, it is only short-term gains and performance that really matter to investors not the long-term interests of the company in which they invest. As a result, it is argued, this prompts company directors and managers to make decisions which are more focused on providing short-term benefits (by way of share price and dividend increases) to investors to the detriment of the long-term interests of the company as a whole.

A classic example is that management may defer essential long-term investment and other expenditures (such as research and development) so as not to depress short-term earnings. In addition it is argued that such short-termist behaviour in the markets increases share price volatility.

Short-termism runs counter to the EMH. In efficient markets investors are expected to act rationally and assess investment decisions by the firm objectively in terms of their expected future cash flows. Short-termism implies irrational, purely self-interested behaviour on the part of investors in the market.

It is interesting that a survey of leading executives of FTSE 100 companies conducted by the *Financial Times* found that around 98 per cent of the executives who participated in the survey (the response rate was 74 per cent) considered their major shareholders to be investors for the long term (Martinson 1998).

In contrast professional investors and fund managers argue that it is the managers of companies who are short-termist in outlook. They argue that managers are more concerned with short-term self-interest issues of pay, performance bonuses and career prospects which are linked to the company's short-term profit performance.

This short-termist behaviour by corporate managers has been supported by Marsh (1991) who found no evidence of a bias in favour of short-term concerns in the markets. However, more recent research by Miles (1993), who surveyed approximately 500 UK quoted companies, found that the London stock market does in general appear biased in favour of shorter-term cash flows from projects than longer-term cash flows.

Expected future cash flows from projects are seemingly discounted at higher rates of return by the market than that which managers consider appropriate for the project. For example, Miles's research indicates that, *in the opinion of managers,* the markets require abnormally high rates of return, as much as 40 per cent above normal, from projects with a five-year term to maturity.

Unfortunately again there are conflicting views about where short-termism originates: is it with managers or with investors in the markets? One party appears to blame the other, and even the research evidence is inconclusive, perhaps the reality lies somewhere in between.

SMALL FIRMS FINANCING

We have identified that one of the primary functions of a capital market is to enable companies to raise essential *long-term* financing. However, the role of capital markets, and the financial system in general, as a source of financing for small firms has been, and remains, an area of intense debate and often controversy.

Since the early 1980s it has been the small business sector which has been responsible for the bulk of job creation and employment, in both the UK and US economies. While large firms have pursued the opposite trend of 'downsizing' and shedding labour, the numbers employed by small firms have steadily grown.

For example, in the UK between 1982 and 1991 firms employing less than 20 people created nearly 2.5 million jobs, whereas larger firms actually reduced their number of jobs by 0.25 million (Bank of England 1994).

While no generally agreed definition of what constitutes a small firm exists, in our current context a small firm is one which employs less than 200 people which according to the Confederation of British Industry (CBI) amounts to 98 per cent of UK firms (CBI 1993). Small firms in this category are alternatively referred to as *small and medium-sized enterprises (SMEs).*

Despite their important role in the economy, raising capital, especially equity capital, has been, and remains, an acute problem for the small firms' sector. Small firms invariably have difficulties in securing adequate capital, either to begin operations *(start-up capital),* to expand existing operations *(development capital),* or to sustain existing operations in the event of financial hardship or an economic downturn. In fact most small firms tend to remain undercapitalised throughout their entire existence.

For example, the business start-up scenario presented in Coffee Ventures would be a typical case where difficulties in raising both start-up and development finance are likely to be experienced.

Raising debt finance is less of a problem than raising equity (small firms have access to the conventional sources such as bank overdrafts and loans, and hire-purchase and leasing), although there is still a lack of *flexibility* over the choice of sources of debt finance. Small firms, for example, are unable to offer *incentives* to debt finance providers through the use of warrants (essentially the right to purchase equity shares in the future at a fixed price) or other debt conversion instruments.

For a variety of reasons, which we will identify shortly, small firms have traditionally found it difficult to raise equity in the capital markets. Raising additional equity capital, which is often the preferred method of financing investment projects with risky cash flows, is frequently unattainable. Small firms seeking to raise equity in the region of £50,000−£200,000 find it particularly difficult, and this is often referred to as the 'equity gap'.

In recent years stock markets worldwide have responded to this 'equity gap' by establishing dedicated small companies markets. As we have seen, the London Stock Exchange's Alternative Investment Market (AIM) was introduced in June 1995 specifically to address this problem in the UK. Other countries have responded similarly,

for example the Developing Companies Market in Dublin, the Nouveau Marché in France, the Neuer Markt in Germany and the pan-European stock market EASDAQ (European Association of Securities Dealers Automated Quotation) introduced in 1996.

The difficulties experienced by small firms in raising capital

Among other factors, the options available to a small firm for raising capital will be influenced by its financial status and risk profile, as viewed by potential investors and lenders. The following factors contribute to the difficulties experienced by small firms in raising finance:

Cost

Small firms do not have the economies of scale of large firms, this makes raising additional finance, particularly equity finance, relatively expensive. For example, the administration and arrangement fees charged by investment banks are high. Even a flotation on a 'junior' stock market such as AIM is very expensive for a small company.

Risk

Small firms with limited track records, and perhaps lacking in management and professional expertise, are generally perceived as high-risk investments by lenders and investors—four out of five start-up ventures fail. Consequently higher returns will be required, which again increases the cost of raising capital.

In addition, small companies may have developed initially profitable businesses on the basis of a single product or market. These may be seasonal (toys and games), cyclical or even fashion fads. Small businesses will be more vulnerable and less able to withstand external economic shocks and adverse business conditions.

Any assessment of a small firm's risk will include a consideration of the following:

- *Stock market listing.* Whether the company is listed on a recognised stock exchange will influence the risk attitude of investors' to the firm. Not having a listing makes equity investment less attractive for potential investors, as they have no apparent means of easily liquidating their investment.
- *Age.* Younger companies, and particularly start-up companies, will invariably find it more difficult to raise capital than companies with a more established track record. The business promoters may be unknown in the investing community.
- *Performance history.* A company's past trading history, the quality of its past earnings and cash flows will clearly be important assessment variables. Most small firms tend to have erratic or volatile patterns of earnings.
- *Management.* The quality of the company's management, its experience and knowledge of the business, qualifications and expertise, both technical and professional, are clearly relevant factors.

Returns

Investors and lenders require higher returns because of the perceived higher risk. The returns required by some possible investors, for example venture capitalists, (in the region of 35–40 per cent per annum over a 3–5 year period) are beyond the capabilities of smaller firms to generate.

Ownership and control

Many small firms are owned and controlled by entrepreneurs and innovators who are reluctant to cede control to potential investors. Lenders often require restrictive covenants and management constraints (e.g. limitations on dividends, borrowings from elsewhere, cash flow targets and so forth) to be put in place. Entrepreneurs typically find such restrictions difficult to live with.

Reputation

If the company has a very limited reputation or business profile it will be an unknown quantity to many of the investing institutions, thus finding willing investors can be difficult.

Lack of expertise

Small business managers may lack financial expertise and experience. They may not know where to go to seek additional funding or how to deal with the issues of raising finance. In addition they may have little idea of the type or amount of finance required.

Owner-managers may lack the skills necessary to provide professional financial projections (e.g. cash flow and profit projections), forecasts, and business plans. Even if professional accounting help is sought the projections and forecasts are only as reliable as the information which has been provided by the firm's management.

It is interesting that a key factor contributing to small firm failure is weak, or even the complete absence of, *financial management skills.* Research studies (e.g. Rhodes 1981) have found that small business managers tend to be financially naïve and inept. They are unable to assess either the amount or type of financing required. Research has also confirmed the critical importance of financial management skills as a determinant in the success of a small business enterprise.

Size

Smaller firms often have difficulty in stimulating investor interest as investors perceive the potential rewards to be low. If a firm is not eligible for listing on the stock exchange, there will be a very limited market for its shares. In addition to problems with marketability of shares, valuation will also be difficult. This means that it can be very difficult to find investors who are willing and able to purchase shares in the company.

The provision of equity capital is often limited to a small number of founder members and employees (typically equity is provided by the 'three Fs'—founder, family, and friends) who either do not have additional capital to invest or are not willing to assume further risk. Thus small firms have a shallower and weaker investor base than the larger firms.

Sources of finance for small firms

The conventional sources of short- and medium-term finance available to small companies are examined in Chapter 19. In this section we will briefly review some of the more specialised sources of finance available specifically to small firms, these include:

The small firms loan guarantee scheme

This is operated by the Department of Trade and Industry (DTI) where the government provides a guarantee of 70 per cent for loans granted by approved lenders (usually the high street banks). Loans, in the region of £5,000−£100,000 are provided to firms which are unable to obtain conventional financing because of lack of security. Firms which have been trading for at least two years can receive loans up to £250,000, with 85 per cent of the outstanding loan being guaranteed by the government.

Equity capital

As we have discussed, raising equity capital for small firms is particularly difficult. One potential source is a **venture capital company (VCC)** or a **venture capital trust (VCT).** Venture capital companies and trusts provide high-risk equity capital in the expectation of earning high returns. However, venture capitalists tend to prefer investing in larger firms, and usually have a lower investment limit of £250,000, with the result that venture capital is unavailable as a source of finance to very small firms.

Another potential source of equity is through informal investment such as a **'business angel'.** Business angels are wealthy individuals, perhaps also professional business people, who are prepared to invest equity capital in a company. As a rule, business angels will invest less than venture capitalists, but may not be so demanding in terms of future success, growth rates, and rates of return as venture capitalists. In addition to finance, business angels can add value to a business by making their professional expertise available to any company in which they invest.

A third possibility is **corporate venturing.** This is where a large company with surplus cash resources may invest equity directly in a small firm. The equity interest will generally be a minority one, and, like business angels, large companies have also professional skills and advice to offer. Wealthy corporations are also more likely to take a longer-term view of their investment in a small firm, thus they may not be so demanding of returns and success in the short term.

The **Enterprise Investment Scheme (EIS)** was introduced as a means of helping small unquoted trading companies gain access to equity capital. By providing tax incentives (mainly income tax relief on money reinvested in the scheme by investors) to

investors, the EIS seeks to stimulate equity investment in small firms.

Other sources

There are many schemes and sources of small firm assistance available throughout the UK, there are over 300 initiatives from the DTI alone, and it would not be possible, or relevant, to include even a small proportion of them here.

For example, sources of finance, support and advice, are available, directly or indirectly, to small firms through the many *Local Enterprise Agencies, Local Enterprise Companies (LECs), Training and Enterprise Councils (TECs),* the *Local Investment Networking Company (LINC),* which is a nationwide service which seeks to establish links between investors and small businesses, and the *Rural Development Commission (RDC).*

There are also various regional bodies and development agencies in Scotland, Wales and Northern Ireland. For example, the *Local Enterprise Development Unit (LEDU)* in Northern Ireland provides grants and other assistance to small businesses employing less than 50 people.

Other organisations providing finance and support to small businesses include *The Prince's Youth Business Trust* and *The Prince's Scottish Youth Business Trust.* These are charities established to help young people in the 18 to 29 age group, and who have a good business idea, start up in business. The trusts provide grants, low interest loans, advice, training and marketing support to young entrepreneurs. Shell UK Ltd. sponsors *Livewire* which also provides financial help, business advice and support to young entrepreneurs in the 16 to 25 age group.

Recent small business financing innovations in the UK include *Mutual Guarantee Societies (MGSs).* These are societies (analogous to credit unions for individuals) which offer to arrange financial support for small firms and start-up businesses. Small firms can join an MGS by buying one share and then deposit regular savings on which they earn a rate of interest from the society.

When sufficient deposits have been accumulated, this enables the society to then act as guarantor for loans which members may obtain from banks which participate in the scheme. The schemes are supported by some of the commercial banks such as the Co-operative Bank and the Unity Trust Bank.

FINANCIAL MARKETS—A PRACTITIONER'S VIEW

We will conclude this chapter on capital markets with a personal viewpoint on the stock market from Lord Weinstock (described by the *Financial Times* as the most powerful post-war British industrialist) who, for 33 years, ran one of the largest multinational companies in Europe—General Electric Company (GEC) UK—with a stock market capitalisation at the end of 1996 of $17,086 million. It has to be emphasised that this is Lord Weinstock's own personal view on the operation of the stock market.

FINANCIAL MARKETS—A PRACTITIONER'S VIEW

"The value that the stock market places on individual stocks and shares seems sometimes to be rather a matter of fashion than a reflection on what is actually going on in the business…

In an objective sense, the judgment of the stock market is suspect because it does not allow enough time to draw conclusions in relation to its observations. If the stock market always valued shares correctly, you would not consistently get violent swings in share prices: in fact, you get violent swings in share prices quite frequently, and quite close to each other.

The City does not live by getting the thing right, it lives by change, buying on expected increases and selling on expected falls, without concern or even knowledge of what will cause the change or justification of its volume. Since it always expects prices to change, it obviously does not know at a given moment what the true value is. It knows only at what price you can deal at that particular moment.

Furthermore the stock market over-emphasises the short term and undervalues the long term; it does not value companies for the underlying soundness of their businesses and the strength of their material resources.

It should not therefore be surprising that GEC shares have not enjoyed the recognition they have merited in their market price. Nor has management been inclined to sell the shares to the public. I do not think we can claim to have been very good in this aspect of what is called "public relations"

(Lord Weinstock, former Chairman of the General Electric Company (GEC) UK, in an interview with the *Financial Times*—'The Company That Arnold built', *Financial* Times, 30 December 1996)

EXERCISE 5 —STOCK MARKETS

Do you agree with Lord Weinstock's view of the stock market? Explain your answer.

RECAP

Capital Markets: These are for trading in long-term securities, such as shares and bonds, and bring together demanders and suppliers of long-term capital. In the United Kingdom the capital markets include **the London Stock Exchange**—the main market—and **the Alternative Investment Market (AIM)** for the securities of smaller companies.

Securities Markets: These serve two main purposes: (1) to allow companies to raise new capital, and (2) to provide a market in which investors can buy and sell securities. A securities market is alternatively referred to as a stock exchange or a securities exchange.

The London Stock Exchange: This is the principal capital market in the UK and provides the mechanism for raising capital for UK and foreign companies, government securities, eurobonds and depositary receipts (negotiable certificates showing ownership of a company's shares).

The Alternative Investment Market (AIM): AIM was created by the Stock Exchange specifically to provide a source of raising capital for smaller and dynamic young companies as an alternative to the main market, debt finance and venture capital.

The Gilt-edged Market: This market exists for the trading of gilt-edged securities (gilts), which are securities with interest and repayment guaranteed by the British government.

The UK Fixed Interest or Bond Market: This market allows companies to borrow money directly from investors. The loans raised are known as fixed interest stocks or bonds and, as for equities, trading is also done through SETS and the competing market maker system.

Methods of Listing Securities: There are a variety of methods available to a company which wishes to have its securities listed on the stock market and these will vary depending on whether the company is an unquoted company coming new to the market or one which has securities already listed. The Listing Rules of the Stock Exchange effectively permit a new applicant and its advisers to select any method they consider appropriate for the company subject to certain disclosure rules.

Trading in the Stock Market: Stock market trading is carried out through a system of competing market makers (or Retail Service Providers, RSPs), who must be members of the Stock Exchange and are dealers in the securities in which they are registered. They are obliged to make a continuous market in these securities under any trading conditions.

Broker-dealers: Like market makers, broker-dealers too must be members of the Exchange. They provide advice to and deal on behalf of their individual clients through market makers and they can also deal on their own account.

Market Efficiency: An efficient financial market is one in which security prices reflect new, relevant information about a company's future prospects so rapidly that investors are unable to profit from publicly available information.

This is the underlying assumption of the **efficient market hypothesis (EMH),** that the stock market immediately adjusts security prices to reflect any new information as soon as it becomes available. Research evidence to date suggests that capital markets are in effect 'efficient', but largely in a weak to semi-strong form.

Market efficiency also implies that capital markets are a fair and competitive source of finance for the firm.

Small Firms Financing: Despite their important role in the economy, raising capital, especially equity capital, has been, and remains, an acute problem for the

small firms' sector. Small firms invariably have difficulties in securing adequate capital, either to begin operations *(start-up capital),* to expand existing operations *(development capital),* or to sustain existing operations in the event of financial hardship or an economic downturn.

There is a wide range of specialised sources of financing available to small firms and these were briefly reviewed.

APPENDIX LONDON STOCK MARKET TRADING SYSTEMS

This appendix provides a brief review of the London Stock Exchange's market trading and supervisory systems.

Trading in stocks and shares on the London Stock Exchange is supported by a number of dedicated computerised systems such as SEAQ, SEATS and GEMMS.

SEAQ

The various bid and offer prices of UK equities are displayed throughout the trading day on the **Stock Exchange's Automated Quotations (SEAQ)** service. The system maintains continuously updated security prices and the best bid and offer prices are highlighted in yellow on SEAQ screens—the 'yellow strip'. Brokers and market makers will have SEAQ screens in their offices so they can continuously monitor share price movements and see who is offering the most competitive price at any point in time, they can then deal at these prices through SETS (see below) or over the telephone on behalf of their clients or themselves.

Trading in non-UK equities is supported by an electronic price quotation system similar to SEAQ called **SEAQ International.** SEAQ is also used for disseminating the prices of fixed interest securities.

SEATS PLUS

This is the **Stock Exchange's Alternative Trading Service (SEATS PLUS)** which is used for less liquid securities, that is those which are not frequently traded. Trading in AIM securities is supported on SEATS PLUS.

GEMMS

This is the network of **gilt-edged market makers (GEMMS)** recognised by the Bank of England for trading in government securities. Although there is a separate computer system for displaying gilt prices it is still managed by the Stock Exchange.

Order-driven trading

The role of the market maker is now somewhat under threat as on 20 October 1997 the Chancellor of the Exchequer Gordon Brown 'pushed the button' which launched the Stock Exchange's new system of **computerised order-driven trading.**

The change was the biggest stock market innovation since 'Big Bang' in 1986, and in fact was nicknamed 'Big Bang 2'. The new system has replaced the traditional over-the-

phone bargaining and has brought London closer into line with other international exchanges.

The new order-driven system, which is formally known as the Stock Exchange Electronic Trading Services (SETS) and initially only applies to the FTSE 100 index shares, in effect provides **matched bargains** direct between buyers and sellers thus eliminating the market maker middlemen. Market makers are also referred to as **retail service providers (RSPs).**

The system works by examining each incoming order and trying to match this with an order already on the Stock Exchange's central electronic order book. When a buy order and a sell order match, the trade is executed automatically. If there is no match the order remains on the order book until a match is found or it is cancelled by the trader.

The expected advantages of moving to the new order-driven system are a faster, cheaper, more efficient and more transparent share trading system.

The initial operation of the new system has caused some concern among brokers, investment fund managers, and listed companies. The system has been blamed for increasing the volatility of share prices, and reducing market liquidity as so few trades were being processed by the new system. A survey in April 1998 by Reuters, a leading financial and news information services company, found that around 60 per cent of trades were still being carried out under the traditional market maker system and away from the order book, due to investing institution frustrations with the new system.

It remains to be seen how the new system will develop in the coming years.

Market supervision

Trading in the London Stock Exchange is regulated internally by the Exchange's Market Supervision Department, the Surveillance Department and the Regulatory News Service (RNS).

The Stock Exchange operates its own **Market Supervision Department** which is responsible for monitoring, enforcing and developing the rules and regulations governing the operations of market makers and broker-dealers.

Surveillance

All the trading activity in the market is monitored by **the Stock Exchange's Surveillance Department** through its own computer systems to reveal any unusual trading patterns or dealings in certain securities which might suggest for example, fraud, money laundering, attempts at price rigging or insider dealing.

Regulatory News Service (RNS)

The Exchange's **Regulatory News Service (RNS)** deals with the processing and validation of all the information which companies (on the main market and AIM) are required to provide to the Exchange in accordance with the continuing obligations of listing, for example, profit announcements and share issues.

The system is designed to validate and immediately communicate company

announcements, especially those which could be regarded as 'price sensitive', that is have an impact on a company's share price, to the market.

REVIEW QUESTIONS

Concept review questions

1 (a) What are capital markets? (b) What role do they play in financial management?
2 Describe the main securities traded in a stock market.
3 (a) Discuss the aims and activities of the London Stock Exchange, (b) Summarise the key requirements which a company must satisfy in order to obtain admission to the Official List.
4 What is meant by stock market 'liquidity' and why is it considered important?
5 Outline the respective roles of *market maker* and *broker-dealer.*
6 (a) What do you understand by the term 'market efficiency' in financial management? (b) What are the implications of market efficiency for the financial manager?

Test questions

7 **Small firms financing,** (a) Outline the particular problems experienced by small firms in raising finance, (b) Identify the main sources of specialised financing available to small firms.
8 **Rights issue.** Describe briefly what a 'rights issue' is and explain why such issues are a common way of raising additional finance.
9 **Stock exchange listing methods.** Briefly explain the methods whereby a company can obtain a quotation for its shares on the London Stock Exchange.
10 **The Alternative Investment Market (AIM).** (a) Discuss the role of the London Stock Exchange's Alternative Investment Market (AIM).
(b) Lofty Enterprises is a rapidly growing private company which operates a very successful leisure and entertainment business. The company has ambitious expansion plans and wishes to raise £10 million fresh capital to finance its growth: a listing on the London Stock Exchange's Alternative Investment Market (AIM) has been mentioned as a means of achieving this.
As an assistant financial consultant you have been asked to make a presentation to the board of Lofty Enterprises outlining the key factors which the directors will need to consider in deciding whether AIM is appropriate for the company.
(c) Briefly outline *one* appropriate method by which the company could achieve a listing on AIM.
(d) Discuss the role of a merchant or investment bank in the company's listing.
11 **Market efficiency.** The following two comments were drawn from separate articles in a highly respected financial newspaper:
'Market efficiency does not mean that share prices can be forecast with accuracy.'
'The research department of a large firm of stockbrokers has developed a multiple

regression model, based on data collected between 1964 and 1994, which is claimed to give statistically significant results for predicting share prices.'
Discuss these comments and explain why they are not contradictory.

12 **Seeking a stock market listing.** (a) CP plc is a company operating primarily in the distribution industry. It has been trading for 15 years and has shown steady growth in turnover and profits for most of those years, although a failed attempt at diversification into retailing four years ago caused profits to fall by 30 per cent for one year. The figures for the latest year for which audited accounts are available are:

Turnover:	£35.2 million
Profit before tax:	£13.7 million

The company has been financed to date by ten individual shareholders, three of whom are senior managers in the company, and by bank loans. Shares have changed hands occasionally over the past 15 years but the present shareholders are predominantly those who invested in the company when it was formed.
Some of the shareholders are now keen to realise some of the profits their shareholdings have earned over the years. At the last Annual General Meeting, it was proposed that the company should consider a full listing on the Stock Exchange. You are required

(i) to discuss the advantages and disadvantages of a flotation on the stock exchange in the circumstances described above;
(ii) to explain and compare the following methods by which the company's shares could be brought to the market:

- Private placing
- Offer for sale at fixed price
- Offer for sale by tender.

(b) Describe the services which are likely to be provided by the following financial institutions in connection with a public offering of shares:

- Merchant banks
- Stockbrokers
- Institutional investors.

13 **Rights issue.** Hoseknit Clothing has 9 million £1 ordinary shares in issue. The shares are currently trading in the stock market at £3.75. The directors wish to raise a further £4.5 million for expansion and a 'one-for-six' offer is proposed. The company's advisers have indicated that an issue price of £3.00 would be appropriate.
You are required to calculate:

(a) the theoretical ex-rights price of a share;
(b) the shareholding value after the rights issue;

(c) the value of the right to buy another share;

(d) the value of a right per individual share.

14 **Rights issue.** Shaw Holdings plc has 20 million ordinary shares of 50p in issue. These shares are currently valued on the Stock Exchange at £1.60 per share. The directors of Shaw Holdings believe the company requires additional long-term capital and have decided to make a one-for-four rights issue at £1.30 per share. An investor with 2,000 shares in Shaw Holdings has contacted you for investment advice. She is undecided whether to take up the rights issue, sell the rights, or allow the rights offer to lapse.

Required:

(a) Calculate the theoretical ex-rights price of an ordinary share.

(b) Calculate the value at which the rights are likely to be traded.

(c) Evaluate each of the options being considered by the owner of 2,000 shares.

(d) Explain why rights issues are usually made at a discount.

(e) From the company's viewpoint, how critical is the pricing of a rights issue likely to be?

Practical project I

Survey the financial media to find two examples of companies which are in the process of floating, or have just recently floated, on the stock market: one on the main market and one on the Alternative Investment Market (AIM). Obtain a copy of the prospectus relating to each flotation. From your research see if you can determine:

1 The reasons for the flotation.

2 The method of listing used.

3 The offer price of the company's share.

4 Any change in the company's share price in the market following the flotation.

5 The market reaction to the offer.

6 If the offer was viewed as successful or unsuccessful, and the reasons why.

Practical project II

For a company in an area of business relevant to your studies, obtain its most recent annual report and accounts. In addition, obtain information on its monthly share price movements over the past two years. Draw a chart of the price movements. From your information:

1 What is the overall trend in share price performance over the two-year period? Your chart is likely to have many peaks and

troughs, but it is the general trend that is important. For example, does the trend show growth or decline in share value?

2 Can you relate any share price movements to particular announcements or new information about the company during the period?

3 Has the share price been affected by information about any changes in the general economy?

4 Has the company raised any additional capital over the two-year period? If it has, in what form has the capital been raised, shares, bonds or debentures? What were the reasons for raising the capital?

CASE STUDY 1

Financial Planning—Metallic Products Ltd

Metallic Products Ltd manufactures a range of metal-based products for use in the DIY and building trades. The company currently has four directors and an issued share capital of four million ordinary shares. All the directors are shareholders in the company.

It is approaching the end of the current financial year and the directors are meeting to discuss the company's plans for the next three years. The following is a summary of the points discussed at the meeting:

(a) The directors predict sales to grow by 30 per cent per year in years 1 and 2, and by 10 per cent in year 3. They are confident that the current gross profit as a percentage of sales ratio can be maintained.

(b) Operating expenses are assumed to be 25 per cent of sales and depreciation is assumed to be 10 per cent of operating expenses.

(c) Interest charges relate to a £1 million long-term loan on which the interest rate is fixed at 10 per cent per year. Metallic is not obliged to make any repayments of principal over the planning period. The company currently has no other borrowings.

(d) The relevant taxation rate is 30 per cent and this is not expected to change.

(e) The company currently distributes 50 per cent of its after-tax profits as dividends to shareholders. The directors wish to at least maintain this level of dividend payout over the planning period. Approximately 25 per cent of the shares are owned by a

financial institution.

(f) The directors have stated that the current return on investment (ROI) should grow by 10 per cent per year and reach a target rate of 25 per cent by the end of the planning period. They also wish to achieve a doubling of earnings per share (EPS) by the end of year three.

(g) Capital expenditure for the past two years has been nil. The directors estimate that for the sales growth and other objectives to be realised, the company will need to invest in new assets. The planned investment programme has been determined as £1.38m in year 1, £1.79m in year 2, and £1.97m in year 3.

The financial director has prepared a projected profit and loss statement for the current financial year and this, together with relevant balance sheet extracts, is presented below.

As an assistant to the financial director, and based on the information available, you are required to:

1 Prepare forecast profit and loss statements for each year of the three year planning period.
2 Using the forecast profit and loss statements calculate three relevant financial ratios for each year of the forecast.
3 Prepare statements showing the expected free cash flow for the current year and for each year of the planning period. For convenience you should assume that tax, interest, and dividends are all paid in the year in which they are incurred, and that the company's opening cash balance at the start of the current year was zero.
4 Based on your findings, present relevant comments and observations on the company's plans, objectives and methods of forecasting.
5 How do you think the company's objectives relate to the goal of the shareholder wealth maximisation?

Metallic Products Ltd Summarised Profit and Loss Account for the year to 31 December	Current Year £m
Sales	10.60
Cost of sales	6.10
Gross profit	**4.50**
Operating expenses	2.65
Depreciation	0.27
Operating profit	**1.58**
Interest	0.10

Profit before tax	**1.48**
Taxation	0.44
Profit after tax	**1.04**
Dividends	0.52
Retained profit	**0.52**
Balance sheet extracts as at 31 December	**£m**
Fixed assets	5.30
Net current assets	2.65
Total assets less current liabilities	7.95
Long-term loan	1.00
Net assets	**6.95**

NOTES

1 The terms securities market, securities exchange, and stock market tend to be used interchangeably.
2 London Stock Exchange Fact Book 1995.
3 London Stock Exchange Fact Book 1998.
4 London Stock Exchange Fact Book 1998.
5 London Stock Exchange Fact Book 1998.
6 London Stock Exchange Fact Book 1998.
7 The notion of an efficient capital market and the EMH were developed by Eugene Fama in 1970.
8 Shakespeare, *Henry IV, Part Two*. Meaning that by studying the past—'the times deceased'— one will be better able to predict the future.

FURTHER READING

General

A useful introduction to capital markets is provided in:
• *Financial Markets: An Introduction* . Dixon, R. and Holmes. P., Chapman & Hall, 1992.
   A more extensive, and relatively non-technical, treatment of many aspects of capital markets (domestic and international) is provided in:
• *Finance and Financial Markets* . Pilbeam, K., Macmillan Business, 1998.

Capital markets

For a review of the operation of UK capital markets see:
• *British Financial Markets and Institutions: An International Perspective* . Piesse, J.,

Peasnell, K. and Ward, C., Prentice Hall, 1995.

• *London Stock Exchange Fact File* . An annual statistical publication on the operation of the London Stock Exchange, published by the London Stock Exchange, London EC2N 1HP.

    On issuing securities see:

New Equity Issues and Raising Cash.' Brealey, R. and Nyborg, K. *Mastering Finance* , Issue 4, Financial Times, 1997.

    For excellent coverage on the operation of international capital markets see:

Financial Management for International Business . Demirag, I. and Goddard, S., McGraw-Hill, 1994.

Multinational Finance . Buckley, A., 3rd edition, Prentice Hall, 1996.

An Introduction to Global Financial Markets . Valdez, S., 2nd edition, Macmillan Business, 1997.

    For an analysis of the trend towards the globalisation of capital markets see:

Capital Goes Global.' *The Economist* , 25 October 1997, pp. 139–140.

Market efficiency

A useful discussion of financial market efficiency is provided in:

• *Finance and Financial Markets* . Pilbeam, K., Macmillan Business, 1998. See Chapter 10; and

• *Stock Market Efficiency: Theory, Evidence and Implications* . Keane, S.M., Philip Allan, 1983.

    See also the following for differing perspectives on stock market efficiency:

The Stock-picking Fallacy.' *The Economist* , 8 August 1992 pp. 15–16.

Beating the Market: Yes, It Can Be Done.' *The Economist* , 5 December 1992, pp. 21–23.

Mastering Finance . Issue 7, *Financial Times,* 1997. This publication contains several articles relating to markets and market efficiency. Issue 6 of the same series contains a useful article on market short-termism—*'Myths surrounding short-termism'* by P.Marsh, 1997.

Market Efficiency and the London Walk', *Financial Times* , 17/18 October 1998, p. 7.

Small firms financing

A range of publications on small firms financing is available from the Department of Trade and Industry, see for example:

• *A Guide to Help Small Firms* . Department of Trade and Industry, February 1997.

• *Understanding the Small Business Sector* . D.J.Storey, International Thomson Business Press, 1997.

• 'Sources and types of finance.' *Mastering Enterprise* , Issue 3, *Financial Times* 1996.

    See also:

Hutchinson, R. 'The Capital Structure and Investment Decisions of the Small Owner-Managed Firm: Some Exploratory Issues.' *Small Business Economics* , 1995.

Hutchinson, R. & McKillop, D. 'Banks and Small to Medium Sized Business Financing in the United Kingdom: Some General Issues.' *National Westminster Bank Quarterly*

Review , 1992.

REFERENCES

Bank of England. 'The Financing of Small Firms.' *Bank of England Quarterly Bulletin* , February 1994.

Confederation of British Industry (CBI). *Finance for Growth: Meeting the Needs of Small to Medium Sized Enterprises* . CBI Smaller Firms' Council, 1993.

Dimson, E. and Marsh, P. 'Event Study Methodologies and the Size Effect: The Case of UK Press Recommendations.' *Journal of Financial Economics* , September 1986.

Fama, E.F. 'Efficient Capital Markets: A Review of Theory and Empirical Work.' *Journal of Finance* , May 1970.
Fama, E.F. 'Efficient Capital Markets II.' *Journal of Finance* , December 1991.

Griffiths, I. *New Creative Accounting. How to Make Your Profits What You Want Them To Be* . Macmillan, 1995.

Keim, D.B. 'Size Related Anomalies and Stock Return Seasonality: Further Empirical Evidence.' *Journal of Financial Economics* , 1983.
Kendall, M.G. 'The Analysis of Economic Time-Series, Part 1. Prices.' *Journal of the Royal Statistical Society* , 96, 1953.

Loughran, T. and Ritter, J.R. 'The Timing and Subsequent Performance of New Issue.' *Journal of Finance* , 1995.

Marsh, P. *Short-termism on Trial.* International Fund Managers Association, 1991.
Martinson, J. 'Shares in the Action.' *Financial Times* , 27 April 1998, p. 21.
Miles, D. 'Testing for Short-Termism in the UK Stock Market.' *The Economic Journal* , 1993.

Rhodes, R. *A Study of Business Financed under the Small Business Loan Guarantee Scheme* . Department of Trade and Industry (DTI), 1981.

part two
THE CORE CONCEPTS IN FINANCIAL MANAGEMENT

THIS PART CONTAINS THE FOLLOWING:

Part 2 explores in more depth the core concepts of financial management. These concepts, which form the essential building blocks of financial management, will guide the financial manager in financial decision-making and in the operation of the financial management process. They will also exercise a profound influence on the determination of shareholder value.

For example, the connection between the time value of money concept and investment decision-making becomes readily apparent when we examine strategic investment decision-making in Part 4. The time value of money is presented in Chapter 5.

Chapter 6 introduces risk and return and how they are calculated for a single asset. The chapter then proceeds to examine the effects on risk and return when investments are combined into a portfolio.

Chapter 7 extends the analysis of risk and return and introduces one of the most influential models in modern financial management—the capital asset pricing model (CAPM). The model is used in the financial markets as a method of pricing, or valuing, a firm's securities.

Chapter 8 deals with the central concept in financial management, that of value. A range of processes and techniques used in asset valuation are explained, including some of the more recent innovations, such as Economic Value Added (EVA) and Market Value Added (MVA).

Part 2 concludes with an integrative case study on the relationship between risk and return and value.

5
THE TIME VALUE OF MONEY

This chapter examines the key financial management concept of the time value of money (TVM).The following topics are covered:

an overview of the time value of money;
future value and compounding;
present value and discounting;
annuities;
perpetuities.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the time value of money (TVM) concept and its role in financial decision-making;
2 calculate the future value (FV) and the present value (PV) of differing cash flow streams;
3 understand and calculate net present value (NPV);
4 calculate perpetuities.

OVERVIEW

In Chapter 1 the **time value of money, cash flows** and **opportunity cost** were introduced as three of the key concepts of financial management: as we shall see the time value of money in a sense incorporates all three. We also noted in Chapter 1 that the financial manager's concern is not just with the volume or size of cash flow returns but also with their **timings.**

   We could alternatively name this chapter the 'Time Value of Cash Flows'—although the time value of money is the term more commonly used—as we are essentially dealing with determining the time value of the firm's cash flows. The reasons for emphasising cash flows (rather than profits) was explained in Chapter 1.

   Cash inflows and cash outflows arising from the firm's investing and financing activities will necessarily occur over different time periods, and it is the respective timings of these cash flows which is vitally important. It is the timing of cash flows which affects their value and ultimately the value of the firm.

As we shall shortly discover, the sooner cash flows are expected to be received, the more valuable they are, and conversely the later they are expected to be received, the less valuable they are. There is thus a negative or inverse relationship between the timing of cash flows and their value: as the time before receipt increases the value declines. The timing of cash flows therefore directly affects their value and this is what we mean by the time value of money concept.

Financial managers constantly have to make decisions based on the time value of money concept, whether it is decisions about in which projects the firm should invest its capital resources, or about how the firm should raise the capital resources necessary for its activities. Such decisions can only be made effectively and lead to an increase in the value of the firm if the financial manager has a sound understanding of the time value of money concept.

The time value of money concept is thus extremely relevant to both investment and financing decisions. Not just to the investment and financing decisions of the firm, but also at a personal level for us all. For example, whether you are buying a house, joining a savings scheme, or providing for a future pension, the time value of money affects them all and consequently your personal wealth.

The time value of money of necessity involves some mathematical manipulation and for students who are less mathematically inclined these calculations may seem at first intimidating. However, do not be deterred, as with a little effort and practice they will soon become clear. The time value of money is such a fundamentally important concept in financial management that making an effort to grasp its principles now will yield its rewards later.

THE TIMING OF CASH FLOWS

You may well ask why the timing of cash flows is so important and how does timing affect value? We will try to explain.

Most of us will instinctively appreciate that, 'a pound today is worth more than a pound tomorrow'. In other words most of us would prefer to receive cash sooner rather than later, and to spend cash later rather than sooner, because intuitively we know that *money has a time value.*

Suppose, for instance, you were offered the choice of receiving £1,000 today or £1,000 one year from now, like most people your preference would probably be for the £1,000 now. You probably didn't even have to think about your answer: your response, like that of most people, was probably instinctive. However let us now explore more formally the reasons why most of us have this time preference.

There are a number of reasons. First, there is less **risk** associated with the £1,000 if it is to be received today, £1,000 to be received one year from now is much less certain—a bird in the hand as the proverb goes. Second, there is what economists call **personal consumption preference,** most people prefer to spend or consume now rather than at some less certain time in the future.

The third, and perhaps the most relevant for our purposes, is that there always **exists alternative investment opportunities:** you can decide to forgo present consumption,

accept some risk and invest the £1,000 with the aim of increasing its value (and your wealth) in a year's time.

Thus the sum of £1,000 to be received one year from today (ignoring inflation), is worth less than the same £1,000 received today. If you had the £1,000 today you would have the opportunity to invest it, perhaps in an interest-bearing deposit account paying a rate of interest of say 10 per cent per year, so that in one year's time your initial £1,000 would be worth £1,100. That is, your £1,000 *principal* amount plus the interest earned at 10 per cent (£1,000×1.10).

If 10 per cent is the best rate of return you can get in the market for investments of this type, then you would in fact be *indifferent* between receiving the £1,000 today or receiving £1,100 a year from now.

TWO PERSPECTIVES ON THE TIME VALUE OF MONEY

In terms of the time value of money, there are two ways of looking at this investment. We can say that if we invest the £1,000 now in a savings account paying interest at 10 per cent, then this starting amount will grow to £1,100 one year from now. In other words, the **future value** of our £1,000 principal one year from now will be £1,100.

Alternatively, we can say that £1,100 to be received one year from now, at an opportunity cost of 10 per cent, is of equal value to £1,000 received today. Expressed in terms of the time value of money, the **present value** of £1,100 due one year from now, at an opportunity cost of 10 per cent, is £1,000. Observe that the concepts of future value and present value are inversely related. Over time, future value will increase while present value will decline. We shall explore the concepts of future value and present value in more depth shortly.

INFLATION

You may have wondered about the role inflation plays in the time value of money. It is certainly the case that in times of inflation the value of money is eroded. Expressed in terms of its purchasing power, the same nominal amount of money will purchase less goods and services over time. However, for the time being, we will ignore the specific effects of inflation on investment decisions and focus on the important concept of opportunity cost.

OPPORTUNITY COST

By now we have established that cash flows to be received at some time in the future have less value than the equivalent cash flows to be received today. Cash flows received today by a firm can be reinvested in another profitable project in order to generate more cash flows, or at least placed in a deposit account to earn interest, thereby increasing value or wealth.

Thus there is an opportunity cost associated with cash flows because alternative investment opportunities always exist. This opportunity cost is the time value of money. In our £1,000 investment example, the opportunity cost is 10 per cent, it is the rate of return sufficient to entice you to accept the promise of £1,100 one year from now.

If you were not to receive the money for more than a year from now, the greater would be your opportunity cost—you could earn more interest. Therefore the longer one has to wait to receive cash flows, the greater is their opportunity cost.

As we mentioned in Chapter 1, the concept of opportunity cost is extremely important in financial management and we shall come across it time and again.

INVESTMENT DECISIONS AND THE TIME VALUE OF MONEY

The evaluation or appraisal of investment decisions is a critical task in financial management, whether for individuals or for firms. Investment decisions directly affect the wealth of the firm (or the individual). From the firm's perspective the objective of the investment appraisal process is to determine how the value of an investment (as measured in terms of the cash flows it generates) is likely to affect the value of the firm. The goal is to increase the wealth of the firm by making investments which are expected to yield returns greater than their costs.

The investment appraisal process involves the evaluation of a prospective investment's relevant cash flows (inflows and outflows), which will occur over different time periods. In order to make a valid comparison of cash flows occurring over different time periods, it is necessary to convert them to a common base, or time period. We do this by either converting future cash flows back to their present day values, or by moving present cash flows out to a future date.

At this point it may be helpful to illustrate an investment cash flow by use of a **timeline;** which is simply a horizontal line than can be used to represent the cash flows associated with any investment. Figure 5.1 illustrates the time-line for a specimen investment. Conventionally, cash outflows are shown as negative values and appear below the time-line, whereas positive cash inflows are shown above the line.
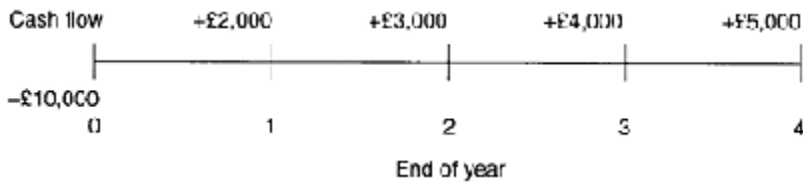
Figure 5.1 Time-line for investment cash flows

The time-line clearly shows the cash flow pattern or profile associated with this particular investment. In this case there is an initial cash outflow of £10,000 occurring at the present time (conventionally denoted as year 0), followed by a series of cash inflows expected to occur in the future over a four-year period. Conventionally, cash flows are assumed to

occur at the end of the period shown unless otherwise stated and time periods can in fact be any time period, years, quarters or months. Alternatively the investment cash flows can be shown graphically as in Figure 5.2.

As we shall see later, there are formal techniques and methods, principally **net present value (NPV) analysis,** which we will use to evaluate the size, timing and riskiness of the cash flows associated with investment decisions.

The concept of the time value of money may appear tricky to understand at first but it underpins so many aspects of financial management that any time spent now in trying to gain a firm grasp of the topic will certainly pay off later.
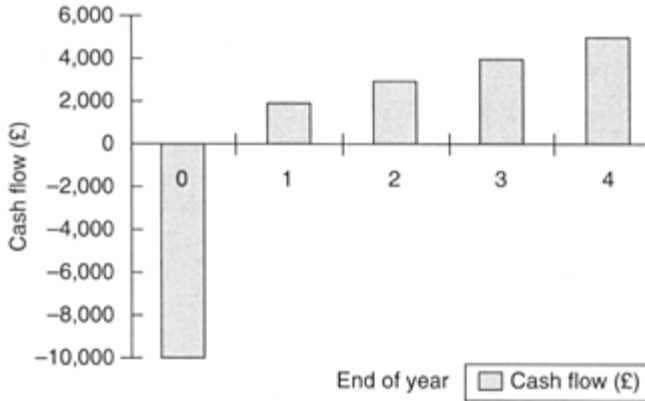
Figure 5.2 Investment cash flow profile

As we have mentioned above, the time value of money can be divided into two perspectives, future value and present value. We shall begin with future value.

FUTURE VALUE (FV)

The future value ($FV_{r,n}$) can be defined as: **the sum to which an initial amount of principal, or present value (PV), is expected to grow over a period of n years, when interest is earned at the rate of r% per year.** Mathematically this is represented as:

$$(FV_{r,n})=PV(1+r)^n$$

where,

FV=the future value of the investment
r =the annual rate of interest (or discount rate)
n =the number of periods, (usually years), over which the initial
    principal or starting sum is invested
PV=the initial principal sum invested (or the present value of the

investment).

The number 1 included in the term in brackets (1+r) is simply a constant factor; without it we would only be calculating a percentage of the original amount.

Applying this formula to our previous starting sum of £1,000, at 10 per cent after one year the value would be:

$$(FV_{r,n})=PV(1+r)^n$$
$$FV_{10\%,1}=£1,000\times(1+0.10)$$
$$=£1,000\times1.10$$
$$=£1,100$$

In this case n equals one, so the term in brackets is raised to the power of 1. If we invest the £1,000 principal sum for two years (i.e. n=2) at the same rate of interest 10 per cent, then we will have £1,210 at the end of the two-year period, derived as follows:

$$FV_{10\%2}=£1,000\times(1+0.10)^2$$
$$=£1,000\times1.21$$
$$=£1,210$$

For practice you may wish to calculate the future value of the £1,000 at the end of three years. Your answer should be £1,331 (£1,000×1.331).

By now you will probably have recognised the pattern of calculation. In finding future values we are concerned with **compounding** or growth in value and the technique of compound interest (where the interest earned on a principal sum invested becomes part of the principal after a specified period), underlies the concept of future value. If you can understand compound interest then you will understand the idea of future value.

The concept of future value (which is also referred to as *terminal* or *end value)* is further illustrated in Example 1.

Example 1 —The future value of money

Will B.Rich decides to invest £1,000 in a savings deposit account paying an annual interest rate of 15 per cent. At the end of year one his initial £1,000 principal will have grown to:

$$FV_{15\%1}=£1,000(1+0.15)=£1,000(1.15)=£1,150$$

After three years the original £1,000, (assuming an unchanged interest rate), will have grown to:

$$FV_{15\%3}=£1,000(1+0.15)3$$
$$=£1,000\times[(1+0.15)\times(1+0.15)\times(1+0.15)]$$

$$=£1,000 \times (1.521)$$
$$=£1,521$$

EXERCISE 1 —FUTURE VALUE

For practice you may wish to calculate the future amount if the initial sum is left on deposit for 10 years and the interest rate remains fixed. You will find the answer in Appendix B.

Remember that, for convenience and by convention, we assume that future cash flows occur *at the end* of the period in which they arise—unless the terms of the investment (or the exam question!) specify otherwise. If, for example, a cash flow occurs in period 3, we assume that it occurs at the end of period 3, which is also the start of period 4. Moreover, all cash flows shown as occurring in time period 0, occur right now, in the present time; they are already in present time values.

In Example 1 if we wished to calculate the future amount for a 10-year period this would become a time-consuming and tedious exercise. Fortunately, the factors required in future value computations are available from future-value interest tables, and are referred to as the **future value interest factor, (FVIF $_{r,n}$)**, for r and n. Thus the future value interest factor for r equal to 8 per cent and n equal to 7 years is:

$$\mathrm{FVIF}_{8\%,7}=(1+0.08)^7=1.7138$$

This is the factor by which the present value of the principal will be multiplied to determine its future value.

You can check this factor by referring to the future value tables, Table A1 in Appendix A. The column on the left of the table shows the period, n, which in this case is 7, and by cross-referencing this with the interest rate, r, (in this case 8 per cent), shown across the top of the table, the future value interest factor can be read as 1.714—rounded to three decimal places for practical convenience.

EXERCISE 2 —FUTURE VALUE INTEREST FACTORS

For practice, read from the future value tables the future value interest factors (a) $(1+0.05)^6$ and (b) $(1+0.12)^9$.

Alternatively the future value interest factor can be determined by using a financial calculator!

The '72 rule'

The '72 rule' is a quick but approximate method of determining how long it will take for a specified sum to double in value. To find how long it will take a particular sum to double divide the annual interest (or growth rate) into 72. For example, if the interest rate is 8 per cent then it should take 72/8 i.e. approximately 9 years for that particular sum to double. From future value tables the future value interest factor for 9 years at 8 per cent is 1.9990, which for most practical purposes is equivalent to 2.0.

Interest paid half yearly or semi-annually

So far we have assumed that interest is paid annually, however, some investments pay interest half yearly or semi-annually and to find the future value in six months time requires a modification to the future value equation as follows:

$$FV_{r,n} = PV(1+r/m)^{mn}$$

where,

n = number of years over which compounding occurs
m = number of compounding periods during the year
r = annual interest rate

You will appreciate that the more frequent the compounding the greater m will be. For example with daily compounding m=365! Semi-annual compounding is illustrated in Example 2.

Example 2* —*Interest paid (accrued) semi-annually

Using the same data as Example 1 but now with semi-annual compounding. Will B.Rich decides to invest £1,000 in a savings deposit account paying an annual interest rate of 15 per cent. At the end of six months his initial £1,000 principal will have grown to:

$$FV=£1,000(1+0.15/2)=£1,000(1.075)=£1,075$$

At the end of year one his initial £1,000 principal will now have grown to:

$$FV=£1,000(1+0.15/2)^{1 \times 2}=£1,000(1.1556)=£1,155.60$$

Compare this amount of £1,155.60 with the sum of £1,150 expected after one year in Example 1. In this case Will B.Rich is better-off (wealthier) by a marginal amount of £5.60. After

three years the original £1,000, with semi-annual compounding, will grow to:

$$FV=£1,000(1+0.15/2)^{3×2}$$
$$=£1,000×(1+.075)^6=£1,000×1.5433$$
$$=£1,543.30$$

This is an increase of £22.30 compared with the amount expected (£1,521) with annual compounding. With relatively small sums the differences are marginal, but consider the position of a financial or treasury manager who may have millions or tens of millions of pounds to invest: in such cases the differences will amount to very large sums of money. You can appreciate that for an investment of £1,000,000, (assuming the same investment terms), the difference would amount to £22,300 [(£1,000,000÷£1,000)× £22.30].

With interest accruing (being paid) quarterly the expected return on the same initial sum of £1,000 after one and three years would be as shown in Example 3 below.

Example 3 —Interest paid (accrued) quarterly
At the end of year one Will B.Rich's initial £1,000 principal will now have grown to:

$$FV=£1,000(1+0.15/4)^{1×4}=£1,000(1.1587)=£1,158.70$$

and after 3 years:

$$FV=£1,000(1+0.15/4)^{4×3}=£1,000(1.5555)=£1,555.50$$

This time the increase in wealth after 3 years with quarterly compounding, compared with 3 years' annual compounding in Example 1, amounts to £1,555.50−£1,521= £34.50. Again you will appreciate that for large sums invested this difference will amount to a considerable amount of money. For an investment of £1,000,000 this would amount to [(£1,000,000÷£1,000)×£34.50]=£34,500!

The pattern emerging is that the more frequently interest is accrued on a principal amount invested then the greater will be its future value.

EXERCISE 3 —FUTURE VALUE
You may wish to test this for yourself with the same original data but assuming monthly interest payments.

The annual percentage rate (APR)

Note from Example 2 that earning interest semi-annually at a nominal rate of 15 per cent is equivalent to an **annual percentage rate (APR),** or *effective annual interest rate (EAIR)* of 15.56 per cent. The APR or effective annual interest rate is calculated as:

$$(1+r/m)^{mn}-1=(1+0.15/2)^2-1=0.1556=15.56\%$$

Also, from Example 3, it can be seen that earning interest quarterly, at a nominal rate of 15 per cent, is equivalent to an annual percentage rate (APR) of 15.87 per cent.

$$(1+r/m)^{mn}-1=(1+0.15/4)^4-1=0.1587=15.87\%$$

When comparing the prospective returns from alternative investments, it is really the annual percentage rates offered by the investments which should be compared. The APR is the true, or effective, rate of interest earned.

Clearly this also applies to borrowing money, whether from banks, building societies, credit unions, or credit card companies. To find the true cost of borrowing money from any source, it is the APR which should be examined. The APR reflects the frequency with which interest is charged on a loan (or earned on an investment). Financial institutions are legally required to disclose the APR on any loans or investments which they provide.

For example, if the stated, or nominal rate of interest on a loan is given as 20 per cent, (r=20%) with interest being charged monthly (m=12), the effective annual rate of interest would be determined as:

$$(1+0.20/12)^{12}-1=0.219\approx22\%$$

SUMMARY OF FUTURE VALUES

Table 5.1 summarises our findings for the respective future values of a principal amount (PV) of £1,000 invested for one year (n), at 15 per cent nominal interest rate (r), where compounding is: (1) annual, (2) semi-annual, and (3) quarterly.

Table 5.1 Comparison of compounding frequencies

	Future value	Increase in value	APR (%)
(1) Annual compounding	£1,150.00	—	15.00
(2) Semi-annual compounding	£1,155.60	£5.60	15.56
(3) Quarterly compounding	£1,158.70	£8.70	15.87

Future value increases as the frequency of compounding increases. The more frequent the

compounding, the higher the effective rate of interest or APR being earned. With quarterly compounding the future value of the same initial sum of £1,000 is worth £8.70 more than with annual compounding. As previously indicated, these differences can add up to substantial sums when the initial principal is large and the investments are held for a lengthy period of time.

Manipulating the FVIF formulae

We can now use the future value equation to help us make investment decisions even when not all the values needed for the equation are known. The following two examples illustrate two different scenarios. In the first one we need to find the number of years, n, and in the second scenario we need to determine the interest or growth rate, r.

Example 4 —Finding n

Simon Simple has just been left a small legacy of £2,000 and has asked you to help determine how long it will take for his starting sum (PV) of £2,000 to grow to £4,000 if it can earn interest at 9 per cent compounded annually. In this case the objective is to solve the future value equation for n.

Substituting the known values into the future value equation gives:

$$(FV_{r,n}) = PV(1+r)^n$$
$$\text{thus: } £4,000 = £2,000(1+0.09)^n$$
$$£4,000/£2000 = (1+0.09)^n$$
$$2.00 = (1+0.09)^n$$

The next step is now to look up the FVIF tables, using the 9 per cent interest column and try to find the value factor of 2.0, or a very close approximation. We find that there is not an exact value of 2.0 in the 9 per cent column, the nearest is 1.9926 which is the factor for year 8. The value for n therefore, for most practical purposes, is 8 years.

A rough check using the '72 rule', =72/9=8 years. Simon will therefore have to leave his principal sum on deposit for at least 8 years if he wishes to realise a future value of £4,000, assuming interest rates remain unchanged.

Example 5 —Finding r

In this instance we wish to find the growth or interest rate, r.

Julie Chang currently has £3,000 available for investment and wishes to have at least £4,500 in 5 years time. Advise Julie as to what interest rate she must earn on her starting sum of £3,000 if she wishes to achieve her investment objective, assuming annual compounding.

$(FV_{r,n})=PV(1+r)^n$
$£4,500=£3,000(1+r)^5$
$£4,500/£3,000=(1+r)^5$
$1.5=(1+r)^5$

The next step is to look in the n=5 row of the FVIF tables for a value of 1.5 and we find that it lies between the 8 per cent and 9 per cent columns. At 8 per cent the factor is 1.4693 and at 9 per cent it is 1.5386, both of which are almost equidistant from the target value of 1.5 (1.4693+ 1.5386=3.0079÷2=1.504) suggesting an interest rate lying approximately halfway between them i.e. 8.5 per cent. Julie would therefore be advised to seek an interest rate of at least 8.5 per cent to achieve her objective.

PRESENT VALUE (PV)

'A pound today is worth more than a pound tomorrow.'

With future value the question we are trying to answer is: what will a present amount, when invested at a given rate of interest, be worth at some point in the future? Present value (PV) is the reverse of this. With present value we are trying to determine **today's value** of a sum of money to be received at some time in the future.

Present value therefore is the current value (sterling or otherwise) of a future amount; thus future money is brought back to its present day value. The process of finding present value is also called **discounting cash flows (DCF).** Present value or discounting cash flows is a financial technique that is used extensively in the appraisal of investment decisions, so it is a concept which is of fundamental importance in financial management.

More formally, present value (PV) can be defined as: **the cash equivalent today of a sum of money due to be received or paid at a specified future date, discounted at a known rate of return.**

The rate of return is alternatively referred to as, *the investor's required return, the discount rate, the cost of capital* or *the opportunity cost:* in financial management the terms are often used interchangeably.

By way of example, you have been told that you will receive £1,000 one year from now. If you can presently earn a 7 per cent rate of return on similar investments, what is the most you would be prepared to pay *today* for this opportunity? Expressed another way, how much would you need to invest at 7 per cent today to receive £1,000 one year from now? Drawing on your knowledge of future value and using the same notation as before the question can be expressed mathematically as:

PV×(1+0.07)=£1,000

where PV is the unknown value and solving for PV yields:

$$PV \quad = \quad \frac{£1,000}{(1 + 0.07)}$$
$$= \quad £935 \text{ (rounded to the nearest £)}$$

The sum of £935 is the present value (PV) today of the £1,000 to be received one year from now when rates of return for this type of investment are 7 per cent. Thus if you invested £935 today at 7 per cent for one year your investment would be worth £1,000 in one year's time. You will notice that here is no difference between the two amounts, £935 today has the same value as £1,000 received a year from now, when the rate of return that can be earned is 7 per cent. In this instance you would be **indifferent** between these two amounts.

You will also notice the **inverse relationship** between present value (PV) and future value (FV): £935 is the present value of £1,000 to be received one year from now if the rate of return is 7 per cent, or alternatively £1,000 is the future value of £935 invested for one year and at an interest rate of 7 per cent. Thus:

£1,000=£935×(1+0.07)

or

$$£935 \quad = \quad \frac{£1,000}{(1 + 0.07)} \quad = \quad \frac{£1,000}{(1.07)}$$

The *present value is the reciprocal of the future value* and the present value interest factor (PVIF), defined as $[1/(1+r)^n]$, is the reciprocal of the future value interest factor (FVIF), which was previously defined as $(1+r)^n$, thus:

$$PV_{r,n} \quad = \quad FV_{r,n} \left[\frac{1}{(1 + r)^n} \right]$$

wherePV=present value of a sum of money
    r =the rate of return or discount rate
    n =the number of periods (usually years) until the
       payment is received
    FV=the future value of the investment at the end of n
       periods (years) at an interest rate of r

Since the term in brackets on the right-hand side of the equation represents the **present**

value interest factor (PVIF), this equation can be more simply stated as:

$$PV_{r,n}=FV\times(PVIF_{r,n})$$

This expression merely means that to determine the present value (PV) of a sum of money to be received at some future time (n), we have only to multiply the future sum by the relevant present value interest factor (PVIF). An example will serve to illustrate the point.

Example 6 —*Finding the present value (PV)*

Raj Prasad is due to receive the sum of £4,000 five years from now and wishes to find out what it is worth today, that is its present value, assuming an opportunity cost of 9 per cent.

$$PV_{9\%,5} \ = \ \frac{£4,000}{(1+0.09)^5}$$

$$PV_{9\%,5} \ = \ \frac{£4,000}{(1.09)^5}$$

$$PV_{9\%,5} \ = \ \frac{£4,000}{1.5386}$$

$$= \ £2,600 \text{ (to the nearest £)}$$

Alternatively we can find the present value by the following route:

$$PV_{9\%,5}=£4,000\times(PVIF_{9\%,5})$$
$$PV_{9\%,5}=£4.000\times[1/(1+0.09)^5]$$
$$=£4,000\times[1/(1.5386)]$$
$$=£4,000\times0.650$$
$$=£2,600 \text{ (to the nearest £)}$$

Present value interest factors are also available from present value interest factor tables as presented in Appendix A—Table A3, extract shown in Table 5.2. You can verify the answer in Example 6 by looking up the PVIF factor for n=5 and r=9% in Table A3 in Appendix A, and reading off the appropriate factor. Alternatively a financial calculator can be used.

Referring to Table A3, which shows the present value of £1 due at the end of n periods, the period in the above example is five years so look down the period column on the left-hand side of the table until you find period 5. Next read along the period 5 row until you reach the 9 per cent column.

Table 5.2 Present value table: the present value of £1, or PVIFr, n

Period, n	*Discount rate, r*					
	5%	*6%*	*7%*	*8%*	*9%*	*10%*
1	0.952	0.943	0.935	0.926	0.917	0.909
2	0.907	0.890	0.873	0.857	0.842	0.826
3	0.864	0.840	0.816	0.794	0.772	0.751
4	0.823	0.792	0.763	0.735	0.708	0.683
5	0.784	0.747	0.713	0.681	0.650	0.621

Where the period 5 row and the 9 per cent column intersect (just like a cell reference in a spreadsheet), you will find the appropriate present value interest factor. In this case the PVIF is rounded to 0.650—which is the same as the reciprocal of the FVIF 1.5386. Multiplying the future amount, £4,000, by this present value interest factor gives the present value of £2,600 (£4,000×0.650).

EXERCISE 4 —PRESENT VALUE

Find the present value of the following:

(a) £1,000 due to be received three years from now with an opportunity cost of 7%.
(b) £3,000 due to be received six years from now with an opportunity cost of 8%.
(c) £5,000 due to be received nine years from now with an opportunity cost of 10%.

Frequent discounting

Recall that the formula for the future value (FV) when compounding is more frequent than once a year is:

$$FV_{r,n} = PV(1+r/m)^{mn}$$

where,

n = number of years over which compounding occurs
m = number of compounding intervals during the year
r = annual interest rate

For more frequent discounting this can be converted to:

$$PV = \frac{FV_{r,n}}{(1 + r/m)^{mn}}$$

Thus the present value of £1,000 after three years when the interest rate is 15 per cent and discounting takes place semi-annually:

$$PV = \frac{£1,000}{(1 + 0.15/2)^{2 \times 3}}$$

$$= \frac{£1,000}{1.5433}$$

$$= £647.96$$

Relationship between present value and future value

Table 5.3 illustrates the relationship between present value and future values at the end of a corresponding time period for a starting sum of £1,000 at an interest rate of 7 per cent. Row 1 in the table shows the time period in years, starting with the present time (conventionally designated as time 0) and progressing to 3 years from now. The relevant cash flows for each year are assumed to occur at the end of the year shown. Row 2 sets out the future value interest factor (FVIF), $(1+.07)^{n}$, and in row 3 we have the future

Table 5.3 Relationship between present and future value

1 Year (n)	0	1	2	3
A: Future value				
2 FVIF$_{7\%}$	1.000	1.070	1.145	1.225
3 Future value *(Compounding)*	£1,000	£1,070	£1,145	£1,225
B: Present value				
4 PVIF$_{7\%}$	1.000	0.935	0.873	0.816
5 Present value *(Discounting)*	£1,000	£935	£873	£816

(compounded) value of the original £1,000 (£1,000×FVIF) at the end of its respective time period.

In contrast, row 5 in the table displays the relevant present values for the same time periods calculated using the respective present value interest factor (PVIF), $[1/(1+ 0.07)^{n}]$, shown in row 4.

By comparing rows 3 and 5 you will see the inverse relationship between future value and present value: future value increases over the three-year period while present value declines. This same relationship can be shown graphically as in Figure 5.3.
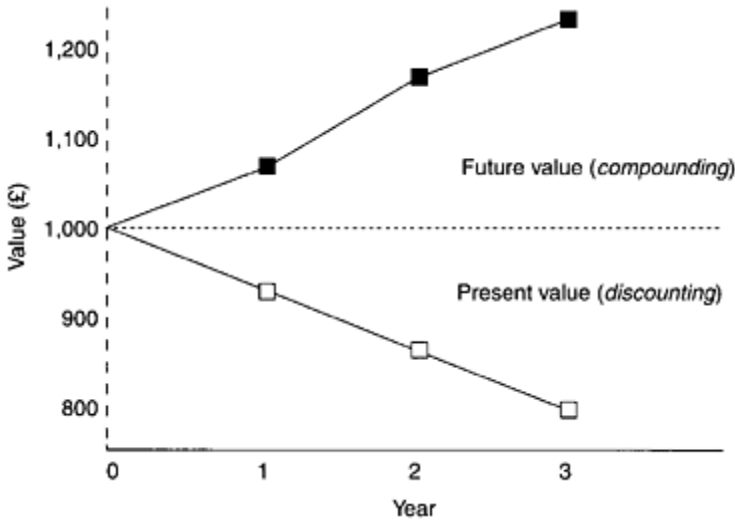
Figure 5.3 Future value-present value relationship: graph

Net present value (NPV)

The cash flow profile of business investment decisions typically involves the outlay of a substantial cash sum now (time zero) followed by a series of cash inflows occurring over some defined future period. The problem is that the initial outlay is being spent now in the present time whereas the future cash inflows which the investment is expected to generate will occur at different time periods over the future—clearly there are timing differences in the cash flows.

We know that cash flow amounts to be received at some future time are of less value than the same amounts received today and that the further into the future these cash flow amounts are expected to be received the less their value. Therefore an investment's expected future cash inflows must be converted or discounted back to their present values so that they can be fairly compared with the present value of the initial investment outlay.

To convert them to their present value all the investment's expected future cash inflows will be discounted at the investor's opportunity cost of capital which is the rate of return the investor would expect to earn on an investment of similar risk.

For the investment to be considered worthwhile the present value of all the cash inflows must exceed, or at least equal, the present value of the cash outflows. Thus when the present value of the initial investment outlay is deducted from the present value of all the future cash inflows, the investment should have a positive, or at least a zero, **net present value (NPV).** Investments which have positive NPVs are value enhancing as their net value is positive and therefore they will increase investor wealth.

Should the present value of the cash outflows be greater than the present value of the cash inflows then the project is not wealth enhancing and should be rejected. The investment decision rule using NPV can be summarised as: ***if the NPV ≥ 0.0 accept the***

investment and by implication, if the NPV<0.0 reject the investment.

For example, supposing an investment project by a firm had the following cash flow profile:

End of year	(1) Cash How £	(2) Discount rate (7%)	(3)=(1)×(2) Present value £
0	−10,000	1.000	−10,000
1	2,000	0.935	1,870
2	3,000	0.873	2,619
3	4,000	0.816	3,264
4	5,000	0.763	3,815
			NPV=1,568

The cash flow profile shows an initial cash outlay of £10,000 being spent now, at time zero, followed by a series of expected future cash inflows over a four-year period. All cash flows are discounted at an opportunity cost of 7 per cent and are assumed to occur at year end.

It can be seen that the present value of all the expected cash inflows (£11,568) is greater than the present value of the initial cash outlay of £10,000. The difference between them, that is, the net present value (NPV), is £1,568 positive. Therefore according to the NPV rule this investment project is acceptable. The project cash flows can be represented graphically as shown in Figure 5.4.
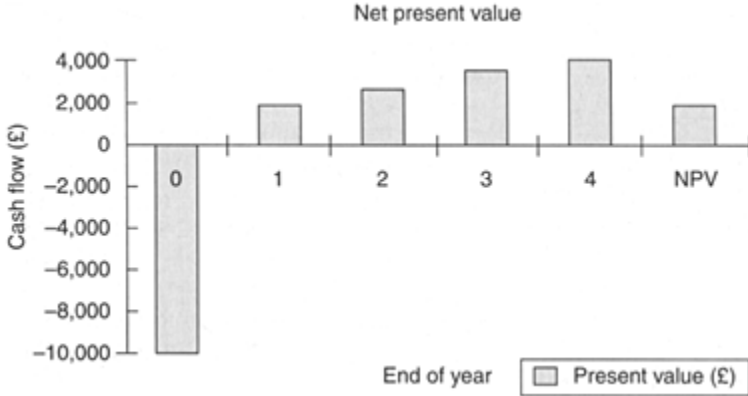
Figure 5.4 Net present value

To realise the goal of the firm of maximisation of shareholder wealth, the firm should only invest in those projects which increase wealth, that is those projects with positive NPVs.

NPV formula

As we have just demonstrated, the net present value (NPV) of an investment is found by subtracting the initial investment (I_0) from the total present value of all the expected future cash inflows (CF_t) discounted at the discount rate (r). Alternatively, NPV=total present value of all expected future cash inflows minus initial investment. This can be summarised in the formula:

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$$

where,

NPV	= net present value
I_0	= initial investment/cash outlay
CF	= cash flow
t	= any year
r	= discount rate/rate of interest
n	= project's expected life

The Greek symbol Σ (capital sigma meaning to sum or add up) merely means that you have to go through the process of: let t=year 1 and find the PV of CF_1 (the cash flow for year 1); then let t=year 2 and find the PV of CF_2 (the cash flow for year 2). Repeat for each future year's cash flow, until the PV of each individual year's cash flow has been found. Next add up all the PVs of these individual cash flows to find their total PV. The final step is to subtract from the total PV the initial investment, I_0, of all the individual cash flows to find the net present value (NPV) for the project.

Example 7 demonstrates the NPV approach.

> ### *Example 7 —Finding the net present value (NPV)*
> Mary Brown, who owns and runs Bon Appétit, a small but very successful sandwich bar, wishes to expand her business by acquiring another outlet in a desirable location. With the assistance of her accountant she has presented a business plan to the bank manager detailing the expected cash flows associated with the expansion project.
> The investment project is expected to cost £30,000 (site acquisition, renovations and professional fees etc.) and generate *net* cash inflows, that is additional cash revenues (sales) less additional cash operating costs (e.g. wages, food and beverage supplies, heat and light etc.), of £8,000 in year 1, and £10,000 each year thereafter for the next five years. The bank will advance a loan of £30,000 to cover

the start-up costs of the project. Assuming Mary needs to earn a return of at least 10 per cent on the investment, is the project worthwhile for Mary to undertake?

To determine if the project is a worthwhile investment for Mary, we will first have to find its net present value (NPV) as follows:

Year	(1) Cash Flow £	(2) PVIF @ 10%	(3)=(1)×(2) Present Value (PV) £
0	(30,000)	1.000	(30,000)
1	8,000	0.909	7,272
2	10,000	0.826	8,260
3	10,000	0.751	7,510
4	10,000	0.683	6,830
5	10,000	0.621	6,210
6	10,000	0.564	5,640
	Net Present Value (NPV)		*11,722*

All cash flows have now been converted to a common base in terms of their respective present values. Comparing the present value of the £30,000 cash outflow in year 0 with the present value of the expected cash inflows for years 1–6, the project is found to have a substantial positive NPV. Applying our investment criterion—a project should have an NPV ⩾ 0—this project is acceptable, it adds to the owner's, in this instance Mary Brown's, wealth.

ANNUITIES

An **annuity** is a special cash flow pattern in which, as its name implies, a constant annual amount is to be paid or received over a defined number of years. Figure 5.5 illustrates the cash flow pattern or profile of an annuity. In this case it is a four-year £5,000 annuity in which it is assumed that the cash flows occur at the end of the year shown, sometimes called an *ordinary annuity.* Alternatively the annuity cash flow can be shown graphically as in Figure 5.6.

In contrast an annuity due is one in which cash flows occur at the beginning of each year. Ordinary annuities are much more common than annuities due and from now on, unless otherwise stated, we will assume we are dealing with ordinary annuities.

An annuity can be for any fixed annual amount and extend over any time period. They occur frequently in finance, particularly in the area of financial services (personal savings, investments, pensions and trust funds management).
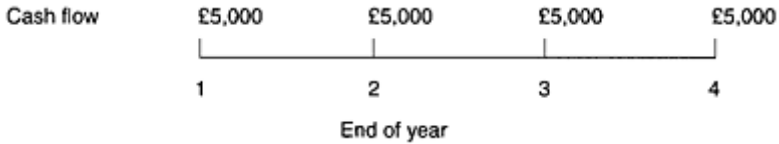
Figure 5.5 Annuity cash flow profile
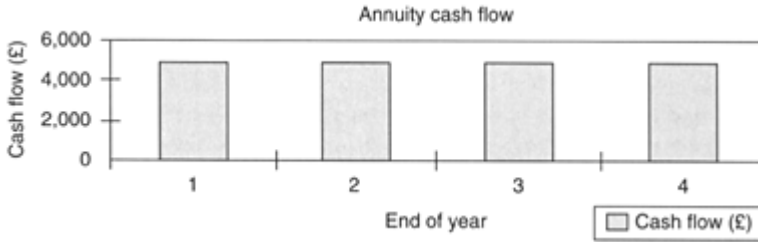
Figure 5.6 Annuity cash flow: graph

The future value of an annuity

The **future value of an annuity (FVA)** is the total sum the annuity will be worth at the end of the annuity term, when a constant annual amount is invested each year and retained until the end of the annuity term.

Example 8 —The future value of an annuity

Anna Saver would like to know how much she will have five years from now if she deposits £1,000 at the end of each year into a bank savings account paying a fixed annual rate of interest of 5 per cent. In other words, Anna wishes to find *the future value of a five-year £1,000 annuity at a 5 per cent rate of interest.* This can be determined as follows, using the future value interest factor (FVIF) from the future value tables:

End of Year	Amount Invested (£)	FVIF @ (5%)	Future Amount (£)
0	—	—	—
1	1,000	1.216	1,216.00
2	1,000	1.158	1,158.00
3	1,000	1.102	1,102.00
4	1,000	1.050	1,050.00
5	1,000	1.000	1,000.00
		Future Value of Annuity	5,526.00

Notice that since the first £1,000 is invested at the end of year one it will only earn interest for four years, thus the use of the FVIF for r equal to 5 per cent and n equal to four and similarly for the subsequent years. The final £1,000 in year 5 is invested at the very end of the annuity period so it does not earn any interest.

As you can imagine the calculations for a long-term annuity would become somewhat cumbersome, so the process can be greatly simplified by using a future value interest factor for an annuity (FVIFA$_{r,n}$) as set out in Table A2, Appendix A.

Table A2 in Appendix A shows the future value of an annuity of £1 per period for n periods. As the annuity period in the above example is five years, first look down the period column on the left-hand side of the table until you find period 5. Next read along this row until you reach the 5 per cent column and where the period 5 row and the 5 per cent column intersect, you have the *future value interest factor of the annuity (FVIFA),* in this case 5.526.

The final step is simply to multiply the annuity amount, £1,000 by this factor, (£1,000 ×5.526), giving the future value of the annuity of £5,526.00. This amount is identical to the amount arrived at by the previous more lengthy method used in Example 8, and the future value interest factor for the annuity (FVIFA) is equal to the sum of the individual FVIF factors. In Example 8 if you add all the individual FVIF factors you will get 5.526: try it and see.

The annuity procedure can be expressed more generally as:

$$FVA_n = PMT(FVIFA_{r,n})$$

where,

FVA_n = the future value of an n-year annuity
PMT = the constant annual amount invested
r = the rate of interest (or discount rate)
n = the number of years of the annuity

Substituting the data from Example 8:

£5,526.00 = £1,000 × 5.526

In the absence of relevant tables or a financial calculator, an alternative mathematical expression can be used to find the future value interest factor of an ordinary annuity and is given by:

$$FVIFA_{r,n} = [(1/r) \times ((1+r)^n - 1)]$$

Thus, for Example 8:

$$5.526=[(1/0.05)\times((1+0.05)^5-1)]$$

Further applications of future value annuities

A common investment problem is determining how much has to be deposited or saved each year in order to achieve a desired amount by the end of a given period. For example, if you know that you will need £10,000 in eight years time (towards the purchase of a car or a deposit on a house), how much will you have to deposit at the end of each year in a savings account paying 7 per cent per year? This amount can be determined by applying the FVA_n equation above, by solving for the unknown PMT as follows:

$$
\begin{aligned}
FVA_8 &= PMT(FVIFA_{7\%,8}) \\
£10,000 &= PMT(10.260) \\
\frac{£10,000}{10.260} &= PMT \\
PMT &= £974.66
\end{aligned}
$$

Therefore you will have to deposit £974.66 at the end of each year to realise £10,000 in eight years time, assuming an unchanged rate of interest. Now attempt the following exercise.

EXERCISE 5 —FUTURE VALUE OF AN ANNUITY

How much would an investor have to deposit each year, at an interest rate of 6%, if he wished to accumulate the sum of £8,000 in 7 years time?

The present value of an annuity

Similar to the future value of an annuity, the present value of an annuity is a concept widely employed in the evaluation of many financial decisions, corporate and personal. Many financial products in the financial services market, such as pension plans, income bonds and insurance policies, all involve, in one fashion or another, the determination of the present value of an annuity. In the corporate sector many investment decisions require an evaluation of annuity cash flows.

We can develop a relatively simple equation for calculating the present value of an annuity by drawing on our experience of the equation for the future value of an annuity. You will remember that the future value of an annuity was given as:

$$FVA_n=PMT(FVIFA_{r,n})$$

This can be rewritten for the present value of an annuity and can be expressed as:

$$PVA_n = PMT(PVIFA_{r,n})$$

where,

PVA_n = the present value of an n-year annuity
PMT   = the constant annual amount invested
r   = the rate of interest (or discount rate)
n   = the number of years of the annuity

Example 9 —The present value of an annuity

Paul Spender would like to know the present value of £800 due to be received at the end of each year for the next five years at an opportunity cost of 8 per cent. Expressed alternatively, Paul wishes to find *the present value of a five-year £800 annuity at an 8 per cent discount rate.* This can be determined by using **the present value interest factor for an annuity (PVIFA),** from the present value of an annuity tables.

From the PVIFA tables—in this case Table A4 in Appendix A— the PVIFA factor for this example (3.993) is found where the period 5 row and the 8 per cent column intersect in Table A4:

$$PVA_5 = £800(3.993)$$
$$= £3,194.40$$

EXERCISE 6 —PRESENT VALUE OF AN ANNUITY

Find the present value of a seven-year £1,500 annuity using a 12% discount rate.

PERPETUITIES

A perpetuity is essentially an annuity that has an *infinite life,* it continues to provide the investor or beneficiary with a fixed annual amount forever. It is a concept which occurs frequently in the evaluation and management of investments.

The present value of a perpetuity is very easy to calculate, as can be appreciated from the following equation:

$$PVP_{r,\infty} = \frac{PP}{r}$$

where,

PVP = the present value of the perpetuity
PP = the constant sum involved in the perpetuity
r   = the discount (or interest) rate
∞   = symbol denoting infinity

Example 10 illustrates the method.

Example 10 —Present value of a perpetuity

Sarah Bright wishes to donate from her estate the sum of £2,000 per year in perpetuity to the children's ward of her local hospital. As finance manager for the hospital you wish to determine the present value of this perpetuity, assuming a discount rate of 7 per cent.

$$PVP_{r,\infty} = \frac{PP}{r}$$

$$= \frac{£2,000}{0.07}$$

$$= £28,571 \text{ (to the nearest £)}$$

As Sarah Bright's financial adviser, advise Sarah of what lump sum she will have to set aside from her estate to provide for the perpetuity.

From Sarah Bright's point of view, she will need to set aside the sum of £28,571 from her estate, so that £2,000 can be withdrawn every year, indefinitely, without ever affecting the principal sum of £28,571, assuming an unchanged discount or interest factor.

Perpetuities with growth

Supposing that Sarah Bright wished to build a growth element into her perpetuity of a constant 3 per cent growth per year, how would her initial investment sum be calculated?

We can simply build a growth factor, represented by g, into the cash flow stream as follows:

$$PVP_{r,\infty} = \frac{PP}{r-g}$$

$$= \frac{£2,000}{0.07 - 0.03} = \frac{£2,000}{0.04}$$

$$= £50.000$$

To fund this level of growth Sarah would virtually have to double her initial investment. Even a small growth factor significantly affects the initial lump sum required.

Should the growth factor actually exceed the interest rate then the formula becomes more complex as illustrated below:

$$PVP = \frac{PP}{(1+r)^1} + \frac{PP(1+g)^1}{(1+r)^2} + \frac{PP(1+g)^2}{(1+r)^3} + \ldots$$

EXERCISE 7 —PERPETUITIES
   Find the present value of:

(a) a perpetuity of £500 assuming a discount factor of 8%; and
(b) a perpetuity of £500 assuming a discount factor of 8% and a
     growth factor of 4%.

We shall return to the concept of perpetuities as we will with the other time value of money concepts introduced in this chapter. Time value of money concepts are a key feature of financial management and provide the essential foundation for much of what will follow. While to the less mathematically inclined student they may seem complex and difficult to grasp they are nonetheless of such fundamental importance that making an effort to understand them now will make future topics much easier to grasp.

KEY LEARNING POINT
   The timing of cash flows affects their value. The earlier cash flows are received the greater their value.

RECAP

The concept of the time value of money: This is concerned with the respective timing of cash inflows and cash outflows. In relation to the goal of wealth maximisation it is the *timing of cash flows* which will affect their values and

ultimately the value of the firm: earlier cash flows are more valuable that later cash flows. The time value of money is reflected in the concept of opportunity cost.

Future value (FV): Future value can be defined as: **the sum to which an initial amount of principal, or present value (PV), is expected to grow over a period of n years, when interest is earned at the rate of r% per year.**

Mathematically this is represented by the formula $(FV_{r,n})=PV(1+r)^n$. The term in brackets is referred to as the *future value interest factor, (FVIF$_{r,n}$),* for r and n. In finding future values we make use of compounding and compound interest.

Present value (PV): Present value can be defined as: **the cash equivalent today of a sum of money due to be received or paid at a specified future date, discounted at a known rate of return.** In finding present values we are concerned with discounting, or inverse compounding.

Present value is the reciprocal of future value and the present value interest factor (PVIF), defined as $[1/(1+r)n]$, is the reciprocal of the future value interest factor (FVIF), $(1+r)^n$, indicating an inverse relationship between future value and present value, thus:

$$PV_{r,n} = FV_{r,n}\left[\frac{1}{(1+r)^n}\right]$$

This equation can be simplified to $PV_{r.n}=FVx(PVIF_{r.n})$.

Net present value (NPV): Net present value is the difference between the present value of the initial cash outlay and the present value of future cash flows when discounted at the opportunity cost of capital. Investments showing a positive NPV will increase owner wealth and thus only positive NPV investments should be selected. By implication investments with a negative NPV should be rejected. Thus if NPV $\geq$ 0.0 accept: if NPV < 0.0 reject. NPV is summarised in the formula:

$$NPV = I_0 + \sum_{t=1}^{n}\frac{CFt}{(1+r)^t}$$

Annuities: An annuity is a special cash flow pattern in which, as its name implies, a **constant annual amount** is to be paid or received over a defined number of years. The formula for an annuity can be expressed as:

$$FVA_n=PMT(FVIFA_{r,n})$$

Perpetuities: A perpetuity is essentially an annuity that has an **infinite life,** it continues to provide the investor or beneficiary with a fixed annual amount forever. The present value of a perpetuity is given by:

$$PVP_{r,\infty} = \frac{PP}{r}$$

For a growing perpetuity the formula is given by:

$$PVP_{r,\infty} = \frac{PP}{r - g}$$

Where g represents the rate of growth.

APPENDIX I EMBEDDED ANNUITIES AND LOAN AMORTISATION

An embedded annuity

Often a series of cash flows will contain an annuity as part of the cash flow stream, such was the case in Example 7 in the chapter. When we have dealt with the example to follow you may, for practice, wish to return to Example 7 and apply the embedded annuity technique. The answer should be the same.

Example 11 —An embedded annuity
   Printwell, a small printing firm, is investing in a new computerised printing system which will cost £10,000 to purchase and is expected to produce the annual cash flows as shown in Column 1 below. The owner requires the project to earn a 10 per cent rate of return. As the firm's accountant you have been asked to calculate the net present value of the cash flows and advise the firm's owner if the project should be undertaken.

1	*2*	*3*	*4*	*5*
Year Cash Flow £	*PV of Annuity*	*Adjusted Cash Flow* £	*PVIF × = @ 10%*	*Present Value* £
0 (10,000)		(10,000)	1.000	(10,000)
1 1,000		1,000	0.909	909
2 2,000	£9,510[1]	11.510[2]	0.826	9,507
3 3.000[1]			0.751	—
4 3,000[1]			0.683	—
5 3,000[1]			0.621	—
6 3,000[1]			0.564	—
7 4,000		4,000	0.513	2,052
		Net Present Value (NPV)	=	2,468

As the project has a positive NPV of £2,469 it will increase the wealth of the owner of the business and therefore it should be undertaken.
Notes

1 £3,000×3.170 (PVIFA$_{10\%,4}$)=£9,510. This is the four-year £3,000 annuity, at 10% rate of return, multiplied by the present value interest factor for the annuity (PVIFA), 3.170, which is found from the PV1FA tables.

2 £9,510+£2,000. The cash flow for the end of year 2 is now adjusted to include the present value of the embedded annuity and discounted at the 10% discount factor (0.826) for year 2 to determine the present value of the revised cash flow.

The adjusted cash flows in column 3 are in turn multiplied by the present value interest factor at 10%, (obtained from the PVIF tables and shown in column 4) to yield the present (or discounted) value of each year's cash flow as shown in column 5.

The net present value of all the cash flows is then simply found by adding up the present value of each year's individual cash flow as calculated in column 5.

Loan amortisation

The annuity method can also prove very useful in loan amortisation (that is the liquidation of a loan), where it is necessary to calculate the equal periodic payments or instalments needed to be made to amortise (pay off) a loan over a defined period of time. With loan amortisation we are in fact producing an annuity from a present sum.

In loan amortisation we will be concerned with determining the equal or fixed annual amounts required to repay both the loan principal and the loan interest, at the rate the lender will charge, over the specified loan term. Thus each fixed annual repayment or instalment consists of both a principal and an interest element.

As we shall see, interest rates are calculated on a **reducing balance method.** With a reducing balance method, interest is calculated on the principal amount outstanding, after the principal element contained in the previous period's repayment has been deducted.

Lenders, such as building societies and banks, usually refer to **loan amortisation schedules** to determine a repayment agreement for a bank loan or mortgage. The principle underlies the determination, by banks and building societies, of the *monthly* repayments necessary to amortise (pay off), for example, a home mortgage at a specified rate of interest over a long-term period of between 15–30 years.

Example 12 demonstrates the loan amortisation procedure by creating a loan amortisation schedule.

Example 12 —Loan amortisation

SqueekyKleen Laundry has negotiated a £20,000, 5-year loan with its bank to finance the replacement of some laundry machinery. The

terms of the loan require fixed repayments to be made at the end of each year and the bank is charging a 10 per cent rate of interest. As a member of the bank's lending staff you have been asked to establish the annual repayments and prepare a loan amortisation schedule.

Establishing the fixed annual payment can be achieved by applying the present value of an annuity equation and solving for PMT, the annual annuity.

$$\text{Remember: } PVA = PMT(PVIF_{r,n})$$
$$\text{thus: } £20,000 = PMT(PVIFA_{10\%,5})$$
$$£20,000 = PMT(3.791)$$
$$\frac{£20,000}{3.791} = PMT$$
$$PMT = £5,275.65$$

The fixed annual payment, which covers both principal and interest, equals £5,275.65. For convenience in our calculations we will round this up to £5,276. As a result we may find a small but insignificant rounding error in the loan schedule. The analysis of the repayment, showing interest and principal elements, is presented in the loan amortisation schedule below:

SqueekyKleen Laundry
Loan Amortisation Schedule

1	*2*	*3*	*4*	*5*
End of Year	*Repayment Amount (£)*	*Interest Amount (£)[1]*	*Principal Amount (£)[2]*	*Outstanding Balance (£)*
0	—	—	Z	20,000
1	5,276	2,000	3,276	16,724
2	5,276	1,672	3,604	13,120
3	5,276	1,312	3,964	9,156
4	5,276	916	4,360	4,796
5	5,276	480	4,796	0

Notes
1 The interest amount shown in column 3 is arrived at by multiplying the outstanding balance of the loan by the 10% interest rate. At the end of the first year the interest is calculated as £20,000×10%. No repayment of principal will be made until the end of the first year; thus at the end of year 1 interest will be due on the entire starting principal of £20,000. For year 2 interest is calculated on the reduced balance outstanding

(£16,724) at the end of year 1 multiplied by 10%.
2 The principal amount shown in column 4 is found by
subtracting the interest figure in column 3 from the repayment
annuity of £5,276. Thus for year 1 the interest is calculated as
£2,000, therefore the principal element of the end of year 1
payment is £5,276−£2,000=£3,276.

APPENDIX II CONTINUOUS COMPOUNDING AND THE FUTURE VALUE INTEREST FACTOR FOR AN ANNUITY (FVIFA)

Continuous compounding

In practice continuous compounding may be encountered. This is where compounding is applied to the smallest time interval conceivable. Applying our previous equation $FV_{r,n}=PV(1+r/m)^{mn}$

where,

n = number of years over which compounding occurs
m = frequency of compounding during the year
r = annual interest rate

In this case m tends towards infinity (∞) . The investor begins to earn interest immediately and the value of $(1+r/m)^{mn}$ approaches e^{rn}, where e is the base of natural logarithms is approximately equal to 2.71828:

$$e=\lim_{m\to\infty}(1+1/m)^m$$

Thus the future value of an amount compounded continuously can be expressed in terms of an exponential:

$$FV_n \quad = \quad PV.e^{r\times n}$$

where e=2.71828 and PV=the present value or principal amount at the beginning of the first year.

Thus a £1,000 principal sum (PV) invested now at an interest rate r of 8 per cent for 5 years (n) will grow to:

$$FV_5=£1,000e^{(0.08\times5)}=£1,000\times1.49=£1,490$$

The future value interest factor for an annuity (FVIFA)

The future value interest factor for an annuity (FVIFA) is defined as:

$$FVIF_{r,n} = \sum_{t=1}^{n} (1 + r)^{t-1}$$

Where interest is compounded annually at r per cent for n periods.

This formula simply means that to find the future value interest factor for an ordinary annuity for n years add, ($\sum$=sum up), the sum of the first n–1 future value interest factor to 1.0000, in other words:

$$FVIFA_{r,n} = 1.0000 + \sum_{t=1}^{n-1} FVIF_{r,t}$$

REVIEW QUESTIONS

Concept review questions

1 (a) What do you understand by the time value of money concept? (b) Why is it considered important for the financial manager to understand this concept?
2 What do you understand by the concept of opportunity cost?
3 There are two perspectives on the time value of money, what are they and how are they related?
4 Explain the term 'net present value' (NPV).
5 (a) How would you define an annuity? State some applications of an annuity in financial management. (b) How would you define a perpetuity? State some applications in financial management, (c) What is the difference between an annuity and a perpetuity?

Practice questions

6 Future Value and Present Value.

(a) Calculate the future value of £5,000 at the end of 10 years at an annual compound interest rate of 10%.
(b) Calculate the present value of £8,000 at the end of 8 years at a discount rate of 8%.
(c) Find the future value of a £4,000 5 year annuity at an annual compound rate of 6%.
(d) Determine the present value of a £2,000 6 year annuity at a discount rate of 7%.
(e) Determine the future value of £5,000 at the end of a 5-year period assuming

compounding on (i) a semi-annual basis and (ii) a 2-monthly basis at 6% interest rate.

(f) Calculate the present value of the following perpetuities:

(i) £1,000 at a discount rate of 8%;
(ii) £1,000 at a discount rate of 8% and with a growth factor of 3%.

7 Present Value. Suppose that you have won a grand prize draw competition which offers you the opportunity to receive your winnings in the form of either £30,000 at the end of each year for the next 30 years or as a lump sum of £500,000 to be given to you immediately. Your new found accountant friend has just told you that you could expect to earn a return of 5 per cent per year over the next 30 years. Ignoring taxation and inflation (and life expectancy), which option would you choose and why?

Test questions

8 Assessing investment options. Peter Principal has a lump sum of £10,000 available for investment now and wishes to accumulate at least the sum of £15,000 in five years time, although he considers that he can invest the money for longer if worthwhile. He is faced with the following investment options, all requiring a minimum investment of £10,000:

(i) The Bank of Ambition offers a five-year deposit account paying a fixed-rate of interest of 8 per cent with annual compounding. For periods less than five years the bank currently pays 5 per cent interest.
(ii) The Happy Saver Institution offers a six year deposit account paying a fixed-rate of interest of 7 per cent with annual compounding plus a terminal bonus of £500 if the money is left on deposit for the entire investment term.

Advise Peter which, if either, of the above options, would be a suitable investment for him, stating clearly any assumptions you make. Ignore taxation.

9 Net Present Value. Susie Lee owns the Lotus Blossom Bar and Restaurant and is considering the following investment to upgrade the existing facilities. The cash flows for the investment are estimated as follows:

End of Year	Cash Flow (CF) £
0	(100,000)
1	10,000
2	20,000
3	40,000
4	50,000
5	30,000

Assuming the opportunity cost of capital is 12 per cent calculate the investment's net present value (NPV), and based on your findings advise Susie if she should undertake the investment project.

RISK AND RETURN

Portfolio theory

> This chapter deals with the key financial management concepts of risk and return. The following aspects are covered:
>
> the nature of risk and return;
> modern portfolio theory.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the meaning of risk and return in investment management;
2 measure risk and return for an individual asset;
3 explain the nature of the risk-return relationship;
4 measure risk and return for a portfolio of assets;
5 explain how diversification affects the risk and return of a portfolio of assets.

OVERVIEW

In the previous chapter we dealt with the key financial management concept of the **time value of money.** By now we should appreciate that it is cash flows, not profits, which are *the* important measure of investment returns and how it is both the size and timing of such cash flows that affect their value.

In this chapter, we will build on what we have covered so far by learning about the third critical element in the financial decision-making process, namely **risk**—a topic which is central to an understanding of modern financial management. We will explore both the nature and measurement of risk in financial decision-making.

When considering a prospective investment the financial manager, or any rational investor, will be concerned not only with the volume and timing of its expected future cash flows but also with their riskiness, by which in finance we mean their tendency to vary from some expected or mean value. The greater the range or spread of possible returns from an investment, the greater its risk. Thus both the return and the risk dimension of investment decisions must be evaluated.

Risk and return are intimately related and we shall spend some time exploring this

fundamental relationship (or in technical terms the **correlation**), between risk and return. We will see how the notion of return cannot be considered in isolation from risk—the two variables are inseparable. We will also examine risk and return in the context of **modern portfolio theory** and see how risk can be reduced by **diversification.**

For the financial manager the goal of investment decisions is to maximise shareholder wealth, and making sound investment decisions that enhance shareholder wealth lies at the very heart of the financial manager's job. Wealth-enhancing investment decisions (corporate or personal) cannot be made without an understanding of the interplay between investment returns and investment risk. The risk-return relationship is central to investment decision-making, whether evaluating a single investment or choosing between alternative investments (recall the Coffee Ventures scenario).

Potential investors, for example, will assess the risk-return relationship or trade-off in deciding whether to invest in company securities such as shares or bonds. Investors will evaluate whether, in their view, the securities provide a return commensurate with their level of risk. Furthermore we shall see in the next chapter how the risk-return relationship is used in the financial markets to determine the price or value of financial assets or securities.

Before proceeding it may be helpful to point out that some aspects of this and the following chapter may, on first sight, appear intimidating for some students, particularly for those who are not mathematically inclined or for whom finance is a non-specialist subject. Do not be deterred if some of the concepts and techniques which follow at first seem challenging to grasp, with a little patience and practice they will soon become clear. If the reader is to gain a worthwhile insight into modern financial management these concepts and techniques cannot be avoided.

THE RISK-RETURN RELATIONSHIP

Every financial decision contains an element of risk and an element of return. The relationship between risk and return exists in the form of a **risk-return trade-off,** by which we mean that it is only possible to earn higher returns by accepting higher risk. If an investor wishes to earn higher returns then the investor must appreciate that this will only be achieved by accepting a commensurate increase in risk. Risk and return are **positively correlated,** an increase in one is accompanied by an increase in the other.

The implication for the financial manager in evaluating a prospective investment project is that an effective decision about the project's value to the firm cannot be made simply by focusing on its expected level of returns: the project's expected level of risk must also be simultaneously considered. This risk-return trade-off is central to investment decision-making.

Risk diversification

It is unlikely that the financial manager or corporate treasurer will be involved with investing all the firm's capital resources in only a single project or asset, this would be very risky. As the old adage goes, all the firm's eggs would be in one basket. More

probably resources will be invested in a collection or **portfolio** of investment projects as total risk will be reduced through **diversification.**

This means risk will be spread and therefore not all the firm's investment eggs will be in the one basket. From the shareholder's perspective, the firm itself can be viewed as a portfolio of assets or investment projects managed by a professional team—the firm's managers.

Holding a group of diversified assets (that is, assets that do not move in the same direction at the same time) in a portfolio reduces overall risk and risk reduction through diversification is a key aspect of the corporate treasury risk management role.

Thus the financial manager's concern is not just with the relative **timings of investment returns** but also with their **relative risks,** (that is, the potential variability of their future returns) and how together these will impact on the firm's market value and shareholder wealth.

Shareholder wealth maximisation means maximising the value of the share price and risk and return are two key determinants of share price. We will begin our study of risk and return by first considering return; it is the easier of the two to understand.

RETURN

An investment's return can be **actual** or **expected** and is measured in terms of *cash flows,* positive or negative. Measuring actual return is usually a retrospective and comparatively easier exercise than measuring expected return. In calculating actual return the relevant data is historic and is known with certainty: determining expected return is altogether a more problematic exercise as we are dealing with the future and the future is uncertain.

An investment's **expected return**—usually denoted **E(r)** or r   (referred to as 'r the investment's most likely return and is measured in terms of the future cash flows, positive and negative, it is expected to generate. It represents the investor's best estimate of the investment's future returns.

As a general rule the **rate of return** (actual or expected) on any investment over a defined period of time can be calculated simply as:

$$\frac{\text{Income}}{\text{Investment}} \times 100 = \%$$

A refinement to the above would be to allow for changes in the value of the investment over the period, such as the capital gain on a share.

$$\frac{(\text{Ending value} - \text{starting value}) + \text{income}}{\text{Starting value}}$$

For example, if you bought a security such as a share for £10.00 which one year later was valued at £11.00 and it paid you a £0.50 dividend during the year, your return would be:

$$\frac{(£11.00 - £10.00) + £0.50}{£10.00} \times 100 = \%$$

$$= \frac{£1.50}{£10.00} \times 100 = 15\%$$

If you invested in a security such as a bond, the income is the cash you receive in the form of interest plus any principal repayments and/or changes in the market price of the bond.

The above is an example of **actual** or **realised returns** where the relevant variables (cash income, beginning value and ending value) are known. They are calculated *after the event,* and are thus sometimes referred to as *ex post* returns.

In contrast, when faced with making an investment decision the relevant variables are not known with certainty, and consequently they have to be estimated. In making investment decisions for the firm, the financial manager will need to make estimates of the returns (cash flows) expected from an investment.

The **expected return** is determined *ex ante,* (before the event) that is before the investment is made, and is calculated by the same method as before only this time **expected values** are substituted in the formula for the actual values.

$$\frac{\textbf{(Expected ending value} - \textbf{starting value)} + \textbf{expected income}}{\textbf{Starting value}}$$

For example, you know that your share is currently valued at £11.00. If you expect its most likely value to be £12.00 one year from now and expect it to pay you a dividend of £0.75 during the year, your expected return E(r) would be:

$$E(r) = \frac{(£12.00 - £11.00) + £0.75}{£11.00} \times 100 = \%$$

$$= \frac{£1.75}{£11.00} \times 100 = 15.9\%$$

Clearly, in one year's time the actual return from this investment may be very different from the expected return. However, at the present point in time, the expected return is our best guess of the share's future return.

The determination of return, actual or expected, in general can expressed mathematically as:

$$r_t = \frac{V_t - V_{t-1} + CF_t}{V_{t-1}}$$

where,

r_t = actual or expected rate of return during period$_t$
V_t = value of asset at time$_t$
V_{t-1} = value of asset at time$_{t-1}$
CF = cash flow from investment over the period$_{t-1}$ to $_t$

Frequently in finance we will be measuring returns over the period of a year, so r_t will often represent the annual rate of return. Where an investment is held for a period greater or less than a year it is best to convert the return to an annual return, as this makes reviewing and comparing investment performance easier.

For example, if you bought a share six months ago for £100 and sold it today for £106 and in the meantime received a dividend of £3 your return over the six-month holding period (known as the ***holding period return***) would be calculated as:

Holding period return=(£106−£100+£3)/£100=9%

To convert this to an annual rate of return we can divide the six-month holding period return by 0.5, thus the ***annualised return*** is: 9/0.5=18%. For any investment we can convert its holding period return to an annual return by dividing the holding period return by the number of holding periods, expressed in terms of years, thus:

Annual return=holding period return/number of holding periods (in years)
18%=9%/0.5

We have previously defined expected return as the most likely future return. When considering a potential investment an investor is likely to determine a range of possible future returns for the investment before deciding on the most likely return.

Returning to our previous share example, if you wish to estimate the share's future return, you may intuitively consider a number of possible future values. For example, assume there is a 25 per cent of the future return remaining at 15 per cent, a 50 per cent chance of it increasing to 16 per cent and a 25 per cent chance that it might be 17 per cent. You could then compile a probability distribution of future returns as follows:

Probability (p)	*Return (r)*	*(p)×(r)*
0.25	15%	3.75
0.50	16%	8.00
0.25	17%	4.25
	E(r)=	*16.00%*

The expected return E(r) is therefore defined as: *a weighted average of possible returns where the weightings are the respective probabilities of each possible return occurring.* All the relative weightings will add up to 1.0.

The expected return E(r) is derived mathematically as: [1]

$$E(r)=r_1 P(r_1)+r_2 P(r_2)+\ldots+r_n P(r_n)$$

where,

r_i =rate of return for the identified ith outcome

$P(r_i)$=probability of earning return i for the identified outcome

n   =number of possible outcomes

Example 1 —Expected return, E(r)

The financial manager of FutureSpec Technologies wishes to determine the expected rate of return from a proposed investment project. The expected returns from the project are related to the future performance of the economy over the period as follows:

Economic scenario	Probability of occurrence (p)	Rate of return (r)
Strong growth	0.25	15%
Moderate growth	0.50	12%
Low growth	0.25	8%

The expected return E(r) is calculated as:

$$E(r)=0.25(15\%)+0.50(12\%)+0.25(8\%)$$
$$=11.75\%$$

The expected return E(r) is the weighted average of the range of possible returns where the weightings are the respective probabilities of each return in the range being realised. In this case the probability weightings will have been determined subjectively by the firm's management.

EXERCISE 1 —EXPECTED RETURN

Calculate the expected return on the following investment for FutureSpec Technologies. You will find the answer in Appendix B.

Probability	Return
0.10	−10%
0.20	8%
0.40	10%
0.30	20%

Required rate of return

The required rate of return is the *minimum* rate of return an investor requires an investment to earn, given its risk characteristics, for the investment to be considered worthwhile. The required rate of return is equal to the rate of return given by a risk-free, or safe, investment—such as a government treasury bill—plus a **risk premium.** The risk premium is necessary to compensate the investor for undertaking a risky investment.

> Required rate of return, R(r)=risk-free return+risk premium

> Once determined, the required return can then be used as a benchmark against which an investment's expected return can be compared.

An investment's expected return may or may not be the same as the investor's required return. If the return which an investment is expected to yield is greater than the return the investor requires then the investment will be considered worthwhile. Should the expected return be less than the required return, then the investor will not consider the investment to be beneficial.

For instance, if in Example 1 the financial manager of FutureSpec Technologies normally required a return of 15 per cent from investments of similar risk, then this investment project would be rejected as its expected return of 11.75 per cent is significantly less than its required return of 15 per cent.

We can now turn to the other member of the inseparable duo—risk.

RISK

> 'Men that hazard all
>   Do it in hope of fair advantages.' [2]

Generally speaking, risk can be defined as: ***the chance that the actual outcome will differ from the expected outcome*** or in our current context *the chance that the actual return will differ from the expected return.* Clearly there is a chance that the actual return will be greater than, equal to, or less than the expected return. In finance it is this **potential variability of returns** that we call risk.

Attitudes to risk

Recall from Chapter 1, when we initially described the risk-return relationship, that investment decisions will be influenced by the investor's **risk propensity** or the investor's attitude to risk. Investors who have a low risk propensity, in other words they have a preference for less risk are said to be **risk-averse.**

Investors who have a high risk propensity or a positive desire for risk are referred to as **risk-taking** or risk-seeking. Other individuals may be **risk-indifferent,** or risk-neutral,

that is for an increase in risk, they do not necessarily require an increase in return.

It should be noted that risk aversion is a preference for less risk, it does not imply complete risk avoidance; it is simply a preference for less risk rather than more risk. Different investors will also differ in their degrees of risk aversion. Individuals and corporations are risk-averse in the sense that they are willing to reduce their risk burden by paying others to assume some of their risks.

For example, they will pay premiums to insurance companies to accept their everyday personal and business risks. Of course insurance underwriters will only assume the risk for a price. This is another way of saying that investors must be paid or compensated for assuming more risk.

Shareholders and managers are generally considered to be risk-averse, that is, for an increase in risk they require a commensurate increase in return. It is common practice in finance to assume that all investor's are risk-averse and that is similarly our assumption throughout this text.

Measuring risk

Before making an investment decision we would certainly wish to have some indication of the level of risk associated with our investment, so how can we measure or quantify risk?

We have already seen the application of probability weightings in determining expected return. In the context of risk measurement, the decision-maker does not know exactly what the future return will be but, as we have seen, it is feasible to develop a range of possible future returns and to assign a relative **probability weighting** to each value in the range of potential returns.

This potential variability or distribution of returns around an expected value is an indication of the degree of risk. Drawing on the discipline of statistics this potential variability of returns (i.e. risk) can be represented by a **probability distribution,** which we assume to be normal, that is it is characterised by a symmetrical, bell-shaped curve. The probability distribution used in Example 1 is a normal distribution.

Having created a normal distribution of potential returns, it is then possible to measure risk in statistical terms by calculating the distribution's **standard deviation,** denoted by σ (the Greek letter small sigma). The standard deviation, σ, is a statistical measure of the dispersion or spread around a distribution's *expected* or *mean value* and the greater the degree of dispersion σ, the greater the degree of potential variability.

In attempting to quantify risk we are concerned with measuring dispersion, good and bad, on either side of an expected or mean value, as the greater the overall *variability* the greater the risk and the greater the perceived risk, the greater the return investors will require to compensate them for assuming greater risk. Remember that risk and return are **positively correlated:** if rational, risk-averse managers and investors wish to gain greater returns they will have to accept greater risk.

Thus before making an investment decision the financial manager, or any potential investor, will need to know an asset's or investment's expected return E(r) and its standard deviation σ, assuming returns are normally distributed.

Before proceeding, it may be helpful to briefly review the key statistical concepts of

standard deviation, σ, and probability distributions. Students who are familiar with these techniques may proceed to Exercise 2 without loss of continuity.

Standard deviation

The standard deviation, σ, is a statistical measure of the dispersion or deviation of possible outcomes around an expected or mean value; we use it to measure an asset's or an investment's *total* risk. As we shall see, total risk consists of two elements, *diversifiable risk* and *non-diversifiable risk,* but more of this later.

The standard deviation is defined as **the square root of the variance.** The variance is defined as *the weighted average of the squared deviations of possible outcomes from the expected value or mean.* The variance and standard deviation are expressed mathematically as follows:

$$\text{Variance, Var}(_r) = \sum_{i=1}^{n} (r_i - \bar{r})^2 \times P(r_i)$$

and

$$\text{Standard deviation, } \sigma_r = \sqrt{\sum_{i=1}^{n} (r_i - r)^2 \times P(r_i)}$$

where

$$\text{Var}(_r) = \text{the variance of returns}$$
$$\sigma_r = \text{the standard deviation of returns}$$
$$r = \text{the expected or mean value of a return}$$
$$r_i = \text{return for the ith outcome}$$
$$P(r_i) = \text{probability of occurrence of the ith outcome}$$
$$n = \text{number of outcomes considered}$$

The higher the variance and consequently the standard deviation, the greater is the degree of dispersion and therefore the higher is the asset's or investment's total risk.

In cases where all the outcomes, r_i, are known and their respective probabilities of occurrence, $P(r_i)$, are all the same, the expected return, r , is calculated as the simple mean value of all the outcomes, thus:

$$r^- = \frac{\sum_{i=1}^{n} r}{n}$$

Given the same conditions (all the outcomes, r_i, are known and their respective

probabilities of occurrence, $P(r_i)$, are all equal), the standard deviation of returns, σ_r, is given by:

$$\sigma_r = \sqrt{\frac{\sum_{i=1}^{n}(r_i - \bar{r})^2}{n-1}}$$

Example 2 —Standard deviation as a measure of asset [3] risk

Having determined the expected rate of return on a proposed investment the financial manager of FutureSpec Technologies now wishes to calculate the standard deviation as an indicator of the investment's total risk. The expected returns from the project are related to the future performance of the economy over the period as follows:

Economic scenario	Probability of occurrence (p)	Rate of return (r)
Strong growth	0.25	15%
Moderate growth	0.50	12%
Low growth	0.25	8%

The expected return $E(r)$ was calculated as:

$E(r)=0.25(15\%)+0.50(12\%)+0.25(8\%)$
$=11.75\%$

To find the standard deviation of returns, σ_r, we first have to determine the variance. The variance is found by: (1) subtracting each individual return from the mean return (column 4 in the table opposite); (2) squaring each difference to remove any negative values, (column 5 in the table opposite); and (3) multiplying each squared deviation by its respective probability weighting (column 7 in the table opposite).

The variance is the sum of the squared deviations times their respective probabilities. The standard deviation is then the square root of the variance.

Thus the standard deviation of return, σ_r, is derived as follows:

(1)	(2)	(3)	(2)−(3) (4)	(4)×(4) (5)	(6)	(5)×(6) (7)
i	r_i	r	$r_i - r$	$(r_i - r)^2$	$P(r_i)$	$(r_i - r)^2 \times P(r_i)$
1	15%	11.75%	3.25%	10.56%	0.25	2.64%

Now that we have calculated a standard deviation of 2.49% in the above example what does it mean? How is it to be interpreted? Is this a high risk or low risk investment? We will defer any response to these questions until after we have reviewed probability distributions, in particular the normal distribution.

Probability distributions

A **probability distribution** is simply a statistical model of the probabilities assigned to a range of possible outcomes. It indicates the likelihood of each outcome occurring. Probabilities may be determined *subjectively* (based on opinion and judgement) or *objectively* (based on observed data).

Probability distributions can be discrete or continuous. A *discrete distribution* implies that only a limited number of possible outcomes can be identified with probability weightings assigned to them. A *continuous distribution* in contrast has an infinite number of possible outcomes.

In Example 2—FutureSpec Technologies—only three possible outcomes were presented with their respective probability weightings assigned, this is an example of a discrete probability distribution. However, if it were possible to set out *all* the possible states of the economy and attach probability weightings to each state then we would end up with a continuous probability distribution.

The normal probability distribution

Our interest is with the **normal probability distribution** which is a symmetrical, bell-shaped curve. Because it is symmetrical—one side is a mirror image of the other—half of the curve's area lies to the right of the mean and half to the left. This implies that there is

Figure 6.1 The normal distribution
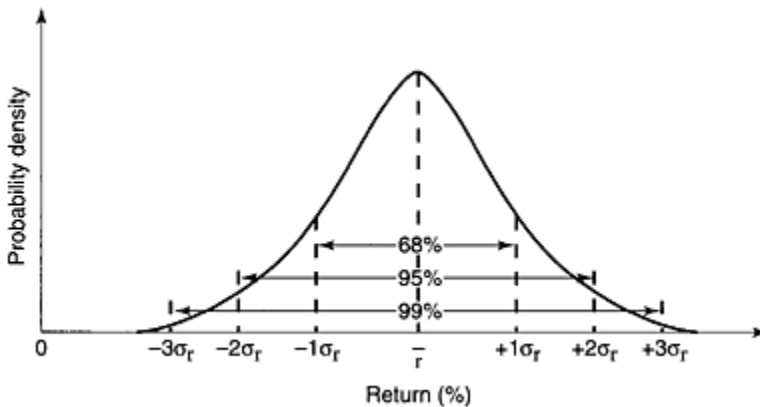
a 50 per cent probability that the actual value will be more than the mean (i.e. lie to the right of the mean value) and a 50 per cent probability that it will be less than the mean

(i.e. lie to the left of the mean value).

From conventional statistical analysis we also know that 68.26 per cent of all possible outcomes will lie within $\pm 1\rho$ of the mean, 95.46 per cent of all possible outcomes will lie within $\pm 2\sigma$ of the mean, and 99.74 per cent all possible outcomes will lie within $\pm 3\sigma$ of the mean. The percentages are equivalent to probabilities, thus there is a 68.26 per cent probability that the actual outcome will lie within $\pm 1\sigma$ of the mean and so forth (see Figure 6.1).

If we now return to Example 2, we can infer that there is a 68 per cent chance of the actual return lying within $\pm 1\sigma$ of the expected or mean value of 11.75 per cent, that is ranging somewhere between 14.24 per cent (11.75+2.49) and 9.26 per cent (11.75 −2.49). Furthermore there is a 95 per cent chance that the actual return will lie within $\pm 2\sigma$ of the mean, that is between 16.73 percent (11.75+4.98) and 6.77 percent (11.75 −4.98).

Although we now have a quantitative measure of risk, for this single investment, this is still not particularly informative in this case. The investment appears risky but we cannot get very far by looking at it in isolation. It would be very helpful if we could compare the risk-return characteristics of this investment with those of other available investment opportunities. In the final analysis the investment decision will be influenced by the investor's **attitude to risk.**

We can now look at how we can apply what we have learned to the comparison of two investment opportunities. Table 6.1 presents the respective probability distributions for two assets, A and B. They are in the form of discrete probability distributions.

We can also show these distributions graphically as in Figures 6.2 and 6.3.

EXERCISE 2 —EXPECTED RATE OF RETURN AND STANDARD DEVIATION

Before proceeding calculate the expected rate of return and the standard deviation for each asset A and B as shown in Table 6.1.

Table 6.1 Probability distribution of returns for assets A and B

Asset A		Asset B	
Rate of return (%)	Probability of occurrence, $P(r_i)$	Rate of return (%)	Probability of occurrence, $P(r_i)$
6	0.05	8	0.25
8	0.10	10	0.50
10	0.20	12	0.25
12	0.30		
14	0.20		
16	0.10		
18	0.05		

Figure 6.2 Probability distribution of returns for asset A
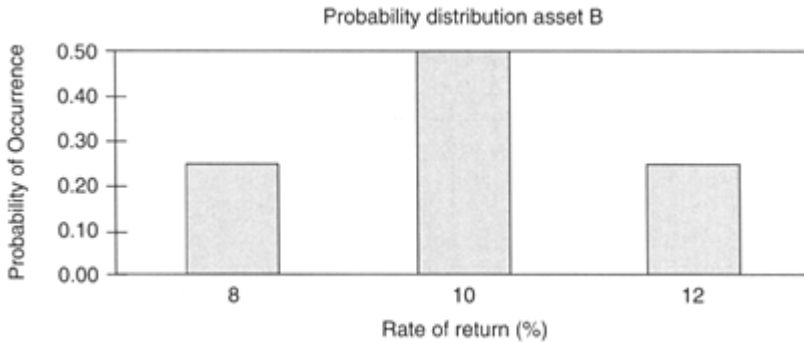
Figure 6.3 Probability distribution of returns for asset B

Comparing alternative investments

In choosing between two alternative investments which have the *same expected returns* but different standard deviations, a rational, risk-averse investor would select the investment with the lower standard deviation (total risk). Conversely, in choosing between two investments which have *identical risk* but different expected returns, the investment with the higher return would usually be selected.

For example consider the following choice between two alternative investment opportunities, Asset C and Asset D:

	Asset C	*Asset D*
Expected return, (E)r	10%	12%
Standard deviation, σ	5%	5%

Which investment would you choose?

Both investments have the same degree of risk, but Asset D promises a higher return

than Asset C. Given this information, rational, risk-averse investors would choose Asset D. In the language of financial management Asset D is said to ***dominate*** Asset C, because all rational investors would select Asset D in preference to Asset C, if this was their only choice.

Asset pricing

This illustrates an important feature of the way asset pricing, or valuing, works in financial markets. If two such investment opportunities were to exist simultaneously in a competitive market, all rational investors would invest their funds in Asset D in preference to Asset C. If, for illustration, we assume that both assets are company shares trading in the stock market, the competitive activity between profit-seeking investors would increase the demand for Asset D, which would in turn bid up its price in the market.

An increase in an investment's market price will result in a reduction in its return. For example, if the price of Asset D in the market was currently £10.00 and it is expected to pay a dividend of £1.20, the expected return would be: (£1.20/£10.00)×100=12 per cent. Should the competitive demand for Asset D bid its price up to £12.00 the expected return would then be reduced to: (£1.20/£12.00)×100=10 per cent.

Moreover, investors who owned Asset C would try to sell and invest their cash in Asset D, thus bidding down the price of Asset C and conversely increasing its return. The expected return from Asset C will continue to increase, while that of Asset D will continue to decrease until eventually competition will force the market for the shares into *equilibrium*. At this point both investments will then yield the same expected returns for the same level of risk.

In a competitive financial market there cannot exist simultaneously two investment opportunities which have equal risk but offer different returns, or alternatively offer equal returns but have different risks—the continual competitive activity of profit-seeking investors will prevent it.

The key point is that in a competitive market rational investors competing with each other for profits will ensure that similar risk investments offer similar returns. Recall from Chapter 4 that it is this kind of competitive activity which contributes to **market efficiency.**

Also in an efficient market expected return will equal required return, for the very same competitive reasons. In an efficient market if an investment's expected return is greater than its required return investors will seek to buy it. This will push its price up and its expected return down, until expected return and required return are in equilibrium. Conversely should an asset's expected return be less than its required return, then investors will seek to sell forcing the price down and expected return up, until the two are again equal.

Notice too the nature of the relationship between price and return, *there is an inverse relationship between an investment's return and its price in the market.* When price increases, return will fall and vice versa.

> ### KEY LEARNING POINT
> **An asset's return is inversely related to its price. When price rises, return falls and vice versa.**

So how can we choose between two alternative investments each of which has different risk/return characteristics? Is there any way of making a rational comparison between two such investments? We can draw on another statistical measure which is useful in such a case, the **coefficient of variation.**

Coefficient of variation (CV)

Consider the following investment choice:

	Asset X	Asset Y
Expected return	10%	20%
Standard deviation	5%	8%

Both assets have different expected rates of return and different standard deviations. Asset Y with the higher expected return also has the higher level of risk. This is what risk-averse investors would expect in a competitive market, the higher risk investment carries a higher **risk premium,** in the form of a higher rate of return.

The risk premium is the amount by which the return from a risky investment exceeds that of a risk-free investment. A risk premium is necessary to entice risk-averse investors to invest. In the above example is Asset Y therefore the more risky investment?

Expected return and standard deviation are absolute measures, to make a valid comparison between two such investments we need a relative measure of risk and return. This is where the coefficient of variation (CV) is helpful. The coefficient of variation is a *relative* measure, or ratio, of dispersion and is particularly useful in comparing assets that have different risk-return characteristics.

Basically the higher the CV, the higher the risk. The coefficient of variation is measured as the ratio of the *standard deviation to the expected return:*

$$\frac{\text{Standard deviation}}{\text{Expected return}} = \frac{\sigma_r}{\bar{r}}$$

For Assets X and Y the coefficient of variation is calculated as:

		Asset X	Asset Y
Expected return, r		10%	20%
Standard deviation, σ_r		5%	8%
Coefficient of variation (CV)	=	5÷10	8÷20

	=	0.50	0.40

We can see that although Asset Y has the higher absolute risk measure, σ, it has the lower coefficient of variation, which means that it actually has lower risk *per unit of return.* The returns from Asset X are relatively more volatile (risky) compared to those from Asset Y.

For a rational, risk-averse investor the preferred choice in this case would be Asset Y. Although, as always, the final decision rests with the investor and depends on the investor's risk propensity or attitude to risk.

EXERCISE 3 —COEFFICIENT OF VARIATION
   Calculate the coefficient of variation (CV) for assets A and B as shown in Table 6.1. Which do you consider to be the riskier investment? Give your reasons.

Risk and time

Risk is often viewed as an increasing function of time: the further into the future you project, the greater the potential variability of returns. In developing a financial model of an investment's future cash flow returns, the more distant the cash flows are projected into the future, the more risky they become.

We will now move on to explore what happens to risk and return when we wish to combine assets or investments together into a portfolio.

PORTFOLIO THEORY [4]

So far we have explored the risk-return relationship in the context of a single asset. Now we are going to explore the effect on risk and return when an investor is managing a **portfolio** of assets, rather than just a single asset. A portfolio is simply a collection or group of assets, and, as we shall see later, preferably a *diverse* group of assets.

Portfolios can consist of, at one extreme, just a few investments held by individuals or, at the other extreme, of hundreds or even thousands of investments managed by the giant investment management funds. For example, at the time of writing, Barclays Global Investors (BGI)—the investment arm of Barclays Bank—is the second largest fund management business in the world after Fidelity, an American fund management organisation. BGI manages over £230 billion of funds on behalf of charities, insurance companies and pension funds, etc.

Now suppose, 'just for an instant', that you had a £1 million windfall on the lottery, what would you do with the money? Probably you would invest some of your new found wealth. Invest it in what kind of assets?

Perhaps a proportion would go into a bank or building society deposit account(s). You may decide to invest in a new house, you may also decide to invest a proportion in a range of shares on the stock market. Another proportion you may decide to invest in a

longer-term savings scheme, purchase a work of art, and so forth.

This diverse group of investments would be your asset or **investment portfolio.** It is unlikely that you would invest all your money in a single asset, as this would be the high risk strategy. Rather, your objective should be to create an **efficient portfolio,** that is one which will maximise your return for a certain level of risk, or alternatively minimise your risk for a required level of return.

You would also be concerned with how future changes to your portfolio through disposals and/or acquisitions of individual assets would affect the overall level of risk and return of your portfolio. Thus the risk of any single prospective asset or investment should not be viewed in isolation, it should be viewed in the context of its impact on the risk and return of the existing portfolio of assets.

The same investment principles apply for financial managers of commercial firms, as they are essentially managing a portfolio of assets in the form of investment projects. Financial managers will also be concerned with achieving an efficient investment portfolio for their firms and with assessing how changes in a firm's portfolio will impact on its levels of risk and return, and ultimately on its share price in the financial markets. But before discovering how changes to a portfolio will affect its risk and return we must first be able to calculate the risk and return of a portfolio. We will deal with portfolio return first.

Portfolio return

To find the **expected return of a portfolio $E(r_p)$,** or **r_p,** we can apply what we have learned previously about the expected return being a weighted average of possible outcomes. However, when dealing with a portfolio of assets the expected return is calculated as the *weighted average of the expected returns of all the individual assets making up the portfolio* and this applies in all cases to portfolios of all sizes, not just two-asset portfolios.

The individual asset weightings are simply the respective proportion of the portfolio invested in each asset and, as with our previous probability weightings, all the proportionate weightings will sum to 1.0 (or 100 per cent).

The expected return on a portfolio is represented mathematically as follows: [5]

$$E(r_p) = w_1 r_1 + w_2 r_2 + \ldots + w_n r_n$$

where,

$E(r_p)$ = the expected return of the portfolio

w_i = weights of the individual assets (where i=1,2,…n)

r_i = expected return of the individual assets (where i=1,2,…n)

n = number of assets in the portfolio

For example, if you decided to invest £10,000 of your lottery winnings in a two-asset portfolio in the following proportions:

	Security 1	Security 2
Expected return on security, $E(r_s)$	20%	15%
Amount invested	£6,000	£4,000
Proportion invested	0.6	0.4

The expected return on this portfolio would be:

$$E(r_p)=0.6(20\%)+0.4(15\%)$$
$$=12\%+6\%$$
$$=18\%$$

EXERCISE 4 —EXPECTED RETURN ON A PORTFOLIO

Calculate the expected return of the two-asset portfolio A and B as shown in Table 6.1, assuming funds are invested in the proportions 60 per cent asset A and 40 per cent asset B.

Portfolio risk

As we are about to learn, calculating portfolio risk is a more complex task than calculating portfolio return, so do not be discouraged if some of the concepts at first seem difficult to grasp, with a little practice they will soon become familiar.

Based on our knowledge of portfolio return it would seem logical to measure the **risk** of our two security portfolio in a similar manner, by simply calculating a weighted average of the respective standard deviations of the two securities, where the weightings are again the portfolio proportions.

For example, assuming the standard deviations of the two securities 1 and 2 above to be 9% and 7%, respectively, the standard deviation of the portfolio, σ_p, would be calculated as:

	Security 1	Security 2
Expected return on security, $E(r_s)$	20%	15%
Amount invested	£6,000	£4,000
Proportion invested	0.6	0.4
Standard deviation of security, σ_s	9%	7%
Standard deviation of the portfolio, σ_p	$=w_1\sigma_1+w_2\sigma_2$	
	$=0.6(9\%)+0.4(7\%)$	
	$=5.4\%+2.8\%$	
	$=8.2\%$	

A word of warning, however, calculating the portfolio's risk by simply taking a weighted

average of the two standard deviations assumes a very special condition: namely that the two assets are ***perfectly positively correlated.*** Unfortunately, except for this very special case of perfect positive correlation, portfolio risk is *not* measured by simply calculating a weighted average of the standard deviations of all the individual assets in the portfolio, some more work is required.

To hold a portfolio of only two assets, both of which are perfectly positively correlated is not a good investment strategy, for reasons we are shortly to explain. It is a much better strategy to diversify and invest in two assets which are not perfectly positively correlated. Can you think why? Consider this for a moment before proceeding.

To appreciate why it is better to diversify, that is invest in assets which are less than perfectly positively correlated, it is necessary first to understand the statistical concepts of correlation and covariance and how they relate to portfolio diversification. Students who are familiar with these concepts can proceed to the 'Asset Correlation' section without loss of continuity.

Correlation, covariance and portfolio diversification

Correlation

Correlation is a statistical technique which is used to measure the relationship between two variables or data series. In portfolio management correlation is used to measure the relationship between two assets or investments. Correlation measures both the *degree* and *direction* of the relationship. Broadly speaking there are three categories or states of correlation as follows:

1 **Positive correlation.** This is the state which exists when two variables move in the *same direction* at the same time e.g. sales and profits. Under normal business conditions one would expect sales and profits to be positively correlated. An increase in sales would normally be expected to produce an increase in profits, and a fall in sales a reduction in profits.
2 **Negative correlation.** This state occurs when two variables move in the *opposite direction* at the same time, that is they are ***inversely related.*** Assuming normal business conditions, one would expect the price and demand for a company's products to be negatively correlated. An increase in price is likely to produce a decrease in demand and vice versa.
3 **Zero correlation.** This applies when there is no relationship between variables, a change in one variable is ***independent*** of a change in the other.

The correlation coefficient

The degree to which two variables, or the returns from two assets, are correlated is measured by the **correlation coefficient,** ρ (Greek letter 'rho') which ranges from +1.0 for ***perfect positive correlation*** to −1.0 for ***perfect negative correlation.*** A correlation coefficient of 0 suggests no relationship between variables.

Perfect positive correlation (ρ=+1.0) exists where two variables move together in exactly the same direction at the same time and by the same *relative degree of magnitude.*

For example, if we have two perfectly correlated variables A and B and variable A

increases by 10 per cent, then B will also increase by a constant amount or proportion of this 10 per cent. The increase for B could be less than, equal to, or greater than 10 per cent. The key point is that *the relative change between the variables remains constant over time.*

In the case of perfect negative correlation ($\rho=-1.0$), this occurs when two variables move in exactly opposite directions at the same time and by the same relative degree of magnitude. Again the proportionate relationship between the variables must remain constant over time.

A correlation coefficient lying between 0 and +1.0 suggests that there is a generally positive, but not necessarily a precise predictable, relationship between variables and the closer ρ is to 0, the weaker the positive relationship. Similarly a correlation coefficient lying between 0 and -1.0 suggests a generally negative, but not necessarily a precise predictable, relationship between variables, and similarly the closer ρ is to 0, the weaker the negative relationship.

It is important to appreciate that the correlation coefficient is an expression of an *average* relationship. There can be temporary or short-term deviations in the relationship, but correlation is concerned with the average nature of the relationship over the longer term.

Asset correlation

Figure 6.4 illustrates three broad types of possible correlation states between the returns of two assets in a portfolio and indicates their respective correlation coefficients. If correlation was perfectly positive in diagram (a), or perfectly negative in diagram (b), then all the points would lie in a straight line; the line would slope upwards to the right in (a) and downwards to the right in (b).

Figure 6.4 Types of correlation: two-asset portfolios

| (a) Positive correlation | (b) Negative correlation | (c) Zero correlation |
| $\rho > 0.0$ | $\rho < 0.0$ | $\rho = 0.0$ |
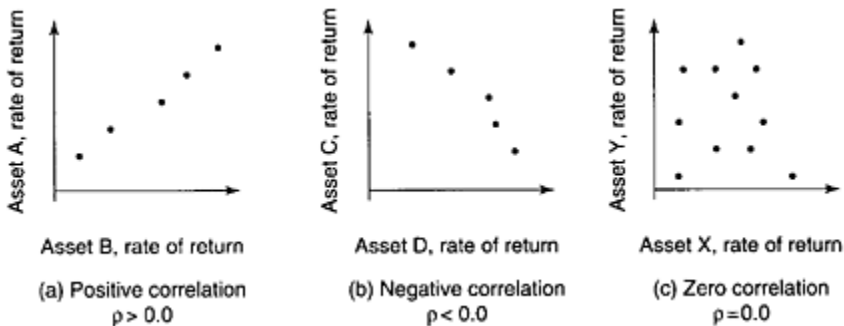
The returns on most securities in the stock market are positively correlated, but not perfectly positively correlated. This is because the returns on most assets tend to follow the movements in the general economy. If the financial markets anticipate a good economic outlook then expected share returns tend to go up, and conversely, if the markets take a very gloomy view of future economic conditions then expected share returns tend to go down.

EXERCISE 5 —ASSET CORRELATION

The table below presents the estimated annual cash flow returns for three potential investment projects, Projects 1, 2 and 3 respectively. Plot the data on a graph. From the graph can you tell which pairs of projects are positively correlated and which are negatively correlated? Which pairs do you consider would be the best investment combinations, that is which combination pairs will reduce risk?

Annual Cash Flows (£000s)

Year	1	2	3	4	5
Project 1	10	20	15	18	20
Project 2	20	10	18	14	13
Project 3	20	40	30	36	40

Risk of a two-asset portfolio

We can now return to quantifying the risk of a two-asset portfolio by using the statistical measures of variance and standard deviation. We will look first at the variance of returns for a two-asset portfolio which is given by the following formula:

$$Var_p = (w_1)^2(\sigma_1)2 + (w_2)^2(\sigma_2)^2 + 2(w_1 w_2 \rho_{12} \sigma_1 \sigma_2)$$

where,

Var_p = the variance of returns for a two-asset portfolio

w_t = weights or proportions of the individual portfolio assets (i=1,2)

σ_i = standard deviations of the individual portfolio assets (i=1,2)

ρ_{12} = correlation coefficient of returns between assets 1 and 2

To find the standard deviation for *a* two-asset portfolio we simply take the square root of the variance as follows:

$$\sigma_p = \sqrt{(w_1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2(w_1 w_2 \rho_{12} \sigma_1 \sigma_2)}$$

$$= \sqrt{Var_p}$$

If you are new to the topic do not be deterred by these complex-looking formulae: they are not as formidable as they look.

You will note that calculating both the variance and standard deviations of a portfolio is more complex than simply calculating a weighted average of the variances or standard deviations of the two separate assets. Although both formulae include the weighted

average of the variances of the two separate assets they also incorporate a third term, $2(w_1 w_2 \rho_{12} \sigma_1 \sigma_2)$, which represents a weighted measure of the covariance of the asset returns.

Covariance

The variance of a portfolio is described as: *the weighted sum of the individual asset variances plus twice their **covariance (COV)*** and the standard deviation of a portfolio is defined as: *the square root of the weighted sum of the individual asset variances plus twice their covariance (COV).*

The covariance term in the above equations is represented by $(\rho_{12})(\sigma_1 \sigma_2)$ and notice that, as for the standard deviations of the respective assets, it is weighted by the product of the respective proportions of each asset $(w_1 w_2)$ in the portfolio.

Covariance (COV) is a measure of how two assets move together in terms of the degree and *magnitude* of the comovement. Remember correlation measures degree and *direction* of movement.

The covariance of two securities, Security 1 and Security 2, denoted COV_{12}, is simply the product of the standard deviations of the two securities (σ, σ_2) multiplied by their correlation coefficient (ρ_{12}), that is, $(\rho_{12})(\sigma_1 \sigma_2)$. The correlation coefficient of the two securities (ρ_{12}) is equal to the covariance of the two securities, COV_{12}, divided by the product of their standard deviations $(\sigma_1 \sigma_2)$. The relationship between covariance and correlation can be seen more clearly from the following:

$$\text{Covariance, } COV_{12} = (\rho_{12})(\sigma_1 \sigma_2)$$

therefore,

$$\text{Correlation coefficient, } (\rho_{12}) = \frac{COV_{12}}{(\sigma_1 \sigma_2)}$$

You will note that covariance includes correlation. Covariance is an *absolute measure* of how two variables move together and depends on the units in which the variables are measured—this is one of its difficulties.

For example, if the two variables were (a) the height, and (b) the weight of people, then the value of covariance would depend on whether the variables were measured imperially (i.e. in feet and stones, or even inches and pounds), or metrically (i.e. in metres and kilograms, or simply centimetres and grams).

Correlation, on the other hand, is an improved covariability concept; it is a *relative measure* of covariability and is completely independent of the units of measurement of either variable. Whereas covariance can assume any value however large or small, correlation can only assume values ranging between −1.0 and +1.0 and this makes it a more convenient measure to work with; consequently, covariance is converted into a correlation coefficient.

Calculating the risk of a two-asset portfolio

If we now return to the two-asset portfolio consisting of Security 1 and Security 2, and this time determine the portfolio risk (variability of returns) σ_p, by applying the previous σ_p equation and assuming *perfect negative correlation* between asset returns.

	Security 1	Security 2
Expected return on security, $E(r_s)$	20%	15%
Amount invested	£6,000	£4,000
Proportion invested	0.6	0.4
Standard deviation of returns	9%	7%

$$\sigma_p = \sqrt{(w_1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2(w_1 w_2 \rho_{12}\, \sigma_1 \sigma_2)}$$

$$= \sqrt{(0.6)^2(9\%)^2 + (0.4)^2(7\%)^2 + 2[(0.6)(0.4)(-1.0)(9\%)(7\%)]}$$

$$= \sqrt{29.16 + 7.84 + 2(-15.12)}$$

$$= \sqrt{37.0 - 30.24}$$

$$= \sqrt{6.76}$$

$$= 2.6\%$$

You will notice that the risk of the two-asset portfolio has reduced significantly with perfect negative correlation ($\rho_{12}=-1.0$) compared with our previous calculation of 8.2 per cent, when we assumed that the two assets were perfectly positively correlated ($\rho_{12}=+1.0$). For practice you may wish to verify the original calculation of $\sigma_p=8.2$ per cent by applying the above equation and substituting $\rho_{12}=+1.0$.

It is important to remember that portfolio variances and standard deviations are not just simple weighted averages of the individual asset variances and standard deviations. When correlation is less than perfectly positive, the risk of the portfolio will be less than a weighted average of the risks of the individual assets.

Portfolios consisting of more than two assets

When more than two assets are included in a portfolio the *expected return* is always a weighted average of the expected returns of all the individual assets, no matter how many assets comprise the portfolio.

Unfortunately the process of computing variance and standard deviations for more than two-asset portfolios is not so simple, it becomes an increasingly complex task as more assets are added to the portfolio. The covariance of each additional asset with each existing asset in the portfolio must be computed and the number of covariance terms actually increases exponentially.

For example, if we were to add a third security, Security 3 to our two security portfolio above we now need to calculate three pairs of covariance (COV_{12}, COV_{13} and COV_{23})

rather than just one, COV_{12}, as before. If a fourth security is added you get six covariance combinations and so on.

Fortunately, as we are about to explain, once a portfolio reaches 20 to 30 assets randomly selected, the scope for increasing risk reduction by including additional assets diminishes dramatically.

Portfolio diversification

We have just seen that if we combine negatively correlated assets the overall variability (i.e. risk) of portfolio returns can be substantially reduced. This is the principle of **diversification,** that is, reducing risk by holding a portfolio of diverse assets. In other words not holding all your investment eggs in one basket. Although, as we shall discover later, total risk can be significantly reduced by diversifying asset holdings in a portfolio, it cannot be completely eliminated.

We can examine the effects on the risk of our two-asset portfolio if the correlation between the two securities is zero:

$$\sigma_p = \sqrt{(0.6)^2(9\%)^2 + (0.4)^2(7\%)^2 + 2[(0.6)(0.4)(0)(9\%)(7\%)]}$$
$$= \sqrt{29.16 + 7.84 + 0}$$
$$= 6.1\%$$

This time portfolio risk has been reduced below the weighted average of the two individual securities when they were perfectly correlated, but you will notice that the reduction in risk is not as substantial as with perfect negative correlation.

The effects of portfolio weightings

What do you think would happen to the risk of the portfolio if you decided to change the weightings of your investment in each security? Observe the effect of changing the portfolio weightings to a 50/50 split, still assuming perfect negative correlation:

$$\sigma_p = \sqrt{(0.5)^2(9\%)^2 + (0.5)^2(7\%)^2 + 2[(0.5)(0.5)(-1.0)(9\%)(7\%)]}$$
$$= 1.0\%$$

The risk of the portfolio has reduced as there is now a lesser proportion invested in the more risky asset, Security 1.

EXERCISE 6 —PORTFOLIO RISK

Calculate the standard deviation, σ_p, of the two-asset portfolio with the original 60/40 weightings reversed and assuming perfect negative correlation.

To summarise our correlation findings so far, see Table 6.2.

Table 6.2 Portfolio risk for various two-asset combinations and correlations

Asset combination		Correlation coefficient of returns, ρ_{12}	Portfolio risk, σ_P
w_1	w_2		
0.6	0.4	+1.0	8.2%
0.6	0.4	0.0	6.1%
0.6	0.4	−1.0	2.6%
0.5	0.5	−1.0	1.0%
0.4	0.6	−1.0	0.6%

We can now summarise some of the key points about the effect of correlation on portfolio risk.

1 If there is **perfect positive correlation** of returns between two assets, portfolio risk is equal to the weighted average of the standard deviations (individual risks) of the two assets. No reduction in risk is achieved.
2 If there is **perfect negative correlation** of returns between two assets, portfolio risk may be virtually eliminated when the optimum combination of assets is achieved.
3 If the correlation of returns between two assets is less than 1.0, portfolio risk can be reduced by **diversification.** The less the degree of positive correlation, the greater will be the risk reduction effects. However, combining assets which are *negatively correlated* will reduce risk further.

> **KEY LEARNING POINT**
> **The degree of correlation between asset returns in a portfolio affects total portfolio risk. The overall risk is greater if asset returns are positively correlated than if they are negatively correlated. It is correlation which underlies the principle of diversification that is used to develop an efficient or optimal portfolio of assets.**

Remember that the investor or financial manager's goal is to achieve an **efficient portfolio,** that is one which yields the highest expected return for a given level of risk (standard deviation), or minimises risk (standard deviation) for a given level of return.

Diversified firms

A common practical application of diversification is for corporate firms to engage in **countercyclical** operations or businesses. The objective is to counteract cyclical economic, seasonal and market conditions, by investing in a portfolio of businesses which respond differently to the same economic or seasonal circumstances e.g. economic

recession or economic boom.

For example, diversification in its most simple form would be a retailing company smoothing out seasonal fluctuations in sales and earnings by selling different product lines at different times of the year e.g. swimsuits in summer and sweaters in winter.

A retailing company could take diversification a stage further and develop activities in other business areas such as the hotels and leisure industry or property development. Even international diversification may be considered, particularly investing in foreign markets which have economic cycles negatively correlated to the firm's domestic cycle.

However, it should be borne in mind that some shareholders (primarily the large financial institutions which own over 60 per cent of UK equities) can diversify their own portfolios in order to reduce their risk. Individual shareholders with smaller portfolios—they may hold just a one or two-share portfolio—cannot diversify so easily. Buying and selling shares can be expensive, so at least for them investing in a diversified company probably makes sense.

Individuals with small portfolios, depending upon their attitude to risk, do of course have the option to invest in diversified unit or investment trusts, or other such investment vehicles, in order to reduce their exposure to risk.

PORTFOLIO THEORY: SUMMARY

Before proceeding this will be an opportune moment to stop and briefly take stock of what we have learned about portfolio theory so far. We can summarise the key learning points as follows:

1 **Overall portfolio risk reduces as correlation reduces.** In Table 6.2 we noted that as correlation reduced first from perfectly positive, through zero and finally to perfectly negative correlation, the portfolio standard deviation also reduced. Even if the portfolio assets are not negatively correlated, lowering the degree of positive correlation between them will lower the level of total risk, that is the overall variability of portfolio returns. The best approach to reducing risk is to combine assets which are negatively correlated.

2 **In *all* cases total portfolio risk is less than that of the riskiest individual asset.** This is the key benefit of creating a portfolio of assets. In our original example Security 1 had the higher standard deviation of 9 per cent. By combining it with another lower risk asset (Security 2 with a standard deviation of 7 per cent), even under conditions of perfect positive correlation, total risk was reduced *without affecting return.* This was Markowitz's important insight that by combining assets into portfolios investors could reduce total investment risk without jeopardising return.

3 **Total risk can also be reduced by altering asset combinations, assuming that the assets are divisible.** For every two-asset portfolio there is an eventual combination (assuming the assets are divisible, such as allocating cash between shares in a two-share portfolio) which will minimise total risk, σ_p.

4 **Thus the overall risk of a portfolio is determined by the degree of correlation between assets *and* by the proportional weightings of the assets in the portfolio.**

5 **The covariance of an asset with the other assets in a portfolio is the key concern for an investor**—not the variance of the individual asset, or its covariance with any other individual asset.

6 **Rational, risk-averse investors will seek to create portfolios that are efficient.** Efficient portfolios offer the maximum return for a certain level of risk or the minimum risk for a specified level of return.

   In statistical terms rational, risk-averse investors will wish to construct a portfolio which is *mean-variance efficient.* In other words, one which has the minimum variance for any specified level of expected return.

RECAP

Return: An investment's return can be **actual** or **expected** and is measured in terms *of **cash flows,*** positive or negative.

Risk: Risk can be defined as: ***the probability that the actual return will differ from the expected return.*** It is this **potential variability** of returns that we call risk.

Attitudes to risk: Investors have different attitudes to risk. They can be **risk-averse, risk-seeking** or **risk-indifferent.** For the most part in financial management we assume that investors are risk-averse, that is for an increase in risk they require a compensating increase in return.

Measuring risk: Risk is measured statistically by the use of **probability distributions** and the **standard deviation,** σ. The standard deviation, σ, is the relevant measure of *total* risk for an asset which is not held in a diversified portfolio.

Portfolio return: The **expected return of a portfolio $E(r_p)$, or r_p,** is always calculated as the *weighted average of the expected returns of all the individual assets making up the portfolio.*

Portfolio risk: The total risk of a portfolio, σ_p, is determined by the degree of correlation, ρ, between assets *and* by the proportionate weightings of the assets in the portfolio. Correlation underpins the principle of **diversification** which is used to develop an **efficient portfolio,** that is a portfolio which yields the highest expected return for a given level of risk or minimises risk for a specified level of return. Diversification benefits can be gained by combining assets which are less than perfectly positively correlated (i.e. $\rho<+1.0$). Negatively correlated assets will provide greater diversification benefits.

REVIEW QUESTIONS

Concept review questions

1 (a) What do you understand by the terms *expected return* and *required return?* (b) How would you define *risk* in financial management? (c) Compare and contrast the three main *attitudes to risk* which investors may exhibit, (d) Why is it considered

important for the financial manager to understand these concepts?

2 Explain the function of the statistical concepts of *standard deviation* and *coefficient of variation* as measures of investment risk.

3 What is meant by an *efficient portfolio?*

4 Explain the effect of the *correlation* of asset returns on portfolio risk.

Practice questions

5 **Return.** Calculate the rate of return earned (realised) on each of the following investments over the past year.

Investment	Opening Value (£)	Closing Value (£)	Cash Flow (£)
1	10,000	11,000	500
2	20,000	19,000	500
3	3,500	3,800	−100
4	123,000	131,000	9,000
5	65,000	63,000	1,100

6 **Risk and return.** Calculate the expected return and risk (standard deviation) of the following investment. If the return on a risk-free investment (e.g. a Treasury bill) is currently 7 per cent should the following investment be undertaken?

Return	Probability
5%	0.10
6%	0.20
7%	0.40
8%	0.30

Test questions

7 **Coefficient of Variation.** Set out below are the returns and their respective probabilities for two assets A and B.

Asset A		Asset B	
Return	Probability	Return	Probability
10	0.05	9	0.10
11	0.25	12	0.15
12	0.40	13	0.50
13	0.25	15	0.15
14	0.05	16	0.10

From this information you are required to:

(i) Compute the expected return and the risk (standard deviation) for each asset.
(ii) Determine the coefficient of variation (CV) for each asset.
(iii) Comment on your findings in (i) and (ii).
(iv) It has been suggested that these two assets should be combined into a portfolio in the proportions 40 per cent Asset A and 60 per cent Asset B. Calculate the expected return for this portfolio and its risk (standard deviation), assuming the correlation coefficient to be 0.6.
(v) What are the benefits of combining the two assets into the suggested portfolio?

8 **Correlation.** As the financial manager of HighGrowth Ltd. you are considering the following three projects as potential investments. Your assistant has estimated the future net annual cash inflows for each project for each of the next five years as follows:

	Expected net annual cash inflows (£000s)				
Year	1	2	3	4	5
Project 1	10	15	12	14	18
Project 2	20	13	16	13	10
Project 3	30	45	36	42	54

(a) Identify which pairs of projects are positively correlated and which are negatively correlated.
(b) To achieve risk reduction which pairs of projects should be selected?

NOTES

1 Alternatively E(r) can be expressed as:

$$\bar{r} = \sum_{i=1}^{n} r_i \times P(r_i)$$

where,

r = the expected value of a return
r_i = return for the ith outcome
$P(r_i)$ = probability of occurrence of the ith outcome
n = number of outcomes considered

This simply means that r is the sum of each individual outcome in the distribution multiplied by its respective probability.

2 Shakespeare, *The Merchant of Venice.*
3 The words asset, investment, and security are used interchangeably.

4 Portfolio theory was developed by Harry Markowitz in 1952. Modern financial management essentially began with Markowitz's paper 'Portfolio Selection', *Journal of Finance,* March 1952.

5 Alternatively $E(r_p)$ can be expressed as:

$$E(r_p) = \sum_{i=1}^{n} (r_i \times w_i)$$

FURTHER READING

General

Risk and return are covered in the standard financial management texts, see for example:
- *Principles of Corporate Finance* . Brealey, R.A. and Myers, S.C., 5th edition, McGraw-Hill, 1996.
- *Management of Company Finance* . Samuels, J., Wilkes, F. and Brayshaw, R., 6th edition, Chapman & Hall, 1995.
- *Capital Investment and Financial Decisions* . Levy, H. and Sarnat, M., 5th edition, Prentice-Hall, 1994.
- 'Risk and Return: Keeping a Level Head.' *Financial Times ,* 10/11 October 1998, p. 7.
- 'The Investment Universe: A Route Map.' *Financial Times ,* 5 October 1998, p. 19.

Portfolio theory

Markowitz's original work on portfolio theory is set out in:
- 'Portfolio Selection.' Markowitz, H.A., *Journal of Finance ,* March 1952.
- *Portfolio Selection: Efficient Diversification of Investments* . Markowitz, H.A., John Wiley & Sons, 1959.

For a more simplified exposition of portfolio theory see:
Aodern Portfolio Theory and Investment Management . Elton, E.J. and Gruber, M.J., John Wiley & Sons, 1991.
Portfolio Theory and Putting it into Practice.' *Financial Times ,* 12 October 1998, p. 19.

REFERENCE

Markowitz, H.A. 'Portfolio Selection.' *Journal of Finance ,* March 1952.

7
RISK AND RETURN

The Capital Asset Pricing Model (CAPM)

This chapter develops the key financial management concept of risk by examining asset pricing models. The following topic is covered:

the capital asset pricing model (CAPM).

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 explain the types of investment risk;
2 understand the structure of the capital asset pricing model (CAPM);
3 explain the role of the beta coefficient (β);
4 use the CAPM to calculate required return;
5 discuss the assumptions and limitations of the CAPM.

OVERVIEW

In this chapter we continue our theme of exploring the nature of the risk-return relationship in modern financial management. We shall see how the risk-return relationship is used in the financial markets to determine the price or value of financial assets. In an efficient market the value and price of an asset will be equal.

This task of **asset pricing,** or asset valuing, is central to the functioning of financial markets and it is clearly of fundamental importance for the financial manager to understand the principles and processes which lie behind it.

For example, when raising long-term finance, such as through equity or debt issues, the asset pricing models introduced in this chapter will enable the financial manager to understand how these securities will be priced in the markets and also how to choose between alternative sources of corporate financing. In this connection we will study one of the most influential concepts in recent financial management history, **the capital asset pricing model (CAPM)**—pronounced 'cap-m'.

THE INVESTOR'S RISK-ADJUSTED REQUIRED RATE OF RETURN

Up until now in valuing investment cash flows we have simply accepted discount rates as a given figure. We have described the discount rate as the investor's **opportunity cost of capital** by which we mean that it represents the minimum rate of return the investor requires an investment to earn for it to be considered worthwhile. The opportunity cost of capital reflects the rate of return an investor can earn elsewhere on an investment of *equal* risk.

If a proposed investment is expected to yield less than the return the investor requires from investments of equal risk, money will not be invested and the investor will seek out alternative investments. In such circumstances the firm will find it very difficult to attract funding for its investment projects, recall the Coffee Ventures scenario.

The rate at which expected cash flow returns are discounted represents the investor's **risk-adjusted required rate of return.** This is the rate of return required by an investor to compensate for a given investment's level of risk. In this chapter we will explore the determination of risk-adjusted required rates of return, that is, discount rates.

THE CAPITAL ASSET PRICING MODEL (CAPM)

The previous chapter on portfolio theory dealt with how to measure the risk and expected return of a portfolio or collection of assets; so far we have not attempted to bring the two together, that is to specifically link risk with return.

In the chronological development of modern financial management, portfolio theory came first with Markowitz in 1952. It was not until 1964 that William Sharpe derived the **Capital Asset Pricing Model (CAPM)** [1] based on Markowitz's portfolio theory. For example, a key assumption of the CAPM is that investors hold highly diversified portfolios and thus can eliminate a significant proportion of total risk.

The CAPM was a breakthrough in modern finance because for the first time a model became available which enabled academics, financiers and investors to link the risk and return for an asset together, and which explained the underlying mechanism of asset pricing in capital markets.

For anyone making an investment decision and trying to determine what return they should require for assuming a given level of risk the CAPM seemed to have come up with the answer. The capital asset pricing model (CAPM) demonstrated how risk and return could be linked together and specified the nature of the risk-return relationship for any security or asset.

The impact of the capital asset pricing model (CAPM) has been immense and it is one of the most influential financial concepts in recent financial management history. It is the basic theory which links together relevant risk and expected return for any security.

Although Sharpe originally developed the CAPM in the context of pricing ordinary shares in the stock market, the model has been subsequently extended and applied to evaluate the decisions by firms to invest in corporate assets. Indeed, one way of viewing

the firm is as a 'portfolio of tangible assets and investment projects'.

We know that all financial decisions contain a *risk element* and a *return element* and that there is always a **trade-off** between these two elements: the higher the perceived risk, the higher will be the required return and vice versa. The CAPM was the first method of formally expressing this risk-return relationship: it brought together **systematic risk** and return for all assets.

However, before analysing the basic constructs of the CAPM we need to understand a little more about the various types of investment risk.

TYPES OF INVESTMENT RISK

In the preceding chapter we have seen how the *total risk* (as represented by the standard deviation, σ) of a two-security portfolio can be significantly reduced by combining securities whose returns are negatively correlated, or at least have low positive correlation—the principle of diversification.

The principle of diversification can be extended to larger portfolios of securities. The greater the volume of securities which are combined in a portfolio, the greater will be the reduction in risk, up to a point, providing that the securities are not closely correlated. Unfortunately, as we shall soon explain, it is not possible to eliminate all portfolio risk through diversification, no matter how many securities are contained in a portfolio.

Even the large financial institutions and investment funds, which may have hundreds or possibly even thousands of securities to manage, cannot eliminate total risk. However, managing such large portfolios becomes progressively more complex. We now know that as the number of securities in a portfolio increases there is a geometric increase in the number of calculations required to determine portfolio risk—remember that correlation and covariance must be calculated for each pair of assets.

According to the CAPM, the total risk of a security or portfolio of securities can be split into two specific types, **systematic risk and unsystematic risk.** This is sometimes referred to as *risk partitioning,* as follows:

> **Total risk=Systematic risk+Unsystematic risk**

- *Systematic (or market) risk* cannot be diversified away: it is the risk which arises from market factors and is also frequently referred to as **undiversifiable** risk. It is due to factors which *systematically* impact on most firms, such as general or macroeconomic conditions (e.g. balance of payments, inflation and interest rates). It may help you remember which type is which if you think of systematic risk as arising from risk factors associated with the general economic and financial *system.*
- *Unsystematic (or specific) risk* can be diversified away by creating a large enough portfolio of securities: it is also often called **diversifiable** risk or **company-unique** risk. It is the risk which relates, or is unique, to a particular firm. Factors such as winning a new contract, an industrial dispute, or the discovery of a new technology or product would contribute to unsystematic risk.

The relationship between total portfolio risk, σ_p and portfolio size can be shown

diagramatically as in Figure 7.1. Notice that total risk diminishes as the number of assets or securities in the portfolio increases, but also observe that unsystematic risk does not disappear completely and that systematic risk remains unaffected by portfolio size.

Figure 7.1 The relationship of portfolio risk to portfolio size
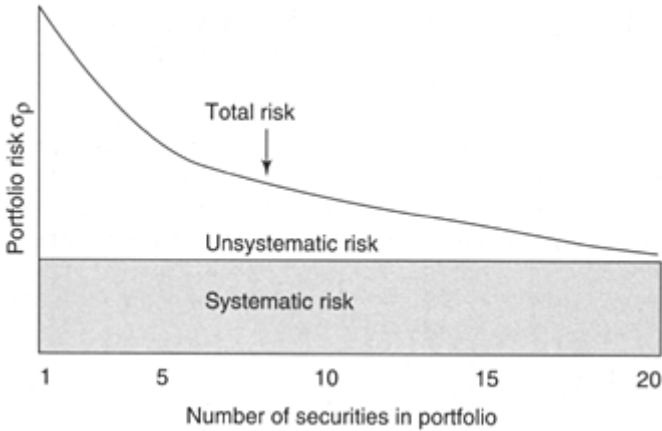
There is research which indicates that a portfolio consisting of 15 to 20 securities, chosen at random, is sufficient to produce most of the risk reduction benefits of diversification (Wagner and Lau 1971; Klemosky and Martin 1975). Thus only a very small fraction of all the infinitely possible investment portfolios available in the market will be necessary to construct an efficient portfolio. Understanding these two types of risk is fundamental to an understanding of the CAPM.

THE CAPM MODEL

We have previously described the CAPM as a method of expressing the risk-return relationship for a security or portfolio of securities: it brings together *systematic (undiversifiable) risk* and return. After all, for any rational, risk-averse investor it is only systematic risk which is relevant, because if the investor creates a sufficiently large portfolio of securities, unsystematic or company-specific risk can be virtually eliminated through diversification.

It is therefore the measurement of systematic risk which is of primary importance for rational investors in identifying those securities which possess the most desired risk—return characteristics. It is the measurement of systematic risk which becomes critical in the CAPM because the model relies on the assumption that investors will only hold well diversified portfolios, so only systematic risk matters.

The CAPM is quite a complex concept so if you find it difficult to grasp at first do not become disillusioned, stick with it.

For reasons of presentation and ease of understanding we will approach our study of

the CAPM by breaking it down into five key components as follows:

1 **The beta coefficient, (β);**
2 **The CAPM equation;**
3 **The CAPM graph—the security market line (SML);**
4 **Shifts in the SML—inflationary expectations and risk aversion;**
5 **Comments and criticisms of the CAPM.**

We will examine each component in turn, beginning with the key concept of beta, β.

The beta coefficient (β)

Recall that the standard deviation, σ, is used to measure an asset or share's total risk, while the **beta coefficient,** β, in contrast is used to measure only part of a share or portfolio's risk, namely the part that cannot be reduced by diversification, that is the **systematic** or **market risk** of an individual share or portfolio of shares.

Systematic risk can be further subdivided into *business risk* and *financial risk.* Business risk arises from the nature of the firm's business environment and the particular characteristics of the type of business or industry in which it operates. For example the competitive structure of the industry, its sensitivity to changes in macroeconomic variables such as interest rates and inflation and the stability of industrial relations all combine to determine a firm's business risk. The level of business risk in some industries, for example catering and construction, is higher than in others and is a variable which lies largely outside management's control.

Financial risk in contrast represents the risk which arises from a firm's level of gearing or leverage and is a variable which is directly under management's control. Basically the more debt a firm has, the greater the level of financial risk (that is, the risk of the firm not being able to meet its financial obligations).

As the level of debt increases, the greater will be the firm's burden of interest and principal payments and the greater the return the equity shareholders require to compensate for the additional financial risk.

Beta is a measure of the sensitivity or volatility of an individual security's or portfolio's return (capital gains plus dividends) in relation to changes in the overall capital or stock market return. In the capital asset pricing model, *market return* is the return (capital gains plus dividends) from the *market portfolio.*

The market portfolio is a theoretical concept which, in theory, should include every conceivable security traded in the capital market in proportion to its market value. It may help to view the market portfolio as a giant weighted average of the market values of all the possible investment assets available in the capital market.

In practice, the market portfolio would be impossible to achieve, so to operationalise the CAPM theory, a sufficiently large stock market index such as the Financial Times Stock Exchange (FTSE) 100 Share Index (i.e. the 'Footsie' 100 index) or the FTSE All-Share index is substituted for the market portfolio.

Returning to the beta coefficient, β, it is important to note that beta can apply in the context of an individual share or a portfolio of shares. However to avoid undue repetition we will for the time being confine our discussion of beta to the context of an individual

asset or share.

The beta coefficient is like a share's *market sensitivity indicator.* For example, if the average rate of return on the stock market rises or falls by 10 per cent, how does the rate of return on an individual share respond? If the share's rate of return similarly rises or falls by 10 per cent in exact harmony with the market, then we say that the share has a beta coefficient of 1.0; it is just as risky as the 'average' share in the market.

Should the rate of return on the share rise or fall by only 5 per cent in response to a corresponding 10 per cent rise or fall in the market, then its beta is 0.5: the share is only half as volatile (risky) as the market as a whole. On the other hand, if the share's rate of return changed by 20 per cent in response to a matching 10 per cent change in the market return, its beta would be 2.0; the share would be twice as risky as the market average.

Categories of beta

Shares or securities can be broadly classified as **aggressive, average** or **defensive** according to their betas. Shares with a beta > 1.0 are described as *aggressive;* they are more risky than the market average, although they will tend to perform well in a rising or bull market. Consequently investors would require a rate of return from the share which is greater than the market average.

Shares with a beta=1.0 are described as *average or neutral* as their rate of return moves in exact harmony with movements in the stock market average return; they are of average risk and yield average returns. In contrast, shares with a beta<1.0 are classed as *defensive.* A defensive share does not perform well in a bull market but conversely it does not fall as much as the average share in a falling or bear market.

EXERCISE 1 —SHARE RISK CLASSIFICATION

How would you classify each of the following shares according to their respective betas, aggressive, neutral or defensive?

Share	Industrial Sector	Beta
Marks & Spencer	Retail, General	0.96
NatWest Bank	Banks, Retail	1.40
Shell Transport	Oil, Integrated	0.75

How are betas determined?

A share's beta is determined from the historical values of the share's returns relative to market returns. It is important to appreciate therefore that beta is a *relative,* not an absolute, measure of risk. As each individual beta is derived from a common base, that is, the return on the market portfolio or a suitable stock index substitute, then beta is a **standardised risk measure,** i.e. this makes the beta of one share directly comparable with the beta of another.

One way of determining the beta for a share is to plot on a graph the historic (ex post) relationship between the movement in the share's returns and the market (or stock index)

returns over a defined period of time. For example, if a stock market analyst considers that the share's actual performance over the past five years also gives a fair indication of the share's likely future performance, then deriving its beta is a matter of:

1 Computing both the average individual share's return and the average market return (utilising an appropriate stock market index) for each month of the five-year period. Sometimes betas are also computed using daily averages.
2 Plotting on a graph the coordinates for each monthly set of returns. Conventionally the market's or index's returns are plotted on the horizontal (x) axis and the individual share's returns on the vertical (y) axis. The results will probably appear in the form of a scattergram and a statistical technique called regression analysis can then be used to derive the regression or **characteristic line** for the data.

The characteristic line is the straight line that best represents or fits the relationship between the share's return and the return from the market over the period. Beta is the

Figure 7.2 Derivation of beta
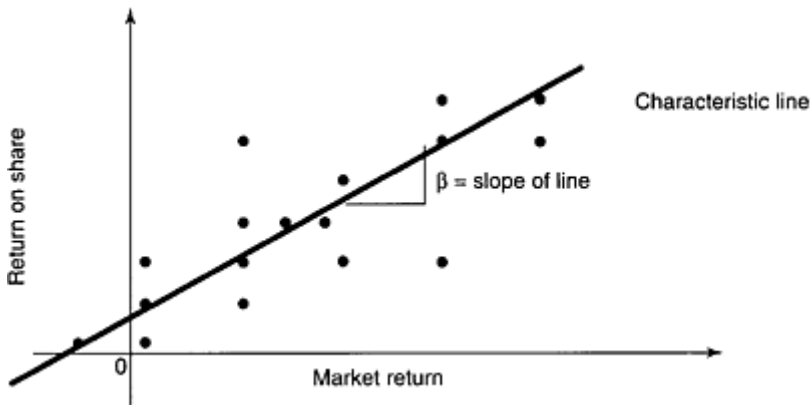
slope of this characteristic line for the share as illustrated in Figure 7.2. Shares with high betas will have steeper sloped characteristic lines than those with low betas, and the steeper the slope of the line the more volatile (risky) are the returns from the share in relation to the returns from the market.

Figure 7.3 illustrates the respective characteristic lines for two different risk securities, A and B. Security A has a beta of 1.5 and is represented by the steeper sloped line, compared with Security B which has a beta of 0.7. Security A's higher beta suggests that its return is more sensitive to changes in the market return: it is thus a more risky investment than Security B.

Figure 7.3 Characteristic lines for two different risk securities, A
and B
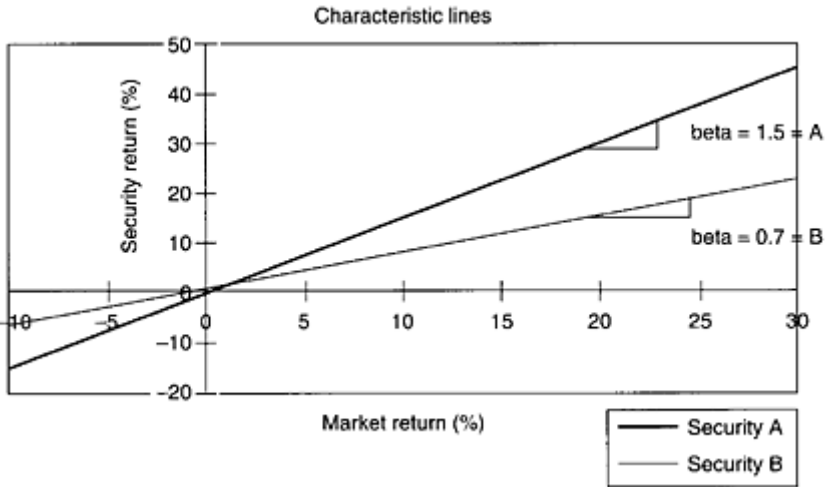
Alternative derivation of beta

Using past data on individual share and market returns over a sufficiently lengthy period,
say, the most recent four to five years, betas can also be calculated statistically. For
example the beta (β) of a share (S) is equal to the covariance between the share's returns
and the market's returns (COV_{sm}) divided by the variance of the market's returns
(Var_m)—which in turn is the standard deviation of the market's returns squared, that is:

$$\text{Beta, } \beta_s = \frac{\text{Covariance}_{sm}}{\text{Variance}_m} = \frac{COV_{sm}}{Var_m} = \frac{COV_{sm}}{\sigma^2_m}$$

The returns on a suitable stock market index can be used as a proxy for the market
returns. For example, substituting the FTSE 100 Share Index, the beta (β) of a share (S)
would be calculated as:

$$\text{Beta, } \beta_s = \frac{COV_{s,FTSE100}}{Var_{FTSE100}} = \frac{COV_{s,FTSE100}}{\sigma^2_{FTSE100}}$$

As the covariance of each individual share is divided by a common denominator, the
variance of the market (Var_m) or a suitable surrogate market index, we end up with a
standardised measure of risk, that is, the share's beta. Being a standardised measure we
are able to directly compare the beta of one share with the beta of another.

Portfolio betas

We have learned that a share's beta represents only part of a share's risk, namely the element of systematic or market risk, which is the risk element that cannot be diversified away. When it comes to including a share in a portfolio we are only concerned with the impact of that share's market risk on the portfolio risk. In a portfolio context market risk is also the only relevant risk and beta is its best measure. The portfolio beta measures the portfolio's responsiveness to macroeconomic variables such as inflation and interest rates.

To determine the systematic risk for a portfolio, that is the portfolio beta, we simply calculate a weighted average of the betas of the individual securities making up the portfolio, as follows: [2]

$$\text{Portfolio beta, } \beta_p = w_1\beta_1 + w_2\beta_2 + w_3\beta_3 \ldots + w_n\beta_n$$

where,

β_p = the portfolio beta (i.e. risk of the portfolio relative to the market)

w_i = portfolio weightings of the individual securities (where i=1,2,…n)

β_1 = beta of the individual security (where i=1,2,…n)

n = number of securities in the portfolio

Example 1 —Portfolio beta

Set out below is the relevant data for a four security portfolio.

Security	Beta, β_i	Weighting, w_i
1	2.0	0.10
2	1.5	0.20
3	0.8	0.30
4	0.5	0.40
		1.00

The portfolio beta would be computed as:

$$\beta_p = 2.0(0.10) + 1.5(0.20) + 0.8(0.30) + 0.5(0.40)$$
$$= 0.94$$

The beta of this portfolio is very close to the market beta of 1.0. Remember that altering the portfolio weightings or the proportions invested in each security would alter the portfolio's risk.

Clearly the systematic risk (beta) of the portfolio will depend on the betas of the individual securities making up the portfolio. If all the individual securities in the portfolio have high betas then the portfolio beta will be high and vice versa. The portfolio beta is interpreted in the same way as the beta for an individual security. Being aware of this allows investors to create portfolios that match their risk-return preferences.

For example, investment fund managers use this knowledge to create different portfolios with different risk-return characteristics to meet their clients' differing investment needs.

Obtaining and interpreting betas

Betas can be obtained from published sources e.g. the London Business School (LBS) and through brokerage firms. The LBS publishes β values and other data for UK and Irish companies listed on the London Stock Exchange every quarter in its *Risk Measurement Service* publication.

Individual betas are produced for all companies listed in the Financial Times (FT) All-Share Index. The individual betas are calculated from the monthly returns over the most recent five-year period related to the monthly returns from the FT All-Share Index using a standard least squares regression computer programme.

Most investment firms and analysts utilise β books which give beta values for all the major companies listed on the stock market although different investment firms may give varying beta estimates for the same company due to the different methods and timings used in their calculations.

In the United States beta values are commonly obtained from Value Line Investment Survey and from brokerage and investment firms such as Merrill Lynch.

Betas—a cautionary note

We will end this section on betas with a few cautionary notes. It is important to appreciate that deriving betas is not an exact science; there are some important limitations in both the determination and in the application of betas. We can summarise these cautionary notes about betas as follows, essentially they:

- rely extensively on *historic data;*
- can and do *change over time;*
- have been seriously *challenged* as a useful risk measure;
- are essentially *average measures;* and
- are available from *different sources.*

We have seen for example that betas have been derived using **historical** data, and as such, they are primarily indicators of past relationships between a security's return and the average market return. Past relationships may or may not be relevant to future relationships, therefore to use beta as a predictor of future relationships is clearly problematic.

Betas can and do change over time as most companies' risk—return characteristics change over time as a result of, for example, changes in products, markets, technology or

financing.

Beta has in recent years has been seriously challenged as a useful measure of risk by Eugene Fama and Kenneth French both from the University of Chicago (Fama and French 1992). Based on their research these two authors have essentially concluded that beta is an inappropriate measure of risk. Their research failed to find any significant relationship between historic betas and historic returns on over 2,000 shares over the period 1963 to 1990. However, the jury is still out on this and their research findings are still being rigorously debated in the academic community.

Beta is an expression of the *average relationship* between a share's returns and the return from the market. Averages are simply that, averages, (like the average family size). They are not hard and fast rules so there will be variations and no share will maintain a constant relationship with 'the market' over time.

Table 7.1 Beta values of selected companies in the FTSE 100 index (September 1996)

Company name	(1) FTSE Industry/ Sector	(2) Market Capitl'n £m	*Beta*	(3) Variability	(4) Specf. risk	(5) Std error of beta	(6) R- sqrd	(7) Annual actual return
Abbey National	Bankretl	7150	1.20	24	17	0.15	46	21
Asda Group	Foodretl	3396	1.04	49	47	0.26	8	26
Bass	Brpbrest	7137	1.20	22	16	0.14	51	40
Boots Co.	Retchnst	5523	1.04	20	15	0.13	47	18
Cadbury Schweppes	Foodprod	5074	0.84	18	14	0.13	38	15
Glaxo Wellcome	Pharma	30521	0.65	23	21	0.17	14	19
Guinness[a]	Alchlbev	9029	0.93	22	18	0.15	33	3
Ladbroke Group	Hotels	2104	1.22	29	25	0.19	31	10
Rank Organisation	Leisfacl	4159	1.32	24	16	0.14	53	31
Reuters Holdings	Publishing	13119	1.00	21	17	0.14	39	51
Smithkline Beecham	Pharma	18858	0.65	23	21	0.17	15	24
Wolseley	Buildmerch	2581	1.36	25	17	0.15	52	35

Source: London Business School, Risk Measurement Service, September 1996.
Notes: The notes which follow relate to the numbered columns in Table 7.1. 1 *FTSE Industry/Sector* is the FTSE—Actuaries classification of the industry or sector in which the company operates. 2 *Market capitalisation* is the market value

of the company's ordinary shares in £ millions. 3 *Variability* is the standard deviation of percentage returns on the share. The annual return on the share will fall short of expectations by at least its variability in about one year in six. 4 *Specific risk is* the risk of non-market-related fluctuations in the share price. Even in an unchanged market, the annual percentage return on the share will fall short of expectations by at least its specific risk in about one year in six. Most of the specific risk of shares is eliminated in a diversified portfolio. 5 *Standard error of beta* is a measure of the potential error in the beta estimate. The lower the standard error, the more reliable is the beta estimate. 6 *R-squared* is the percentage of the share's variability which is accounted for by its market risk or beta. 7 *Annual actual return* is the percentage capital appreciation plus dividend yield over the past year.

[a]Guinness is now a subsidiary of Diagec plc.

We have also noted above that it is possible to obtain different beta values for the same company share from different investment service organisations.

Table 7.1 presents the betas and related data for a selection of companies listed in the FTSE 100 index according to the London Business School Risk Measurement Service. As a general guide, company beta values are most frequently found in the 0.7 to 1.4 range.

Table 7.2 illustrates how some of the betas shown in Table 7.1 have changed over time. Notice the remarkable constancy of the beta for Cadbury-Schweppes. In Table 7.2 you will also notice that Cadbury-Schweppes had the lowest variability and specific risk. Clearly Cadbury-Schweppes is a stable, consistent, and *comparatively* low risk company and this is reflected in its comparatively low return.

Table 7.2 Beta values of selected FTSE 100 companies, 1991–1996

Company name	FTSE Industry/ Sector	Beta		
		1996	*1994*	*1991*
Asda Group	Foodretl	1.04	1.07	0.87
Boots Co.	Retchnst	1.04	0.93	0.90
Cadbury Schweppes	Foodprod	0.84	0.83	0.84
Glaxo Wellcome	Pharma	0.65	0.68	1.13
Guinness	Alchlbev	0.93	0.85	1.00

Source: London Business School, Risk Measurement Service, September 1996.

KEY LEARNING POINT

B**eta is a measure of a share's systematic or market risk. It indicates the sensitivity of a share's return to changes in the overall market return. Betas can be described as aggressive,**

average, or defensive in relation to the market average and need to be interpreted with care.

The CAPM equation

We will now examine the actual equation for the capital asset pricing model. It is one of the most famous equations in financial management. The CAPM equation links together risk and the required return for a share. It shows, for example, that the return a rational investor would require on a particular share, $R(r_i)$, is a function of the share's market or systematic risk (beta), β_i, and a risk premium to compensate for investing in the risky market. Thus *the higher the risk, the higher the return the investor will require and vice versa.*

Simply stated, the underlying precept of the CAPM is that the expected return on a security is composed of two elements as follows:

Expected return, E(r)=a risk-free interest rate+a risk premium

Using the capital asset pricing model (CAPM) this relationship is expressed more formally as:

$$E(r_i) = R_f + \beta_i(ER_m - R_f)$$

where,

$E(r_i)$=required return on asset/share i

R_f =risk-free rate of return

βi =beta coefficient for asset/share i

ER_m=expected market return, that is the return expected on the
market portfolio of shares

As we have seen above, the CAPM equation can be split into two segments:

1 **the risk-free rate of return, R_f; and**
2 **The risk premium, $\beta_i(ER_m - R_f)$**

We will discuss the risk-free rate of return, R_f, first.

The risk-free rate of return, R_f

The risk-free rate of return, R_f, is the rate of return that can be earned on a security which has zero risk; its beta equals 0 and the return is certain. Why should a security offer a return if there is no risk? In short, the risk-free rate of return is the rate that must be offered to compensate the investor for deferring consumption; it reflects the time value of money.

Although no security or investment can be considered absolutely risk-free, securities issued by some governments, such as UK and US government bonds or 3-month Treasury bills (Tbs), are for all practical purposes risk-free investments. In this case the risk is the *risk of default,* that either the US or UK government will not be able to redeem the bonds or bills when they fall due for redemption in 90 days time.

Treasury bills are about as close as one can get to a risk-free investment because their maturity is very short term, they are easily liquidated (i.e. cashed-in without significant loss in value) and they are government backed. The current rate of return or yield on Treasury bills is quoted daily in the financial media.

From a practical point of view there are other investments which could be considered virtually risk-free. These are short-term, easily liquidated deposit accounts held with the major banks and building societies. This is a more universally held form of risk-free investment than Treasury bills. However, the convention in financial management is to use Treasury bill rates as the risk-free rate benchmark.

Adding a risk-free security to an investment portfolio will reduce an investor's risk and the proportion of portfolio investments held in the form of risk-free securities will depend on the investor's attitude to risk and the returns expected from securities in general.

The risk premium, $\beta_i(ER_m - R_f)$

A market risk premium is the second key component of the CAPM equation. This market risk premium is the difference between the expected market return, ER_m, and the risk-free rate of return, R_f. The market risk premium is converted to a risk premium for an individual share by multiplying it by the share's beta, β_i. The risk premium therefore for an individual share is a function of the individual share's beta, β_i and the risk premium for the market.

The market risk premium represents the additional return, over and above the risk-free return, which the investor expects for assuming the risk comparable with investing in the risky market portfolio of shares. The increase in required return is proportional to the amount of risk the investor is willing to assume.

Unlike the risk-free return which is known with certainty, it should be appreciated that in relation to the market return we are dealing with the notion of **expected return** and consequently the market risk premium is an **expected risk premium.** Investing in the market is risky and there are no guaranteed returns. Actual returns may turn out to be greater, equal to, or less than those which the investor initially requires.

R**equired return** may also differ from expected return. Before investing, an investor can use the available data about a security to calculate its expected return, E(r), however this may or may not match the investor's required return, R(r), when calculated using the capital asset pricing model equation.

For example, in relation to the share of a quoted company, information is available on the share price, the expected dividend, and so forth. From this an expected return can be calculated. By using the CAPM equation, the investor can then compare the expected return E(r) with the required return R(r): if E(r)>R(r) then the investment would seem worthwhile. Conversely, if E(r)<R(r) then this would not be a good investment.

Example 2 demonstrates how the CAPM equation can be utilised to calculate the

expected rate of return for an investor.

Example 2 —Using CAPM to calculate the expected rate of return

A.J.Singh is considering a number of investment opportunities. Assuming that the risk-free rate is currently 5 per cent and the expected return from the market is 12 per cent, calculate, using the CAPM, the rates of return that A.J. should expect each investment to earn.

Security	Beta
A	0.9
B	1.3
C	0.6
D	1.5

The expected return on each security is computed as follows:

Security	R_f	+	$\beta_i(ER_m - Rf)$	=	$E(r_i)$
A	5	+	0.9(12–5)	=	11.3%
B	5	+	1.3(12–5)	=	14.1%
C	5	+	0.6(12–5)	=	9.2%
D	5	+	1.5(12–5)	=	15.5%

Negative betas

In theory betas can be negative, implying that a share's expected return will go up as the market goes down and vice versa, but in practice negative betas are extremely rare. If the share's beta is negative, the risk premium for the share will also be negative and the expected return will be less than the risk-free rate.

The effect of a negative beta stock can be best explained with an example. If we assume that a share has a beta of −0.33, the risk-free rate is 7 per cent, the market return is 16 per cent, giving a market risk premium of 9 per cent, then the investor's required return would be:

$R(r_s) = 7\% + -0.33(16\% - 7\%) = 4\%$

EXERCISE 2 —CAPM

Given the data below (which are illustrative not actual) you are required to (1) compute the expected rate of return for each of the following securities using the CAPM and (2) calculate the portfolio beta.

Security	Beta	Weighting, W_i
BG (British Gas)	0.93	0.25
Cadbury-Schweppes	0.81	0.35

| Granada | 1.36 | 0.20 |
| Diageo | 0.88 | 0.20 |

The risk-free rate of return is 6 per cent and the expected return from the market is 17 per cent.

In this instance the expected return is significantly below the risk-free rate. Why then would an investor hold a negative beta share? The reason is that such shares can yield diversification benefits if included in a diversified portfolio. The share can prove beneficial particularly when other shares in the portfolio are not performing well.

The CAPM graph—the security market line (SML)

Having now had some practice in using the CAPM to calculate expected returns you will have noticed that the CAPM equation is in fact a straight line equation. Conventionally the equation for a straight line is usually given as: $y=ax+c$.

When the CAPM equation is shown in graph form, the resultant straight line is referred to as **the security market line (SML)**. It is the line which exhibits the positive relationship (correlation) between the systematic risk of a security and its expected return.

On the security market line (SML) the risk-free rate, R_f, is a constant and represents the vertical intercept, i.e. the point where the SML crosses the vertical axis; it is equivalent to the constant c in the straight line equation above.

The coordinate x represents the systematic or market risk of the share as measured by its beta, β_i, and coordinate y represents the expected market return. Observe that the slope or gradient of the line, a, is represented by the market risk premium $(ER_m - R_f)$, *not* beta and indicates the level of risk aversion in the economy.

The SML represents the level of return expected in the market for each level of the share's beta (market risk), thus the risk-return trade-off for the share can be plainly seen as in Figure 7.4.

Interpreting the security market line (SML)

A few comments about the SML will facilitate its interpretation. First, notice that the beta associated with the risk-free security is 0, reflecting the security's freedom from risk and its immunity from changes in the market return.

Second, point M on the SML represents the ***market portfolio.*** The return on the market portfolio (i.e. the average return from all securities on the entire market or a proxy index) is given by ER_m and its corresponding level of risk is shown by β_m, where $\beta=1.0$.
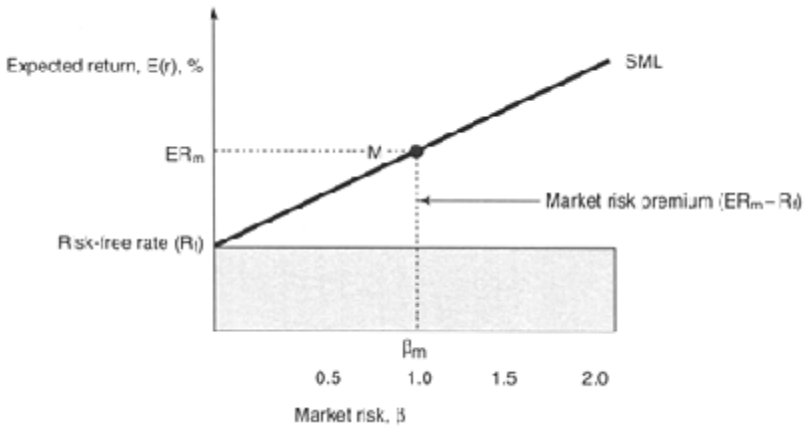
Figure 7.4 Security market line (SML)

The beta for the market portfolio must be 1.0 because the market's correlation with itself is 1.0; thus a security with a beta of 1.0 has risk equal to that of the market.

Third, the difference between ER_m and R_f (ER_m-R_f) is the **market risk premium,** thus the risk premium for an individual asset, i, equals the market risk premium multiplied by the share's beta, $\beta_i(ER_m-R_f)$.

As it is a straight line the slope or gradient, a, of the SML is given by $\Delta y/\Delta x$, which substituting equals $(ER_m-R_f)/(1.0-0.0)$ giving ER_m-R_f Thus the greater the market risk premium, the steeper the SML slope and thus the greater the rate of return required by investors (as we shall see later). For example, supposing the expected return on the market ER_m is 12 per cent and the risk-free rate, R_f, is 7 per cent, the slope of the SML would be calculated as:

$$\Delta y/\Delta x=(ER_m-R_f)/(1.0-0.0)=(12-7)7(1.0-0.0)$$
$$=ER_m-R_f=12-7$$
$$=5$$

In this instance, the expected rate of return would increase by 5 per cent for each 1.0 increase in beta. Thus assuming beta initially equals 0.5 and then increases to 1.5 the change in the expected return would be an increase of 5 per cent, thus:

(1) $E(r)=7\%+0.5(12-7)=9.5\%$

(2) $E(r)=7\%+1.5(12-7)=14.5\%$

To construct the SML the only data needed are the risk-free rate of return and the expected return on the market portfolio.

Market equilibrium

Earlier we drew a distinction between the expected return $E(r)$ and the required return $R(r)$ on a share and noted that it is possible for the two to differ.

Given an individual share's risk characteristics, the CAPM specifies what the return on that share *should* be, that is, its required return. In **market equilibrium** (when supply equals demand and prices remain stable) expected return and required return for the share would be equal, $E(r)=R(r)$ and its price would be stable. However, consider the respective positions of the two shares A and B in relation to the SML in Figure 7.5.
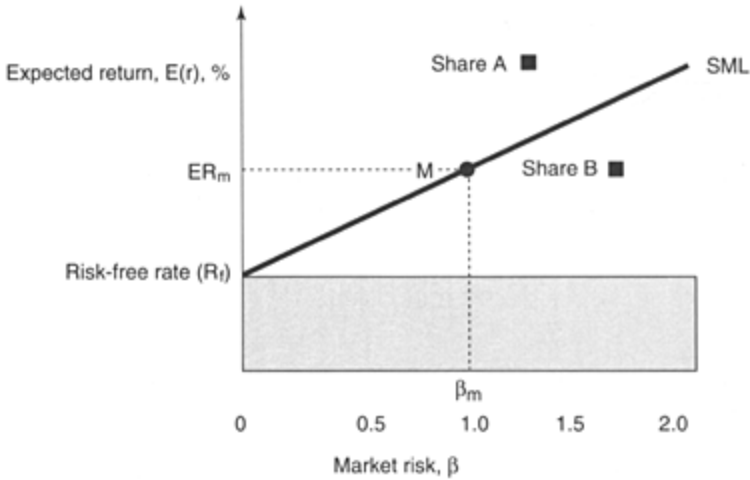
Figure 7.5 SML: expected return and required return

Share A has a beta of between 1.0 and 1.5, yet, as it lies above the SML at this point, it is expected to offer a return greater than that required by the market for that level of risk: its expected return is greater than its required return as specified by the CAPM. Alternatively, Share B has a beta of between 1.5 and 2.0 but is expected to provide a return below that required by the market for that corresponding level of risk.

An astute rational investor will soon realise that both assets are mispriced: Share A is *undervalued,* it is a bargain as it offers a higher return for the given level of risk. In contrast Share B is *overvalued,* it offers to provide a return lower than that required by the market for its level of risk. What do you think may happen next?

In an efficient market these anomalies will not obtain for very long. Rational profit-seeking investors will seek to buy Share A driving its price up and its return down (remember the inverse relationship between price and return) until it gravitates to the SML.

Conversely, with Share B rational investors will wish to sell but may find it difficult at the current price as it is overvalued. They will only find buyers when the price drops thus increasing return. This share will also gravitate towards the SML where its expected return equals its required return. You may wish to think of the SML, via an efficient stock market, as acting like the force of gravity which pulls aberrant shares back into equilibrium.

Remember that the SML is based on the CAPM, which as we shall see is in turn based on a number of assumptions, many of them unrealistic. There are also practical

difficulties in specifying beta and the market portfolio.

The CAPM, and therefore its graph the SML, like any other model, is only as good as the quality of the data on which it is based. If poor quality or erroneous data is used in constructing the SML then what appear to be aberrant stocks may only be a mirage! In short, the SML may be badly constructed.

Shifts in the security market line (SML)

We noted above that the slope of the SML is given by the market risk premium $(ER_m - R_f)$, *not* beta and that it reflects the general level of risk aversion in the economy.

The security market line is not static, it is an expression or snapshot of the risk-return relationship at a particular point in time. In dynamic capital markets, which are constantly responding to new information, risk-return factors change continually, thus the SML can and does shift over time. Here we will explore the impact of two specific major change effects on the SML—**(1) inflation** and **(2) risk aversion.**

The inflation shift

The risk-free rate of return is composed of several elements: a *real interest rate, a liquidity or maturity premium* and an *inflation premium (IP).* However, as we are primarily concerned with understanding inflation effects, we will simplify matters by assuming that any liquidity premium is subsumed within the real interest rate, which we will denote $r\star$. Thus the risk-free interest rate is made up as follows:

$$R_f = r\star + IP$$

When expectations in the financial markets about the future rate of inflation change, this will essentially move the risk-free rate, R_f, up or down depending on the market's expectations about the direction of inflation. As the risk-free rate is the base line ingredient for all rates of return, any change in the risk-free rate as a result of changes in inflation expectations will be applied to all required rates of return as implied by the CAPM.

For example, suppose the risk-free rate is currently 7 per cent and this is made up of a real underlying interest rate, $r\star$ of 3 per cent and an inflation premium, IP, of 4 per cent. If the financial markets expect inflation to rise to 6 per cent (perhaps as a result of increased consumer spending or changes in government policy), this will cause the risk-free rate to correspondingly increase to 9 per cent [$r\star$ (3%)+IP(6%)].

Under CAPM this will result in a parallel shift upwards of 2 per cent in the SML showing that an increase in the risk-free rate, R_f, affects the rate of return on *all* risky assets *equally.*

The effect of an inflationary increase on the SML is illustrated in Figure 7.6. Notice that the market risk premium itself remains unchanged, that is $(ER_{m1} - R_{f1}) = (ER_{m2} - R_{f2})$ =2 per cent. The original risk-free rate, Rf1, was 7 per cent and the original market return (ER_m1) was 9 per cent (it was originally located at the point where the new risk-free rate, R_{f2}, is now positioned) yielding an expected market risk premium of 2 per cent. The new

market risk premium $(ER_{m2} - R_{f2}) = (11\% - 9\%) = 2$ per cent, the same as before.
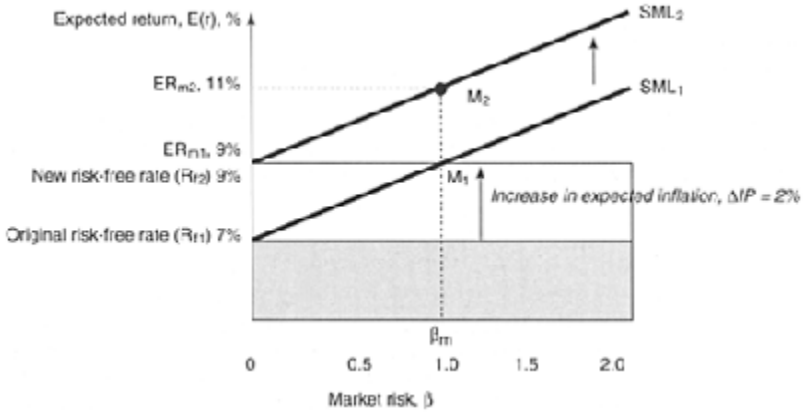
Figure 7.6 SML: inflation shift

The risk aversion shift

As we have explained, the slope of the SML represents the market risk premium, the steeper the slope, the greater the risk premium in the market. This reflects the extent to which investors in the market are risk-averse, that is for an increase in risk they require a commensurate increase in return as indicated by the upward slope of the SML. If market risk did not exist there would be no risk premium and the SML would be a flat line extending from the R_f vertical intersection.

However, in reality market risk does exist and it is a variable which can change, primarily as a result of economic, political and social factors such as general strikes, widespread civil unrest, stock market crashes, wars or greater political or economic uncertainty and instability.

Should market risk increase, for example because investors perceive greater economic uncertainty or instability ahead, then this will be reflected in a rise in the slope of the SML. Note that in this instance the risk-free rate remains unchanged, it is the risk premium which now changes. Observe also how the increase in the risk premium becomes more prominent as the riskiness of the security (its β) increases. The increase in the risk premium is significantly greater for a security with a beta of 1.5 (an aggressive share) than it is in relation to a security with a beta of 0.5 (a defensive share). The effect of an increase in risk aversion on the SML is illustrated in Figure 7.7.
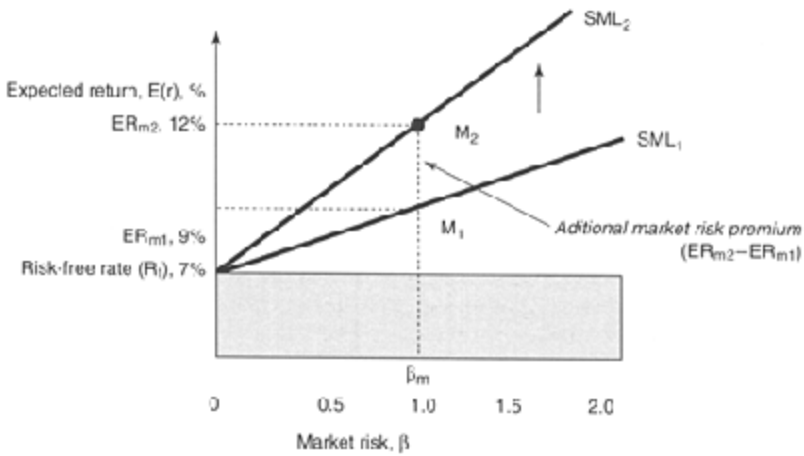
Figure 7.7 SML: risk aversion shift

If we adopt the same figures as before, that is R_{f1} equals 7 per cent and ER_{m1} equals 9 per cent the original market risk premium was $ER_{m1}-R_{f1}=9\%-7\%=2\%$. If we assume that ER_{m2} has now moved to 12 per cent, the new market risk premium is $ER_{m2}-R_{f1}= 12\% -7\%=5\%$. Thus the market risk premium has increased by an additional 3 per cent; $ER_{m2}-ER_{m1}=12\%-9\%=3\%$: the risk-free rate remains unaffected.

Underlying assumptions and limitations of the CAPM

The CAPM is a mathematical model, and like any model it is merely a representation of reality. All models (business, economic and financial, etc.) are constructed from a set of underlying assumptions about the real world; they inevitably have their limitations. The CAPM is built on the following set of assumptions and limitations:

1 **Historic data.** CAPM is a *future-oriented* model yet it essentially relies on historic data to predict future returns. Betas, for example, are calculated using historic data; consequently they may or may not be appropriate predictors of the variability or risk of *future* returns. Thus the CAPM is not a deterministic model, the required returns suggested by the model can only be viewed as approximations.
2 **Investor expectations and judgements.** The model includes the *expectations* and *subjective judgements* of investors about future asset or security returns and these are very difficult to quantify. In addition the model also assumes that investor expectations and judgements are *homogeneous,* i.e. identical. If investors have heterogeneous (i.e. varied) expectations about future returns they will essentially have different SMLs, rather than a common SML as implied by the model.
3 **A perfect capital market.** CAPM assumes an efficient or perfect capital market. An efficient capital market is one where all securities and assets are always correctly priced and where it is not possible to outperform the market *consistently* except by luck. An efficient capital market implies that there are many small investors (all are

price-takers), all of whom are rational and risk-averse; they each possess the same information and the same future expectations about securities. It also assumes that in the financial markets there are *no transaction costs, no taxes and no limitations on investment.*

4 **Investors fully diversified.** The CAPM also assumes that investors are fully diversified. In practice many investors, particularly small investors, do not hold highly diversified asset portfolios.

5 **Practical data measurement problems.** There are also practical problems associated with the model such as difficulties with specifying the *risk-free rate,* measuring *beta* and measuring the *market risk premium.*

6 **One-period time horizon.** CAPM assumes investors adopt a one-period time horizon. In practice investors are likely to have differing time horizons and again this would imply varying SMLs.

7 **Single factor model.** CAPM is a single factor model: it relies on the market portfolio to explain security returns. The rate of return on a security is a function of the security's beta times a risk premium, that is, $\beta(ER_m - R_f)$. Both beta and the risk premium are determined in relation to the market portfolio. Recall that each security's beta (risk factor) is derived by linear regression, plotting its return against the return from the market portfolio—the characteristic line.

Comments and criticisms of the CAPM

Some of these assumptions are clearly unrealistic, implying that the CAPM is of very limited value. However, the model should not be dismissed solely on the grounds that it includes some simplifying assumptions. The acid test of its efficacy is: does it work? Can it be used effectively as a predictive tool? Unfortunately the evidence is controversial and inconclusive and it is beyond our scope here to enter the fray. We will, however, present the key issues in respect of CAPM.

Some researchers have found evidence supporting the model, or certain aspects of it, and others have found evidence to challenge the model. In 1977, in what is now a classic article, Richard Roll questioned if it was even possible to test the model because it is practically impossible to establish the return on the market portfolio. As the market portfolio is theoretically supposed to include *all* risky assets (shares, bonds, commodities, precious metals, property, works of art, etc.) it is not feasible to test the model empirically. Even if a stock market index is used as a surrogate for the market portfolio, this is still a very restricted view of the market portfolio as so many other types of risky assets are omitted.

On the upside, there is substantial empirical evidence supporting the positive linear relationship between an asset's beta (risk) and its return as implied by the model (Levy and Sarnat 1994). This would apparently confirm the model's inference that high beta (risk) shares produce high returns and low beta (risk) shares produce low returns. However, even these findings are not free from controversy.

To date perhaps the most serious challenge to the validity of the CAPM has come from research by Eugene Fama and Kenneth French, both from the University of Chicago, published in 1992. Fama and French found no correlation between *historical* betas and

historical returns on over 2,000 stocks between 1963 and 1990—thus they concluded that the magnitude of a stock's historical beta bore no relationship to the magnitude of its historical return.

Based on this, and their other findings, Fama and French concluded that 'beta is dead'—at the time a seemingly body blow to the validity of the CAPM. Fama and French found, for example, that variations in share returns had more to do with company size (as measured by the total market value of the firm's equity and the ratio of the company's equity book value to its equity market value) than with beta.

Needless to say, the work of Fama and French has provoked even more controversy and many academics have since rushed to the defence of the CAPM, criticising Fama and French's research methodology and suggesting that their arguments are 'theoretically incomplete'.

Roll and Ross (1992), for example, have argued that the use of a stock market index such as the Standard and Poor's (S&P) 500 (a US stock market index analogous to a FTSE index in the UK) or the New York Stock Exchange (NYSE) index, as a surrogate or proxy for the true market portfolio may not give an accurate measure of the true market returns. Thus if the surrogate portfolio used by Fama and French is not a correct one, then it may not be reasonable to conclude that there is a positive correlation between betas and rates of return.

Other researchers, such as Chan and Lakonishok (1993) have found that the CAPM is an adequate measure of the risk-return relationship.

Whatever the conclusions of various researchers, it is worth noting that all of the tests of the CAPM have by necessity been based on *ex post* (after the event) data, whereas the CAPM is an *ex ante* (before the event) model. In other words, CAPM is a future oriented, equilibrium model linking *future* required return and risk.

While the academic battling is likely to continue for some time, the CAPM, in the meantime, has not been dethroned. Until it is superseded by a more suitable theory the CAPM remains a valuable **expectational model:** it is still of value as a *predictive* tool.

Despite its limitations the CAPM offers the financial manager and investors a very insightful methodology for recognising and making explicit the relationship between risk and return inherent in financial decisions. It forces investors to consider both sides of the coin, not just to focus on return.

In making investment decisions, which are the key wealth-creating decisions, it is clearly important that the financial manager considers both elements, risk as well as return, in evaluating the decision. By recognising that a vital risk-return trade-off is inherent in every investment decision, and by endeavouring to take account of and evaluate risk *together with* return in such decisions, the financial manager will be guided towards realising the goal of shareholder wealth maximisation.

Recognising that shareholder wealth is reflected in the market price of a company's shares, the financial manager will now realise that the company's share price in the market will fluctuate until investors perceive that it offers a 'fair' return relative to its risk.

In conclusion, the CAPM is a very simple yet powerful financial model which implies that the risk premium for an individual share is equal to the average risk premium in the stock market multiplied by the share's beta.

It is important to appreciate the CAPM's major contribution, 'warts and all', to our understanding of the linkages between risk and return, and how required rates of return are derived and therefore how securities are valued in the markets.

Clearly there has to be some way of analysing and relating risk to return and until a new king is crowned the CAPM will continue to rule; however, the model has to be applied with care.

INVESTING IN CORPORATE ASSETS

How does the capital asset pricing model apply to the firm investing in corporate or real assets? We know that the firm is competing in the financial markets for investment funds. Clearly investors will require the firm to earn a rate of return on its investments that is comparable with other investment opportunities of similar risk. If the firm does not earn the return investors require for its level of risk then it will have difficulty attracting investment capital.

The financial manager can use the capital asset pricing model to evaluate corporate investment decisions. As the model marries risk and return it can be used to compute the rate of return a new investment project must earn in order to satisfy investors and maintain, or enhance, the firm's market value as reflected in its share price.

This is of course providing the risk characteristics of the new investment project do not differ significantly from the company's present risk characteristics, that is, its beta is not expected to change significantly as a result of the new investment. For example, engaging in a risky takeover or a departure into an unfamiliar business area, or raising additional debt financing could increase a firm's systematic risk (as measured by its beta) and thus the investor's required rate of return from the share.

Each time the financial manager is faced with an investment decision, he or she must consider how the risk of the investment may affect the firm's overall corporate risk and the risk of its shareholders.

RECAP

Types of risk: The total risk of an asset or investment can be divided into two types, **systematic risk** and **unsystematic risk.** Systematic risk is the portion that cannot be diversified away: unsystematic risk can be diversified away. Systematic risk consists of business risk and financial risk. Systematic risk is the only relevant risk as by creating a sufficiently large portfolio of around 20 randomly selected assets unsystematic risk can be virtually eliminated.

Beta: In the capital asset pricing model (CAPM) an asset's **systematic** or **market risk** is measured by **beta,** β, which is determined from the historical values of the asset's returns related to the market returns. Regression analysis can be used to derive the asset's **characteristic line.** That is the regression line which best represents, or fits the past relationship between the asset's return and the market return. Beta is the slope of this characteristic line for the asset.

Portfolio beta: The beta for a portfolio is a weighted average of the betas of the individual assets making up the portfolio.

Limitations of beta: Beta has a number of limitations and needs to be interpreted with care.

The capital asset pricing model (CAPM): The CAPM links together risk and return for an asset or security and is given by the equation:

$$R(r_i) = R_f + \beta_i(ER_m - R_f)$$

We can use the CAPM to calculate an asset's required return by relating its beta (systematic risk) to the market risk premium. CAPM is a *future-oriented* model although it relies on historic data to compute future returns.

The security market line (SML): The CAPM can be represented graphically by the security market line (SML). Shifts in the SML can be caused by changes in inflation or risk aversion levels in the economy.

Limitations of CAPM: The CAPM is based on a number of key assumptions and in recent years the model has been the subject of much controversy, although no other asset pricing model has yet been found to supersede it.

APPENDIX I THE CAPITAL MARKET LINE (CML)

In Chapter 7 we analysed the relationship between risk and return for a single security and demonstrated how, using the CAPM equation, this is expressed in the form of a straight line. This risk-return relationship is represented graphically by the security market line (SML).

In this section we will focus our attention on the risk-return relationships which are available in the capital markets for portfolios of securities or assets. This relationship is represented graphically as the **capital market line (CML)** and is shown in Figure 7.8.

The capital market line is an expression of the optimal relationship between risk and the expected rate of return on what Markowitz referred to as **efficient portfolios.** An efficient portfolio is one which maximises return for a given level of risk or alternatively minimises risk for a specified level of return. Any portfolio lying on the CML is an efficient portfolio; it includes an optimal combination of the risk-free asset and risky assets.

The CML represents the best possible combinations of investment opportunities, and it is also referred to as the **efficient frontier.** Rational investors will therefore only invest in efficient portfolios, that is, those which lie on the CML.

Investors can choose to invest in whichever combination of the risk-free asset, R_f, and the risky market portfolio, M, suits their own risk preferences. In market equilibrium, point M on the CML represents the unique **market portfolio** consisting of all risky assets available in the market, weighted in proportion to each asset's respective market value. It is thus a market-value weighted average portfolio consisting only of risky assets.

The market portfolio M is superior to—in portfolio language it is said to **dominate**—all other portfolios by offering better risk-return characteristics than any other portfolio; it

is the only risky portfolio which is perfectly diversified.

If the market portfolio dominates all others, that is, it is the best available, then all rational investors will invest in it. Exactly what proportion of their wealth they will invest in the market portfolio will depend on their personal risk preferences or risk attitudes.

Risk-averse investors will tend to hold a large proportion of their investment portfolio in the form of the risk-free asset rather than the risky market portfolio and will therefore lie to the left of the market portfolio, M, on the capital market line. The greater their risk-aversion, the more of their wealth they will invest in the risk-free asset and tend towards the bottom of the CML closer to R_f.

In contrast, the portfolios of risk-seeking investors will lie higher up to the right of M on the CML as they will invest more of their wealth in the risky market portfolio. If high risk-seeking investors can borrow money at the risk-free rate they will invest more than their total wealth in the market portfolio. This will position them well up to the right of M on the CML. An investor's position on the CML will thus be determined by the investor's individual risk preferences or attitudes.

For example, portfolio A shown on the CML in Figure 7.8 consists of a combination of risk-free assets and the market portfolio of risky assets. Portfolio B on the other hand consists only of risky assets but correspondingly offers greater potential returns. To invest in portfolio B requires the investor to borrow money to buy more of portfolio M. The investor is investing more than his total wealth in the market portfolio. This is clearly a risky proposition, but the potential returns are greater.

Look at portfolio C in Figure 7.8. Would you invest your money in portfolio C in preference to portfolio A? Not if you would prefer a higher return for the same level of risk. Portfolio A dominates portfolio C. Drawing on our knowledge of the SML we can see that portfolio A offers a higher return than C for the same level of risk, σ_p, as C.
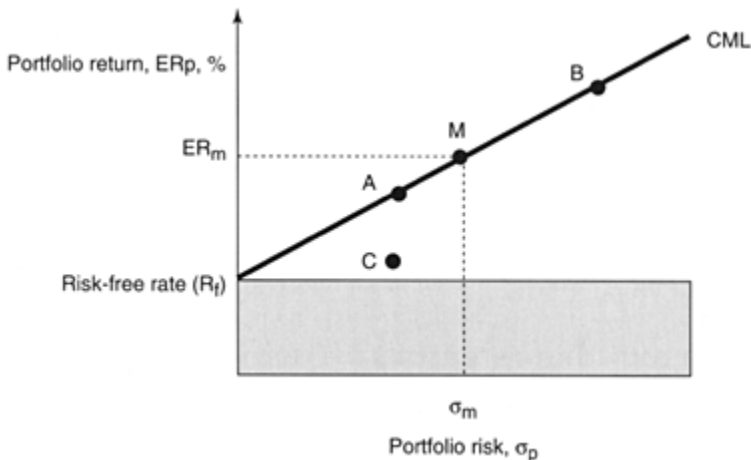
Figure 7.8 The capital market line (CML)

The equation for the capital market line (CML) is given by:

$$ER_p = R_f + \left[\frac{(ER_m - R_f)}{\sigma_m} \right] \sigma_p$$

where,

ER_p = the expected return on an efficient portfolio

R_f = the risk-free rate

ER_m = the expected return on the market portfolio

$ER_m - R_f$ = the market risk premium

σ_p = the standard deviation of the portfolio

σ_m = the standard deviation of returns on the market portfolio

Thus the expected rate of return on an efficient portfolio, ER_p, equals the risk-free rate, R_f, plus a risk premium $[(ER_m - R_f)/\sigma_m]$ multiplied by the standard deviation of the portfolio, σ_p.

Like the SML, the equation for the CML is also a straight line, only this time it demonstrates that the expected rate of return on an *efficient portfolio,* ER_p, is a linear function of its standard deviation, σ_p. The slope of the line is given by $(ER_m - R_f)/\sigma_m$ and is a reflection of the aggregate level of investors' risk aversion for the whole market.

You will notice that the capital market line as illustrated in Figure 7.8 is similar in appearance to the security market line. Both have a positive slope indicating that acquiring greater returns means accepting more risk, and both intersect the vertical axis at the risk-free rate, but they exhibit different risk-return trade-offs. where,

As we have seen, according to the CAPM theory, the risk of a single security is measured by its beta coefficient, β_i, (a measure of systematic risk) whereas the risk of a portfolio is measured by its standard deviation, σ_p (a measure of total risk).

The main difference between the security market line (SML) and the capital market line (CML) is that the SML expresses the linear relationship between systematic risk and expected return for individual securities where beta is the measure of risk. In contrast, the CML expresses the linear relationship between risk and expected return for efficient portfolios whose risk is measured by the standard deviation.

The two models, the security market line (SML) and the capital market line (CML), relate returns to different measures of investment risk, they therefore have different applications in investment decision-making. The appropriate measure of risk will depend on the context in which the investment decision is being made. For example, in valuing an ordinary share, which is widely traded on the stock market and probably widely held in diversified investment portfolios, only systematic risk is relevant, thus the SML is the valuation model which should be used.

In contrast, when evaluating an investment which is not held in a portfolio context, it is total risk which is relevant and the CML is the appropriate valuation model. For example,

in valuing the business of a sole trader, for whom the business is the major asset and who does not possess many other assets, the CML would be the appropriate model.

APPENDIX II ARBITRAGE PRICING THEORY (APT)

In an effort to overcome some of the criticisms and weaknesses of the CAPM, an alternative pricing theory [3] called the **arbitrage pricing theory (APT)** has been advanced. It was originally developed by Stephen Ross (1976) as 'a related but quite distinct theory' to CAPM of the risk-return relationship.

Ross (1976) contended that the APT model is: '*substantially different from the usual mean-variance analysis and constitutes a related but quite distinct theory*'. He maintained that APT differs from CAPM in two major ways. First, APT is a **multi-factor model** while CAPM is a single-factor model. Second, unlike CAPM, the APT model does not require the market portfolio to be mean-variance efficient (i.e. to offer the best risk-return combination) and alternatively assumes that in market equilibrium there will be **no arbitrage profits**—hence the name 'arbitrage pricing theory'. We will explain each of these distinctions in turn.

The absence of arbitrage

A central feature of the APT model is that it assumes **no arbitrage,** that is in market equilibrium there are no opportunities to earn arbitrage profits. Arbitrage is the process of profiting from mispriced securities. Strictly speaking arbitrage involves making a *risk-free profit* with *no outlay.* This is in contrast to pure speculation which involves risk-taking, sometimes considerable risk-taking, to make profits.

An arbitrage opportunity occurs where the same security sells for two different prices, usually, but not necessarily, in two different stock markets. Arbitrageurs will buy the security where it is underpriced and sell it where it is priced higher. As a result of arbitrage activity the price will quickly equalise.

Arbitrageurs (or 'arbs') are market traders who make their money from identifying and exploiting market pricing anomalies. Their activities thus help to remove market inefficiencies. Arbitrageurs are different from speculators in that they seek to make a profit at zero or minimal risk, whereas speculators are willing to assume high risk in the expectation of high returns.

It can be demonstrated mathematically that the assumption of no arbitrage profits in equilibrium yields a linear function between expected return and a number of common factors. Therefore, as we shall see below, according to APT the expected return from a security is a linear function of its sensitivity (as measured by their respective betas) to the various independent factors involved.

The central proposition of the model is that, in theory, investors can create a zero risk (beta) portfolio with no investment outlay and earn a positive return.

A multi-factor model

The second key characteristic of the APT model is that it is a **multi-factor model.** This is in sharp contrast to the CAPM which is a single factor model, relying as it does solely on the market portfolio to determine security returns. In APT the market portfolio has no special role. The APT model asserts that there are other variables at play which determine a security's return other than the market portfolio. The APT model prefers to incorporate multiple risk factors, each with its individual beta, to explain security returns.

The APT model essentially states that the expected rate of return on a security in equilibrium is equal to the risk-free rate plus *multiple* risk premiums, (instead of the single market risk premium as postulated by the CAPM).

In other words, each factor in the APT model has its own risk premium, which is determined by multiplying the security's sensitivity to *unanticipated* changes in a range of economic factors by the market risk premium for each factor. It does not matter how many factors there are, as long as they are less than the number of securities.

The APT model, for a zero arbitrage economy, can be expressed mathematically as:

$$ER_j = R_f + \beta_{j1}RP_1 + \beta_{j2}RP_2 + \beta_{j3}RP_3 + \ldots + \beta_{ji}RP_n$$

where,

ER_j = expected return on security j

R_f = risk-free rate

β_{ji} = beta coefficient indicating the sensitivity of security j's returns to *unexpected* changes in factor i

RP_i = market risk premium for factor i

There is no general consensus among academics and practitioners as to how many factors should be included, nor even as to their identities. Roll and Ross (1980, 1984) have identified four factors for the model which are likely to determine security returns. They are *unanticipated* changes in:

1 **industrial production;**
2 **inflation;**
3 **default risk premiums on bonds; and**
4 **the term structure of interest rates.**

The reason for using unanticipated changes in factors is that any anticipated changes will have already been absorbed by the market into expected rates of return on securities.

APT versus CAPM

The APT model is considered superior to the CAPM as it incorporates multiple economic factors to explain security returns. The CAPM can be viewed as a special case of the

APT.

The assumptions of the APT model are also less restrictive than those of CAPM. APT does not, for example, assume a single time period horizon or that investment decisions are made within a mean-variance context—that is, unlike CAPM it does not assume that investors consider their portfolios in terms of required returns and variance.

However, the APT model is much more complex than CAPM and is theoretically unclear about the nature and number of relevant risk factors. Moreover it is very difficult to establish each factor's risk premiums and to measure their sensitivity coefficients. This makes the model almost impossible to put into practice.

To date, the APT model is still in its relative infancy. The empirical work which has so far been done does not provide any conclusive results on the efficacy of the model.

In conclusion, both the APT and CAPM do offer us alternative conceptual frameworks for trying to understand the connections between risk and return and thus the task of valuing securities. However, academics and researchers are still a long way from developing a universal asset pricing model and the theory of asset pricing remains in a confused state.

REVIEW QUESTIONS

Concept review questions

1 (a) Distinguish between *systematic* and *unsystematic risk,* (b) Which is often regarded as the only relevant risk and why?
2 (a) How would you define beta? (b) Distinguish between an *aggressive* and a *defensive* share, (c) How are betas determined and where can they be obtained? (d) What are the limitations of betas?
3 (a) What is the security market line (SML)? (b) What factors cause the SML to shift?
4 How does the capital asset pricing model (CAPM) apply to the firm investing in corporate or real assets?
5 Briefly outline the key underlying assumptions of the CAPM.

Practice questions

6 **The Capital Asset Pricing Model (CAPM)**. As financial manager of North West Enterprises you are required, using the capital asset pricing model (CAPM), to calculate the *required rate of return* and *the risk premium* for the following list of potential investment projects:

Project	Systematic risk, ß
A	0.90
B	0.00
C	1.25
D	1.50
E	−0.75

You have also determined that the risk-free rate is 7 per cent and that the return on the market portfolio is 16 per cent.

7 **The Capital Asset Pricing Model (CAPM)**. Using the capital asset pricing model (CAPM) equation calculate the following:

(a) The **required return** on share A, $R(r_A)$, if the risk-free rate R_f is 5 per cent, the market return, ER_m is 10 per cent and the share's beta, β_A, is 1.25.

(b) The **market return ER_m** if the risk-free rate R_f is 7 per cent, the required return on share B is 16 per cent and the share's beta, β_B, is 0.75.

(c) The **beta** on share C, β_C, if the risk-free rate R_f is 8 per cent, the market return ER_m is 17 per cent and the required return $R(r_C)$ is 20 per cent.

(d) The **risk-free rate R_f** if the required return on share D, $R(r_D)$, is 17 per cent, the market return, ER_m is 18 per cent and the share's beta, β_D, is 0.9.

Test questions

8 **The Security Market Line (SML).** Wendy James owns a portfolio consisting of the following five shares (the data is illustrative not actual):

Share	Weighting, W_i	Beta, ßs	Expected Return, $E(r_s)$
Airtours	0.20	1.50	15%
Bass	0.15	1.10	19%
Manchester United	0.25	1.20	20%
Marks & Spencer	0.30	0.95	18%
Scottish & Newcastle	0.10	0.80	14%

The risk-free rate is 7 per cent and the expected return on the market is 15 per cent.

(a) Wendy, who has just been reading a book on investment management, has asked for your help to:

(i)   calculate the expected return from the portfolio, $E(r_p)$.
(ii) calculate the portfolio beta, β_p.
(iii) draw the security market line (SML) and plot the shares on the graph,
(iv) determine from the graph which shares appear to be 'superior' investments and which appear to be 'inferior' investments.

(b) What comments and observations would you make about your graph?
(c) Briefly discuss two factors which may cause the SML to shift.

9 **Risk Analysis.** You are the company accountant with a medium-sized, privately
owned company. The company has surplus funds which it does not believe it will be
able to invest in company operations for at least five years. The majority
shareholders are also the directors of the company and they do not wish the surplus
funds to be distributed as dividends. A board meeting has therefore been called to
discuss the proposal that the funds be invested in a portfolio of medium to long-term
securities.

Three of the directors have recently attended a short course at the local university on
'Investment and the Management of Risk'. They make the following comments at
the meeting, based on their interpretations of what they have learnt on the course:

'If we hold a portfolio of stocks, we need only consider the systematic risk of
the securities.'

'As a cautious investor we must always consider total risk.'

'We should not buy anything if the expected return is less than the market as
a whole, and certainly not if it is below the return on the risk-free asset.'

Requirements:

(i) Explain to the members of the board the meaning of systematic, unsystematic
and total risk and advise them, briefly, how all three types of risk can be
measured,

(ii) Discuss the directors' comments.

10 **Portfolio Theory and CAPM.** Rodfin plc is considering investing in one of two
short-term portfolios of four short-term financial investments in diverse industries.
The correlation between the returns of the individual components of these
investments is believed to be negligible.

Portfolio 1

Investment	Beta	Expected return (%) Std dev. of return	Amount invested £ million
a	1.4	16	73.8
b	0	6	25.2
c	0.7	10	56.1
d	1.1	13	132.9

Portfolio 2

Investment	Beta	Expected return (%) Std dev. of return	Amount invested £ million
a	1.2	14	97.1
b	0.8	11	42.7
c	0.2	7	35.4
d	1.5	17	142.8

The managers of Rodfin are not sure of how to estimate the risk of these portfolios,
as it has been suggested to them that either portfolio theory or the capital asset

pricing model (CAPM) will give the same measure of risk.
The market return is estimated to be 12.5%, and the risk free rate 5.5%. Required:

(i) Discuss whether or not portfolio theory and CAPM give the same portfolio risk measure.
(ii) Using the above data estimate the risk and return of the two portfolios and recommend which one should be selected.

NOTES

1 The development of the CAPM is usually attributed to William F.Sharpe (1964) and John Linter (1965).
2 Alternatively, β_p can be expressed as:

$$\beta_p = \sum_{i=1}^{n} \beta_i \times w_i$$

3 Note that both CAPM and APT are called pricing models although they calculate returns. The price of a security in the market is determined by the return required.

FURTHER READING

General

A general introduction to investment theory is provided by:
• *Investments: an Introduction* . H.B.Mayo, 5th edition, The Dryden Press, 1997.

The capital asset pricing model (CAPM)

The capital asset pricing model is covered in the standard financial management texts, see for example:
• *Principles of Corporate Finance* . Brealey, R.A. and Myers, S.C., 5th edition, McGraw-Hill, 1996.
• *Management of Company Finance* . Samuels, J., Wilkes, F. and Brayshaw, R., 6th edition, Chapman & Hall, 1995.
• *Capital Investment and Financial Decisions* . Levy, H. and Sarnat, M. 5th edition, Prentice-Hall, 1994.
  Readers may also find the following articles helpful:
'CAPM—What on Earth Is It Trying to Achieve?' Dawkins, S., *ACCA Students' Newsletter* , December 1996.
'The Capital Asset Pricing Model.' Dimson, E., *Mastering Management* , Financial Times/Pitman Publishing, 1997.
'Assessing the Rate of Return.' Dimson, E., *Mastering Management* , Financial Times/Pitman Publishing, 1997.
Better Ways to Calculate Beta.' Hawawini, G. and Keim, D., *Mastering Finance* , Issue

3, Financial Times, 1997.

The pioneering work on the capital asset pricing model is provided by:

'Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk.' Sharpe, W.F., *Journal of Finance ,* September 1964.

The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets.' Linter, J., *Review of Economics and Statistics ,* February 1965.

REFERENCES

Chan, L. and Lakonishok, J. 'Are the Reports of Beta's Death Premature?' *Journal of Portfolio Management ,* Summer 1993.

Fama, E.F. and French, K.R. 'The Cross-Section of Expected Stock Returns.' *Journal of Finance ,* June 1992.

Klemosky, R.C. and Martin, J.D. 'The Effect of Market Risk on Portfolio Diversification.' *Journal of Finance ,* March 1975.

Levy, H. and Sarnat, M. *Capital Investment and Financial Decisions .* Prentice-Hall, 1994.

Linter, J. 'The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets.' *Review of Economics and Statistics ,* February 1965.

Roll, R. 'A Critique of the Asset Pricing Theory's Tests: Part I: On Past and Potential Testability of the *Theory.' Journal of Financial Economics ,* March 1977.

Roll, R. and Ross, S.A. 'An Empirical Investigation of the Arbitrage Pricing Theory.' *Journal of Finance ,* December 1980.

Roll, R. and Ross, S.A. 'The Arbitrage Pricing Theory Approach to Strategic Portfolio Planning.' *Financial Analysts Journal ,* May-June 1984.

Roll, R. and Ross, S.A. *On the Cross-Sectional Relation Between Expected Returns and Betas .* University of California Los Angeles (UCLA), 8 July 1992.

Ross, S.A. 'The Arbitrage Theory of Capital Asset Pricing.' *Journal of Economic Theory ,* December 1976.

Sharpe, W.F. 'Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk.' *Journal of Finance ,* September 1964.

Wagner, W.H. and Lau, S.C. 'The Effect of Diversification on Risk.' *Financial Analysts Journal ,* November-December 1971.

8
THE CENTRAL CONCEPT OF VALUE

> This chapter deals with the key financial management concept of value. The following topics are covered:
>
> the nature of value;
> value measurement principles and techniques;
> the basic valuation model;
> the valuation of bonds;
> the valuation of equity; and
> Market Value Added (MVA) and Economic Value Added (EVA).

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the meaning of value;
2 explain the factors which determine an asset's value;
3 apply the basic valuation model to determine the value of a bond;
4 apply the dividend valuation model (DVM) to determine the value of ordinary shares;
5 understand and apply asset, earnings, and cash flow-based valuation methods;
6 appreciate the strengths and limitations of the various approaches to asset valuation;
7 appreciate how financial decisions impact on the firm's value; and
8 explain Market Value Added (MVA) and Economic Value Added (EVA).

OVERVIEW

The goal of the firm is the maximisation of shareholder value, which for all practical purposes requires the firm's managers to make investment and financing decisions aimed at maximising the value of the firm's ordinary shares as quoted in the stock market.

We have already obtained some insights into how this value is determined. In previous chapters we have studied the individual components of value, such as **the time value of money** and **risk and return,** now it is time to bring all these various components together to construct an integrated valuation model. A model that will enable the firm's managers to create, measure and maximise the firm's value.

As this chapter draws heavily on an understanding of the concepts and techniques covered in the previous two chapters, it may be an opportune moment to briefly review the factors which are critically important in the valuation process and to see how they fit together to determine value. So far we know that:

1 It is **cash flows,** not accounting profits or earnings, that are *the* important measure of a firm's returns.
2 It is both the **timing** and **size** of cash flows that affect their value. Without exception, earlier and larger cash flows are more valuable than later and smaller cash flows.
3 It is the **discount rate** which determines the cash flow values.
4 It is the **investor's required rate of return** which is used as the relevant discount rate.
5 The investor's required rate of return reflects the asset's **risk;** it is a *risk-adjusted required rate of return.* The greater the perceived riskiness (variability) of expected future cash flows, the greater the return investors will require. Remember the relationship between risk and return is expressed in the form of the capital asset pricing model (CAPM), the higher an asset's risk (beta) the higher the return required.
6 The value of the firm, like the value of any asset, is determined by the *amount, timing* and *riskiness* of the future cash flows it is expected to generate.

Our task now in this chapter is to demonstrate how the above factors apply to the process of asset valuation, corporate or personal. Valuation principles and techniques apply to all types of financial decisions whether corporate or personal, and we will see how maximising asset value, and the value of the firm, in effect means **maximising the present value of expected future cash flow returns discounted at the investor's risk-adjusted required rate of return.**

Investors in general, and the financial manager in particular, need to understand the techniques and processes of valuation so that they are able to decide whether an asset is worth acquiring or an investment is worth undertaking, to evaluate whether the asset or investment will add to the wealth of the individual investor or of the firm.

An asset (a house, a piece of land, a boat, or a business) will only be worth acquiring, or an investment only worth making, if, in the view of the investor, its cost is considered less than or equal to its value. Conversely, an asset will not be worth acquiring, nor an investment worth undertaking, if, from the investor's perspective, its cost is considered higher than its value.

From the seller's point of view an asset will only be worth selling if its price is considered more than, or at least equal, to its value. An asset will not be worth selling if its price is considered less than its value. It is the process of interaction and exchange between buyers and sellers that creates a market and which ultimately determines an asset's price or value.

From our point of view a company's share price in the stock market at any point in time represents the stock market's consensus assessment of what that share is worth, based on currently available information. If the market is efficient, then a share's price at any moment in time will reflect its value and its expected return will equal its required

return.

The financial manager and the firm's other managers will also need to understand the techniques and process of valuation and how they affect the value of the firm's securities (shares and bonds) trading in the financial markets. They need to understand too how the consequences of their decisions and actions might lead to improved shareholder value.

HOW IS VALUE DEFINED?

Defining value is problematic. There is no single accepted definition of value; in fact value means different things to different people. Individuals have different perceptions and interpretations of value; it is often said that, like beauty, value is in the eye of the beholder.

Value is also problematic in that it is not always easy, frequently it is quite difficult, to measure or quantify value in financial terms. Not all aspects of value are for example tangible and measurable. Think for a moment of any asset which you may have, such as a house, a car or a luxury yacht; can you quantify all aspects of its value to you in financial terms? What aspects of value do you find difficult to quantify?

In relation to owning a house, features such as pleasant and beautifiul surroundings, a friendly and safe neighbourhood, and convenience to local facilities would be of value, but they are immensely difficult to translate into financial numbers.

Ultimately, value can be defined in terms of the price an individual investor or group of investors is willing and able to pay to acquire a specific asset. Often one buyer will be willing to pay more for a specific asset (a house, a piece of land, a factory or a work of art) than competing buyers. Perhaps because the buyer perceives the asset, for whatever reason, to be of greater personal value. There is thus a strong *behavioural element* affecting the determination of asset values in any given set of circumstances.

In financial management there are several different definitions of value which you will encounter. These are **book value, market value, intrinsic or economic value,** and **liquidation value.** They are defined as follows:

Book value

In financial or accounting terms book value is the value at which an asset is shown in a balance sheet, which is *generally* at its historic cost less accumulated depreciation. Book value therefore means that an asset's value to the business is measured in terms of what it cost to acquire, less an allowance for depreciation, rather than its current value.

Market value

In contrast to book value, market value is the value or price for which an asset currently trades in the marketplace, usually determined by the interaction of supply and demand for the asset. However, there is not a ready market for many types of assets, such as the shares of unquoted or private companies, or highly specialised production or research equipment. Consequently it can be difficult to find a current market value for some

assets.

Intrinsic (or economic) value

This is equivalent to the present value of all the asset's expected future cash flows discounted at the investor's appropriate risk-adjusted required rate of return. Intrinsic value represents an individual investor's own personal perception or interpretation of an asset's value. Intrinsic value may or may not equal market value, although in an efficient market they should be equal.

Liquidation value

This is the price an individual asset would fetch if the business discontinued its operations and all its assets were sold. The liquidation value of an asset is likely to be less than its book, market or intrinsic value.

VALUATION MODELS

To construct a valuation model for any asset three critical components are required:

1 Estimates of the **size or volumes** of the expected future cash flow returns which the asset is expected to generate, and the bigger the expected cash flows are the better.
2 Estimates of the **timings** of the future cash flows as this will also affect their respective values—the sooner cash flows are received the more valuable they will be. Cash flows may occur over any time period, days, weeks, months or years and their patterns may be regular or erratic.
3 An estimate of the **investor's required rate of return** from the prospective investment. This is the minimum rate of return that will entice the investor to undertake an investment given its level of **risk.** Required rates of return, as we know, can be determined using the capital asset pricing model (CAPM).

We have studied in the previous chapter the underlying risk-return relationship and its mathematical expression in the form of the capital asset pricing model (CAPM), which asserts that the higher an asset's *systematic risk (beta),* the higher the return a rational investor will require and vice versa. If we can establish a given asset's risk characteristics (its beta) then we can use the CAPM to help us determine the required rate of return for that asset.

The fundamental asset valuation model (FVM)

The fundamental asset valuation model (FVM) defines the value of an asset in terms of *the present value of all its expected future cash flows discounted at an appropriate rate of return.* This is essentially describing an asset's *intrinsic value.* We are therefore trying to find the present value of the asset's expected future cash flows using the investor's required rate of return as the appropriate discount rate, which in turn reflects the

investment's level of risk—the higher the risk, the higher the discount rate.

You will appreciate that in the valuation process we rely heavily on the time value of money (TVM) concept introduced in Chapter 5 and in particular the determination of present value (PV).

The value of an asset can be expressed in present value equation form as:

$$V_0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots + \frac{CF_n}{(1+r)^n}$$

Which from the time value of money concept you will remember is the same as:

$$V_0 = [CF_1 \times (PVIF_{r,1})] + [CF_2 \times (PVIF_{r,2})] + [CF_3 \times (PVIF_{r,3})] + \dots + [CF_n \times (PVIF_{r,n})]$$

Which can be summarised in the form:

$$V_0 = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$$

where,

V_0 = value of the asset at the present time, time zero

CFt = cash flow expected at end of year t

t = any year (t=1, 2,…, n)

r = required rate of return/appropriate discount rate

n = asset's expected life

Thus the value of any asset is equal to the present value of the expected future cash flows discounted at the relevant required rate of return. [1] This is the basic valuation model which applies to the valuation of all types of assets, although with some modifications depending on the individual cash flow and risk characteristics of the asset.

Figure 8.1 illustrates the fundamental asset valuation process. The individual characteristics of the asset combine with the individual characteristics of the investor to determine the risk-adjusted investor's required rate of return. The value of the asset is in turn determined by discounting its expected future cash flows at the investor's required rate of return.

Figure 8.1 The fundamental asset valuation model

EXERCISE 1 —ASSET VALUATION

As a trainee accountant in a firm of accountants you have been asked, using the fundamental valuation model, to value the following assets which are owned by one of the firm's clients.

1. Shares in a number of leading 'blue-chip' companies from which your client expects to receive annual dividends totalling £1,000 per year indefinitely.
2. A holiday cottage which according to two different professional valuation agents is estimated to be worth either £80,000 or £120,000 in five years time. Your client considers these valuations to be equally likely.

In the first case the relevant required rate of return is 13 per cent and in the second case, because of the greater risk (variability of returns) the required rate of return has been estimated at 18 per cent. All cash flows are assumed to occur at year end. Round your answers to the nearest £.

The market value of the firm

A business can raise the capital necessary for it operations and long-term success in essentially two forms. The owners of the business can contribute their own money known as **equity capital** and/or they can borrow money from people outside the business in the form of bonds or loans, known as **debt capital.** For various reasons (which we will discover later) most businesses will be funded by a mixture of both forms.

To attract investors, either equity or debt providers, the firm will have to offer a rate of return commensurate with the level of risk, on whichever type of security (equity shares, preference shares, bonds or debentures) the firm is issuing to raise the funding. Investors will need to know whether the securities being offered to them are a worthwhile investment and they can only make this judgement if they have some means of determining the investment's value.

As a corollary to this, if the necessary capital is to be raised successfully and the value of the firm is to be maintained or enhanced, the financial manager will need to know how investors and the financial markets value the firm's securities. The value of its securities determines the market value of the firm.

You may recall this from Chapter 1 when we first discussed the key concept of value that the market value of the firm (MV) is equal to the market value of its debt securities (MV_D) plus the market value of its equity securities (MV_E), assuming both are regularly traded in the financial markets, thus:

$$MV = MV_D + MV_E$$

The value of each type of security is in turn affected by the investment and financing

decisions taken by the firm's management team.

The current market value of the firm's equity at any point in time is simply the total number of shares in issue multiplied by the current share price. It is only in circumstances where a firm has no debt outstanding that the market value of its equity will represent the market value of the firm. It is therefore important that we have an understanding of the various techniques and models used to value or price both equity and debt securities.

We can now apply, and adapt as appropriate, the basic valuation model to the valuation of debt and equity securities. We will begin by applying the model to the valuation of bonds, then we will see how it applies to equities.

THE VALUATION OF BONDS

Bonds were introduced in Chapter 3 as a class of debt security which is traded in the capital markets. However, a brief recap may be helpful here. Remember that 'bond' is essentially a generic term for a **long-term debt instrument** which can be used by a company, or a government, to raise very substantial sums of money. Bondholders typically receive periodic interest payments, of a known amount, during the term of the loan, and the principal or par value is repaid when the bond reaches maturity—providing the issuer does not default. The interest paid on bonds can be at a fixed or floating (variable) interest rate although, for our purposes, we will generally assume that interest is paid at a fixed rate.

A bondholder may also incur a capital gain, or loss, if the bond is sold in the open market before maturity at a price above (gain) or below (loss) its par value.

When a company issues a new bond it will initially be sold in the primary market and the issue proceeds, net of issue costs, will go to the company. Subsequently the bond will be traded in the secondary market and its price will fluctuate over its lifetime.

Recall that in the UK bonds are usually traded in units with a par or face value of £100. So, for example, if a company wishes to raise £100m of long-term debt it could issue in the stock market 1,000,000 debenture loan stock units of £100 nominal value each.

Bond quality and bond rating

Bonds are usually given a credit rating by specialist credit rating agencies such as Moody's Investor Service, Standard and Poor's and Fitch IBCA. The ratings indicate the quality of the bond and the creditworthiness of the issuer. For example AAA (triple A) is the highest quality rating for a bond designated by Standard and Poor's.

The bond designations then descend to AA, A, BBB, BB, B and so forth in decreasing order of quality down through C ratings, which are attributed to bonds of a mainly speculative nature, and finally to those given a D rating which means they are in default and payments of interest and/or principal are in arrears. The rating systems of other agencies are very similar.

Comprehensive listings of the ratings given to bond issues by the leading bond rating agencies worldwide are published regularly by the Financial Times in Credit Listings International.

For companies, the rating attributed to a bond will directly affect its cost: the higher the rating, the lower the cost. Sometimes high quality corporate bonds are regarded as a proxy for the risk-free rate.

Bond valuation

Recall that bonds can be redeemable or irredeemable. We will first review the valuation of irredeemable bonds, which is a relatively straightforward technique, and then we will approach the valuation of redeemable bonds which is a slightly more complex affair.

Bond cash flows have some special characteristics. They pay a constant regular amount of interest, based on the coupon rate to the bondholder and also a one-off lump sum payment when the bond matures or is redeemed by the company. Obviously to the company, the issuer, these are all cash outflows and to the investor or bondholder they are all cash inflows. Compared with other investments, bond cash flows are predictable: the terms will be set out in the formal bond agreement or covenant.

Irredeemable bonds

From the point of view of valuation irredeemable bonds are treated as perpetuities paying a constant regular cash flow in the form of periodic interest payments. As the bond is never redeemed, no terminal cash flow is involved. We can therefore apply the basic present value of a perpetuity equation which was presented in our chapter on the time value of money. Thus the value of an irredeemable or perpetual bond is given by:

$$BV_0 = \frac{I}{r}$$

where,

BV_0 = value of the bond at time zero

I = annual interest or coupon payment in time period t (t=1, 2, …, n.)

r = required rate of return/appropriate discount rate

Example 1 —Valuing an irredeemable bond

If a bond has a par value of £100, pays a coupon interest rate of 10 per cent per year and the return currently required by investors in the market on similar risk bonds is 8 per cent, the bond's value will be calculated as:

$$BV_0 = \frac{£100 \times 0.10}{0.08} = \frac{£10}{0.08} = £125$$

The bond currently is worth more in the market than its par value. This is because its coupon rate is higher than the rate investors currently require from this risk class of bond. The bond is more valuable to an investor than comparable bonds because it currently pays greater cash flows than investors typically require from such bonds. We shall explore this relationship between required returns and bond prices later when we have examined the valuation of redeemable bonds.

Redeemable bonds

The basic redeemable bond valuation model is represented by: [2]

$$BV_0 = \frac{I_1}{(1+r)^1} + \frac{I_2}{(1+r)^2} + \ldots + \frac{I_n}{(1+r)^n} + \frac{P_n}{(1+r)^n}$$

$$= I \times (PVIFA_{r,n}) + P \times (PVIF_{r,n})$$

where,

BV_0 = value of the bond at time zero

I   = annual interest or coupon payment in time period t (t=1, 2, …, n.)

r   = required rate of return/relevant discount rate

n   = number of periods to maturity of the bond

P   = par value of the bond at redemption or maturity

You will recognise this as the basic present value equation where the particular cash flow characteristics of bonds have been substituted. Typically with a redeemable bond the annual cash flows are the interest payments, I, received by the bondholder which are derived from the par or nominal value of the bond multiplied by the bond's coupon or interest rate. When the bond is finally redeemed by the issuer, that is the principal is repaid to the bondholder, this repayment, P, is a terminal cash inflow for the holder.

It is important to appreciate that the investor's required rate of return, r, will vary over the life of the bond: it will be related to current interest rates and returns or yields from similar risk bonds *at the time of valuation.* In contrast, the bond's coupon or interest rate, I, is the rate actually paid by the issuer to the bondholder and is paid on the par or nominal value of the bond, irrespective of the bond's actual issue price. Remember that a bond can be issued at a discount or at a premium to its par value.

Example 2 —Valuing a redeemable bond

WeatherAll Engineering, a mechanical and electrical engineering company, has just issued a 20 year bond at £100 par value with a coupon rate of 12 per cent. This is the same as the current yield (return) on similar risk bonds. Find the bond's current value.

The current value of the bond would be calculated as:

$$BV_0 = \frac{£12}{(1.12)^1} + \frac{£12}{(1.12)^2} + \ldots + \frac{£12}{(1.12)^{20}} + \frac{£100}{(1.12)^{20}}$$

We can calculate the present value using the present value interest factor (PVIF) as follows:

$$BV_0 = £12(PVIFA_{12\%,20}) + £100(PVIF_{12\%,20})$$
$$= £12 \times 7.469 + £100 \times 0.104$$
$$= £89.63 + £10.40$$
$$= £100.03$$
$$\approx £100$$

There are few points worth noting from the above example:

1 The interest payments form a constant annual cash flow stream so we need to use the present value interest factor for an annuity, PVIFA. The redemption value, on the other hand, is a single cash inflow of £100 to be received in 20 years time when the bond matures.
2 The value of the bond is virtually the same (allowing for rounding errors) as its par or nominal value. This is *always* the case when the bond's coupon or interest rate and the required rate of return in the market are the same.
3 The terms bond value and bond price are used interchangeably; in an efficient market they would be the same. The maximum price an investor would be prepared to pay for the above bond is £100.03 as this is what the bond is currently worth. A rational, value-maximising investor would not pay more than £100.03: to do so would be to acquire the asset for more than its value and this would not be a wealth-maximising investment decision.

Remember the goal of financial management is wealth maximisation: this will not be achieved by buying assets for more than their value. The financial manager or investor will seek to buy assets for less than, or at least equal to, their value.

Returning to Example 2, what do you think the bond would be worth after five years if the current yield or return on similar risk bonds is 9 per cent? What is the maximum price a rational investor would pay for the bond at this point in time in the secondary market? Example 3 addresses these questions.

Example 3 —Value of a redeemable bond

After five years, with similar bonds yielding 10 per cent, the WeatherAll Engineering bond would be worth:

$$BV_0 = \frac{£12}{(1.10)^1} + \frac{£12}{(1.10)^2} + ... + \frac{£12}{(1.10)^{15}} + \frac{£100}{(1.10)^{15}}$$

$$BV_0 = £12(PVIFA_{10\%,15}) + £100(PVIF_{10\%,15})$$
$$= £12 \times 7.606 + £100 \times 0.239$$
$$= £91.27 + £23.90$$
$$= £115.17$$

The bond's value has clearly increased. Why?

The bond is now more valuable because the cash flows received by the investor or holder are greater than those required on similar risk bonds: it is thus more valuable to the holder.

When the bond is trading in the secondary market the maximum price a buyer should pay for the bond at this stage is £115.17 and clearly a rational seller should not sell it for less. In the final analysis the value of a bond, or any other asset (e.g. a Picasso painting), will be determined by the price someone is willing to pay to acquire it.

The required rate of return, r, is now less than the coupon rate on the bond and **the time to maturity** of the bond is 15 years, which is the time remaining until the bond is redeemed by the issuer. This time to maturity is the relevant period over which the bond is valued.

EXERCISE 2 —BOND VALUATION

How do you think the WeatherAll Engineering bond's value would be affected if at the same five-year stage other similar risk securities were yielding a return of 14 per cent? Think about this for a moment before actually calculating the bond's value. What is the maximum price an investor should pay to acquire the bond in this case?

Accrued interest

In the preceding examples we have made the simplifying assumption that bond values are determined at the start of the interest period and have therefore no accrued interest. As bonds pay interest periodically in arrears and as they trade continuously in the markets, their prices often include accrued interest.

For example, WeatherAll Engineering pays a 12 per cent coupon on a £100 par value bond and may pay interest semi-annually (half yearly). Therefore after three months the

interest accrued would be £3(£12×1/4). If we assume in Example 3 that the bond is being sold one-quarter way through the year, then its value would actually be £118.17 (£115.17+£3): it would include accrued interest.

In the interests of simplicity and clarity we will continue to assume that bond values are determined at the start of the relevant interest period, in other words we will assume the absence of accrued interest.

Bond values with semi-annual interest

Rather than pay interest annually, bonds usually pay interest semi-annually. We will now see how to modify our basic valuation model to accommodate semi-annual interest payments. Where a bond pays interest semi-annually its value can be determined as follows:

$$BV_0 = \frac{I/2}{(1 + r/2)^1} + \dots + \frac{I/2}{(1 + r/2)^{2n}} + \frac{P}{(1 + r/2)^{2n}}$$

where,

BV_0=value of the bond at time zero

I   =annual interest or coupon payment in time period t (t=1, 2, …, n.)

r   =required rate of return/appropriate discount rate

n   =number of periods to maturity of the bond

P   =par value of the bond at redemption or maturity

You will recognise that this equation is similar to the one we used to calculate present values when discounting takes place more frequently than once a year.

Notice that with semi-annual interest payments the annual interest payment, I, is halved; the number of payment intervals, n, is doubled; and the required rate of return (discount rate) is also halved.

> ### *Example 4 —Value of a bond paying interest semi-annually*
> To illustrate semi-annual interest we can recalculate the WeatherAll Engineering bond, assuming 15 years to maturity and a required return of 10 per cent.

$$BV_0 = \frac{£6}{(1.05)^1} + \frac{£6}{(1.05)^2} + \dots + \frac{£60}{(1.05)^{30}} + \frac{£100}{(1.05)^{30}}$$

$$
\begin{aligned}
BV_0 &= £6(PVIFA_{5\%,30}) + £100(PVIF_{5\%,30}) \\
&= £6 \times 15.373 + £100 \times 0.231 \\
&= £92.24 + £23.10 \\
&= £115.34
\end{aligned}
$$

The original annual interest payment of £12 has been halved to £6; the required rate of return has also been halved to 5 per cent and the number of payment periods left to maturity has doubled to 30.

With annual interest payments the value of the bond was £115.17, with semi-annual payments the value has increased marginally to £115.34. This is what we would expect because the bond holder is how receiving a portion of the interest payments sooner and receiving cash flows sooner rather than later increases their (time) value.

Why bond prices vary

Bond prices can and do change frequently over their life spans, in fact like share prices, bond prices too can fluctuate quite dramatically. Most corporate bonds, like shares, are frequently traded in the markets and buying and selling activities and market expectations will cause prices and yields to change. For our purposes the price or value of bonds is influenced by two main factors:

1 changes in the **required rate of return** which are in turn related to changes in the general level of interest rates; and
2 the **time to maturity** of the bond.

We will now explore the effect of changes in each of these variables on bond values, starting with changes in the required rate of return.

Bond values and the required rate of return

Remember from our studies of risk and return and asset pricing that there is an inverse relationship between an asset's return and its price in the market; if the price of an asset falls its return will rise and vice versa. Note in this case the *inverse relationship* between a bond's price and the required rate of return; *as the required rate of return decreases, the bond's value increases and as the required rate of return increases, the bond's value decreases.*

Remember also that required rates of return change as a result of changes in macro-economic variables such as inflation rates and/or as a result of changes in general risk aversion in the economy.

If, for example, inflation or risk aversion increase, the security market line (SML) shifts upwards showing that higher returns are required by investors for the same level of risk, thus bond prices will fall and vice versa with decreases in inflation or risk aversion. Alternatively some company specific factors may cause the firm's level of risk to change, causing a change in its bond values.

For example, you may notice in the financial press that if required returns increase as a result of a general rise in interest rates, bond prices will fall thus increasing their returns or yields. Table 8.1 illustrates how changes in the required rate of return affect the value of WeatherAll Engineering's £100, 20-year, 12 per cent coupon bond with 15 years to maturity.

Table 8.1 Relationship between bond value and the required rate of return

Coupon rate (%)	Required rate of return (%)	Bond value (£)	Trading position
12	14	87.70	Discount
12	12	100.03	Par
12	10	115.17	Premium
12	9	124.23	Premium

This relationship between bond value and the required rate of return can also be shown graphically as in Figure 8.2. The graph illustrates that for rates of return less than 12 per cent, the coupon rate, the bond is trading at a premium and for rates of return greater than 12 per cent it is trading at a discount.
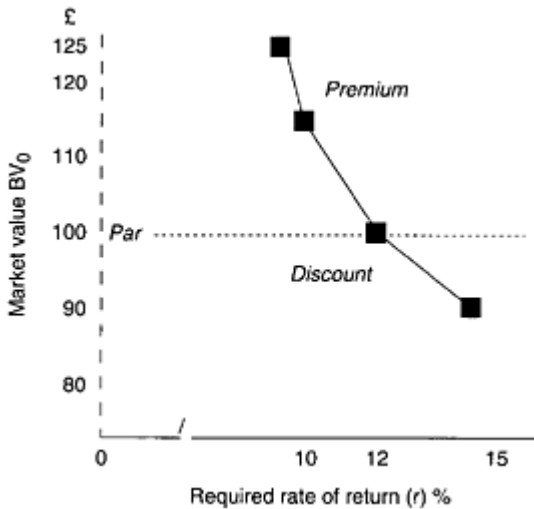
Figure 8.2 Bond value and required rates of return

Bond values and the time to maturity

The value of bonds also changes in relation to their time to maturity. Table 8.2, for example, shows the values for WeatherAll Engineering's bond at the required rates of return of 9 per cent, 12 per cent and 14 per cent over the differing time periods to maturity of 15, 10 and 5 years. The relationship between bond value and time to maturity can also be presented graphically as shown in Figure 8.3.

Notice from the graph that as the time to maturity declines, the value of the bond gets closer to its par value. If the required rate of return is less than the coupon interest rate of 12 per cent, *but remains constant over the time to maturity,* the value of the bond declines towards its par value. Conversely, if the required rate of return is more than the coupon interest rate of 12 per cent, *and remains constant over the time to maturity,* then the value of the bond will increase towards its par value.

Should the required rate of return and the coupon interest rate remain equal, in this case at 12 per cent, then the bond's market value and par value will also remain equal over the time to maturity.

Table 8.2 and Figure 8.3 also reveal that the value of shorter-term to maturity bonds changes less in response to changes in the required rates of return than the value of longer-term bonds. For example, as shown in Table 8.2, the difference in value between a 9 per cent and a 14 per cent required return for a 15-year bond is £36.53. Compare this with the smaller change in value of £18.58 for a 5 year bond.

Table 8.2 Bond values and time to maturity

Required rate of return (r)	Time to maturity (years)		
	15	10	5
(1) 9%	£124.23	£119.22	£111.68
(2) 12%	£100.00	£100.00	£100.00
(3) 14%	£87.70	£89.59	£93.10
(4) Change in value (1)–(3)	£36.53	£29.63	£18.58

This phenomenon is also illustrated in Figure 8.3. You will note that as the time to maturity reduces, the gap between the bond's market value and its par value narrows. This reflects the tendency over time of the bond's value to change less in response to changes in required rates of return. You could say that as the bond gets older it is less able to change!

The graph demonstrates that shorter-term bonds are less responsive to changes in market rates of return (interest rates) than longer-term bonds. Expressed another way, shorter-term bonds (with the same par value, coupon rate and frequency of interest payments as their longer-term counterparts) have less **interest rate risk** than longer-term bonds.

Interest rate risk is the degree to which the market price or value of bonds changes as interest rates in the economy change. As shorter-term bonds have a shorter time to maturity they are exposed to less interest rate risk (variability). Because of interest rate

risk, longer-term bonds include a ***maturity premium,*** that is, they require a higher return to compensate for the greater exposure to interest rate risk.
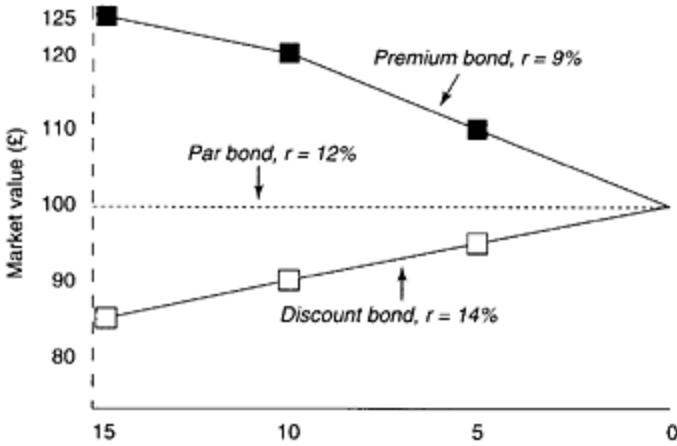
Figure 8.3 Bond values and time to maturity: graph

Yield to maturity (YTM)

If an investor buys a bond today at a quoted price in the secondary market and holds it until maturity, the compound rate of return the investor would earn on the investment is known as the bond's **yield to maturity (YTM).**

When dealing or trading in bonds, the yield to maturity is the rate of return to which dealers and traders most commonly refer. In calculating the yield to maturity the underlying assumption is that bond issuers will not default, that is fail to meet their interest and principal payments to the bondholders.

Suppose you are offered the opportunity to purchase a £100 par value bond with a 10 per cent coupon and 15 years to maturity for a price of £117.10. What is the rate of return you would earn if you bought the bond now and held it until maturity? These figures can be substituted into the basic bond valuation equation as follows:

$$£117.10 \; = \; \frac{£10}{(1+r)^1} \; + \; \frac{£10}{(1+r)^2} \; + ... + \; \frac{£10}{(1+r)^{15}} \; + \; \frac{£100}{(1+r)^{15}}$$

We then need to solve the equation for r. One way to achieve this would be by repeated trial and error attempts, using different interest rates until we obtained a rate of return, r, which resulted in a bond value BV_0 equal to £117.10.

We do, however, have one clue to help in our search for r; we know that there is an inverse relationship between the market value of the bond and market rates of return. Therefore, as the bond's market value is currently more than its par value, we can safely infer that the actual rate of return, r, in the financial markets is lower than the coupon interest rate, I. If we try 9 per cent:

$$£117.10 \ = \ \frac{£10}{(1.09)^1} \ + \ \frac{£10}{(1.09)^2} \ + \ldots + \ \frac{£10}{(1.09)^{15}} \ + \ \frac{£100}{(1.09)^{15}}$$

$$= \ £10 \times 8.061 \ + \ £100 \times 0.275$$
$$= \ £80.61 \ + \ £27.50$$
$$\approx \ £108.11$$

This value is lower than the current value so we need to try a lower rate still. If 7 per cent is used the value becomes:

$$=£10 \times 9.108 + £100 \times 0.362$$
$$=£91.08 + £36.20$$
$$\approx £127.28$$

This time the calculated value is greater than the current value of £117.10, indicating that the yield is greater than 7 per cent but less than 9 per cent. Clearly if we try 8 per cent we find that the two sides of the equation are now equal (allowing for minor rounding errors).

$$=£10 \times 8.559 + £100 \times 0.315$$
$$=£85.59 + £31.50$$
$$\approx £117.09$$

In this example we were successful after only a few attempts and fortunately our answer was an integer. However, trial and error can become a tedious process and more often than not the answer will not be an integer.

As an initial approach an approximate yield could be determined by using the Hawanini and Vora (1982) *yield approximation* formula as follows:

$$\text{YTM (approximate)} \ = \ \frac{I + [(P - BV_0)/n]}{P + 0.6(BV_0 - P)}$$

Applying it to our present example the approximate yield would be calculated as:

$$\text{YTM (approximate)} \ = \ \frac{10 + [(100 - 117.10)/15]}{100 + 0.6(117.10 - 100)}$$
$$= \ 8.86/110.26$$
$$= \ 8.04\%$$

This result is extremely close to the actual yield of 8 per cent, closer than the interpolation value, and may be sufficiently accurate in many practical circumstances. However, in the complex and sophisticated world of bond trading and dealing, calculations of bond yields and prices need to have the degree of accuracy which can only be achieved through the use of sophisticated financial calculators and software

packages.

When the market value of a bond and its par value are equal, the yield to maturity will be equal to the coupon interest rate.

EXERCISE 3 —YIELD TO MATURITY

Calculate, using the yield approximation formula, the yield to maturity (YTM) on a £100 par value bond with a 9 per cent coupon, 10 years to maturity, and which is currently trading at £108.

Interest yield (IY)

Be careful not to confuse the yield to maturity on a bond with its current **interest yield** (also called the flat yield), which is simply the fixed coupon interest payment expressed as a percentage of the bond's *current market value.* The current interest yield in the preceding example would be computed as: $I/BV_0 = £10/£117.10 = 8.54\%$.

Notice that in the above case the current interest yield of 8.54 per cent is greater than the yield to maturity of 8 per cent: why do you think this is so?

The yield to maturity includes an element of capital gain (or capital loss), the interest yield does not. The reason, in this instance, is that the yield to maturity includes a capital loss element which will of course reduce the bond's total return or yield.

Thus the yield to maturity of a bond consists of two elements, an **interest yield (IY)** and a **capital yield (CY),** that is **YTM=IY+CY.** The yield to maturity is the relevant yardstick for comparing the expected returns from bonds as it includes interest and capital yields: the interest yield is not a suitable measure of comparison as it ignores any capital element.

Early redemption of bonds

It is possible for companies to issue bonds which, as part of their issue terms and conditions, include a *call provision* which allows the company to 'call in' the bond before maturity: these type of bonds are known as *callable bonds.* In other words, a company if it so wishes can offer to redeem a bond from holders before maturity and if the offer is sufficiently attractive the holders may take it up.

A company may wish to redeem a bond before maturity for a variety of reasons such as:

1 to utilise accumulated cash reserves;
2 to free itself from rigorous restrictions and covenants associated with the bond;
3 to take advantage of changes in taxation, legislation or changing business
   conditions.

But perhaps the most common reason is to take advantage of reductions in interest rates in general. Remember that bonds are long-term debt instruments and over their lifetime the level of interest rates in the economy can change significantly. Therefore if a bond

was originally issued when interest rates in the economy were high, it will have to have been issued with a competitively high coupon rate to attract investors.

If market interest rates subsequently decline during the life of the bond to a point where they are significantly below the bond's coupon rate, the company may try to redeem the bond before maturity and perhaps refinance with a new bond at a lower coupon rate thus saving on interest costs.

In this situation a company would be a winner (refinancing at lower interest costs) and a bondholder would be a loser as the return after refinancing would be less than before. Clearly if a company wishes to redeem a bond early it will have to offer the holders some kind of incentive or *'call premium'* to entice them to take up the early redemption offer.

Zero coupon bonds

Zero coupon bonds, as the name implies, have no coupon rate, thus no interest is paid during the lifetime of the bond. Why then would an investor buy such a bond? Or a company issue it? The answer is that such bonds are usually issued at a substantial discount to their par or redeemable value and the yield to maturity or redemption can therefore be very attractive.

Suppose, for example, that you had the opportunity to purchase a £100 par value, 15 year, zero coupon bond for a price now of £27.50, would you buy it? Clearly before making the investment decision you would need to establish some basic information such as the bond's yield to maturity, which can be determined as before, only this time there are no interest payments there is just a single cash flow of £100 at maturity. Therefore:

$$£27.50 \quad = \quad \frac{£100}{(1 + r)^{15}}$$

We can solve for r as follows:

$$(FV_{r,n}) = PV(1+r)^n$$
$$£100 = £27.50(1+r)^{15}$$
$$(1+r)^{15} = £100/£27.50$$
$$(1+r)^{15} = 3.64$$

With a FVIF of 3.64 and n=15 we find from FV tables that r equals 9 per cent, which is the annualised rate of return from the bond. In other words, if you invested £27.50 now at a compound annual rate of return of 9 per cent you would receive a lump sum of £100 at the end of 15 years. Whether this annual rate of return is sufficiently attractive will depend on prevailing rates of return on other similar risk investments.

A company may find zero coupon bonds advantageous because it is experiencing current cash flow difficulties, so with a zero coupon bond it will not be committed to annual cash outflows in the form of interest payments to holders. Alternatively the company may wish to undertake a substantial long-term investment project from which it does not expect to receive major cash inflows in its early years.

Zero coupons bonds are attractive to some investors because they can buy into a fixed long-term yield; they do not have to continually reinvest interest income at the prevailing rates.

Deep discounted bonds

In contrast to zero coupon bonds, deep discounted bonds do pay an annual coupon rate to investors but the rate is at a substantial discount to prevailing market rates of return.

Junk bonds

A junk bond is a bond which pays a high coupon, usually about 3 to 5 percentage points above high quality (e.g. government) bonds, but correspondingly has a high risk of default. Junk bonds are regarded as *below-investment-grade* debt, in other words they do not generally qualify for a credit rating by any of the leading bond rating agencies.

Junk bonds first emerged towards the end of the 1970s in the United States and up until the mid-1980s were used extensively by companies as a means of financing management buy-outs (MBOs) and mergers and acquisitions.

The risk-return characteristics of these bonds appealed to some investors. Although they had a high risk of default, when included in an investment portfolio their risk could be substantially diversified. Many junk bond investors suffered substantial losses during the recession of the late 1980s and early 1990s and consequently as a means of raising capital they fell from favour. But in the late 1990s they seemed to be making a comeback, particularly in Europe, as a means of financing acquisitions and mergers as the 'Castles in the Air' vignette illustrates.

CASTLES IN THE AIR

In May 1997 the first high-yield ('junk') *sterling* bond was issued by Castle Transmission, the business syndicate (made up of Castle Tower of the US, Télédiffusion de France and other investors) which bought the BBC's transmission network in February 1997.

The bond issue amounted to £125m, had a 10-year term to maturity and was part of a £250m package which financed the BBC acquisition.

The financing deal was constructed by Credit Suisse First Boston (CSFB) and J.P.Morgan, two leading investment banks which initially provided a £157m loan to finance the acquisition. From the £125m raised by the bond, £100m will be used to repay part of the loan from the two investment banks.

Other high-yield bonds have been issued in D-marks.

Bond issues

We conclude this section on bond valuation with some further examples of corporate bonds issued on the international financial markets by leading companies. Table 8.3 illustrates some leading bond issues which occurred during March 1997.

Table 8.3 International bond issues

Issuer	Bond issues					
	Value of issue	Maturity date	Coupon rate (%)	Price	Yield (%)	Sponsor[a]
BOC Group	£150m	June 2002	7.25	99.308	7.425	HSBC Markets
J Sainsbury	£200m	June 2002	7.25	99.308	7.425	SBC Warburg
Toyota Motor Credit Corp.	$250m	Mar 2000	6.25	99.891	6.291	Merl/SBC Wr.
Walt Disney Co.	$300m	June 1999	6.25	99.819	6.33	Nomura Intern'l

Note: [a]The merchant or investment bank which arranged the issue.

 KEY LEARNING POINTS

1 **The value of a bond is inversely related to required returns. As required returns increase (decrease) the value of the bond decreases (increases).**
2 **If the required return is more (less) than the coupon rate the value of a bond will be less (more) than its par value.**
3 **The market value of a bond moves closer to its par value as the date of maturity approaches.**
4 **Bonds with short-term maturities have less interest rate risk than bonds with long-term maturities.**

PREFERENCE SHARES

Preference shares are often described as **hybrid securities,** that is they are considered neither equity or debt securities: they possess certain characteristics of both. Preference shares resemble ordinary equity shares in that the holder is entitled to a dividend (not an interest payment) but of a limited or fixed amount which is paid, as the name implies, in preference to any ordinary dividend out of a company's after tax profits.

Because the payments to preference shareholders are 'for a limited amount that is not calculated by reference to the company's assets or profits or the dividends on any class of

equity share', preference shares are classed as **non-equity shares.** [3] In addition, most preference shares are irredeemable, just like equities. However, because the dividend payment on preference shares is a fixed cash flow, they are treated for valuation (and other) purposes in a similar manner to bonds.

Preference shares may be *redeemable* or *irredeemable* but most commonly they are irredeemable. The valuation of irredeemable preference shares is very similar to that for consols or perpetual bonds, thus:

$$PV_0 = \frac{D_p}{r}$$

where,

PV_0 = value of preference share at time zero

D_p = dividend payment

r = required rate of return

Example 5 —Valuation of preference shares

Louise Marshall owns 1,000 £1.00 par value irredeemable 5 per cent preference shares in ABC plc and now wishes to determine the value of her investment. The required rate of return on similar shares is currently 6 per cent.

The annual dividend is paid on the nominal value of the preference shares and is computed as *£50*[(1,000×£1.00)×5%], therefore the current value of Louise's preference share holding is determined as follows:

$$PV_0 = \frac{£50}{0.06} = £833.33$$

At 83 pence per share (£833.33/1,000) the preference shares are currently worth less than their nominal value. The shares would thus be trading at a discount as implied by the dividend rate being lower than the current required rate of return on shares of this class.

EQUITY VALUATION

In this section we apply our valuation principles to the valuation of equities or ordinary shares. There are many circumstances in which equity valuations are required, such as in the pricing of initial public offerings (IPOs) and additional or 'seasoned' equity issues, in the valuation of mergers and acquisitions, or in company liquidations.

The value of an ordinary share can be defined as: *the present value of an infinite series of future expected dividend payments.* In this respect the process of valuing an equity share is the same as valuing a non-equity (preference) share, although as we shall see, the cash flows may differ.

The basic equity share valuation model is given by: [4]

$$SV_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_\infty}{(1+r)^\infty}$$

where,

> SV_0 = value (price) of the share at time zero
>
> D_t = expected dividend per share (DPS) at end of year t (t=1, 2, …, n, …, ∞)
>
> r = required annual rate of return on the share/discount rate
>
> ∞ = symbol denoting infinity

You will recognise that the cash flows in this instance consist of an expected future stream of dividend payments to be received indefinitely. This model is known as the **dividend valuation model (DVM)** and essentially states that the value of an ordinary share is equal to the present value of its expected future dividend payments extended to infinity. [5]

The dividend valuation model assumes that dividend payments will continue to infinity and therefore that the company which issued the shares will never be wound up or taken over by another company. In this context anyone buying a share is in effect purchasing a future stream of cash flows in the form of dividend receipts.

At this point you may be wondering about the opportunity for a future cash inflow from selling a share. If a shareholder sells a share, at the time of sale the shareholder is really accepting a present value single cash sum in place of an indefinite stream of future dividend inflows. The selling price of the share is equivalent to the present value of all expected future dividend payments from the time of sale to infinity.

The required rate of return or discount rate, r, which is used to value shares is frequently called the *equity capitalisation rate.* As we shall soon see, when applied to a stream of expected future cash flows in the form of dividend payments, the discount rate in effect 'capitalises' these future streams by converting them into a capital sum—the market value of the share.

The basic dividend valuation model can be modified to reflect a range of different assumptions about the future growth rate in dividend payments, here we will look at two specific assumptions:

1 **zero dividend growth; and**
2 **constant dividend growth.**

Appendix I deals with variable and supernormal dividend growth.

Zero dividend growth

Here it is assumed that there will be no future growth in dividend payments, they will remain at the current level indefinitely. In other words, the future dividend payments represent a non-growing perpetuity and share valuation in this scenario is very similar to that of an irredeemable preference share or consol, therefore:

$$SV_0 = \frac{D_1}{r}$$

Example 6 —Share valuation with zero dividend growth

Sunny Sky Ventures is expected to pay a dividend of £0.20 per share indefinitely; assuming the investor's required rate of return is 12 per cent the share would be valued at:

$$SV_0 = \frac{D_1}{r} = \frac{£0.20}{0.12} = £1.67$$

EXERCISE 4 —SHARE VALUATION WITH ZERO DIVIDEND GROWTH

Prestige Packaging expects to pay a constant annual dividend of £0.35 per share indefinitely. If investors currently require a share of equal risk to earn a return of 15 per cent, calculate the value of the share.

Constant dividend growth

In this scenario it is assumed that dividends will grow at a constant rate each year. This **constant dividend growth model** (often called the *Gordon Growth Model* after Myron J.Gordon who developed it) is in fact a growing perpetuity which we encountered in our studies of the time value of money in Chapter 5 . Therefore:

$$SV_0 = \frac{D_0(1 + g)}{(r - g)} = \frac{D_1}{(r - g)}$$

The constant growth rate is denoted by g. In this case D_1 represents the cash dividend payment expected *one year from now,* which is equal to the current (or last paid) dividend D_0 multiplied by the growth rate g. Note that, as with our growing perpetuity model, the constant growth dividend valuation model is only valid if g is less than r, the investor's required rate of return.

Example 7 *—Share valuation with constant dividend growth*

Sunny Sky Ventures has just paid a current dividend for the year of £0.20 per share and the company expects future dividends to grow at a constant 5 per cent per year.

Assuming the investor's required rate of return is 12 per cent the share would be valued at:

$$SV_0 = \frac{£0.20(1.05)}{(0.12 - 0.05)} = \frac{£0.21}{0.07} = £3.00$$

The significant difference between this value of £3.00 and the previous valuation of £1.67, assuming zero dividend growth, reflects the greater value attached to the higher expected future cash flows.

You should note that dividend valuation models will be affected by any inaccuracies, and the degree of realism, in the estimates of the key input variables, that is g and r. For example, managers may sometimes put forward very optimistic estimates of future growth rates.

The Gordon Growth Model assumes that g, the growth rate, is constant and assuming a constant growth in dividends implies that a company will earn a constant rate of return on its invested earnings. In a rapidly changing and dynamic business environment these assumptions may not be realistic.

Both the zero and constant growth models also require estimates of the required rate of return, r. This is a variable which is itself based on a certain set of restrictive assumptions (the CAPM) as we explained in the previous chapter.

In addition, the problem with all dividend valuation models is that they assume a company's share value is simply a function of its dividend policy; thus ignoring such factors as the company's investment and research and development policies.

Finding the growth rate

There are several methods available for determining compound growth rates, for example the geometric mean can be used to determine mean rates of growth. The method we will use here, while it has its limitations, is appropriate as it draws on our knowledge of time value of money concepts, particularly the use of future value (FV) tables to find r, the unknown compound interest or growth rate.

Example 8 *—Finding the annual growth rate*
    Set out below is the dividend per share (DPS) paid by Meteoric
Enterprises over the period 1994 to 1999. Use this information to
calculate the historic growth rate in dividend per share. Ignore
taxation.

Year	Dividend per Share (DPS)
1999	£0.50
1998	£0.42
1997	£0.35
1996	£0.29
1995	£0.24
1994	£0.20

    The growth rate appears fairly steady over the period shown. If this
past growth rate is considered a fair reflection of the future growth
rate, then it can be used to estimate the future growth rate, g, as
follows:
    Applying time value of money principles, the future value (FV) of
a starting sum is equal to its present value multiplied by a future value
interest factor (FVIF). In this case we wish to find the growth rate, g,
which is analogous to finding the compound interest rate, r. Thus:

$$(FV_{r,n})=PV(1+r)^n$$
Substituting,
$$D_{1999}=D_{1994}(1+g)^5$$
$$(£0.50_{g,5})=£0.20(1+g)^5$$
$$£0.50/£0.20=(1+g)^5$$
$$2.5=(1+g)^5$$

The next step is to look in the n=5 row of the FVIF tables for a value
of 2.5 and we find that it lies in the 20% column. The average annual
growth rate therefore is 20 per cent.
    The period 1994 to 1999 represents *a five year period of growth,*
even though there are six years' dividend figures shown. Essentially
we have taken the dividend per share of £0.20 for 1994 (D_{1994}) as our
starting sum at time 0 and determined at what rate it would have to
grow annually to reach £0.50 (D_{1999}) in five years time. Alternatively,
we could have taken £0.50 as our future value five years from now
and determined the discount rate needed to yield a present value of
£0.20.

**EXERCISE 5 —SHARE VALUATION WITH
CONSTANT DIVIDEND GROWTH**

Prestige Packaging has paid the annual dividends per share as set out below. The company's directors expect that the past dividend growth rate will also be maintained at a constant rate in the future. The company has just paid its dividend for 1999 of £0.35 per share. If investors currently require a share of equal risk to earn a return of 15 per cent, calculate the value of the share. Ignore taxation.

Year	Dividend per Share (DPS)
1999	£0.35
1998	£0.33
1997	£0.31
1996	£0.29
1995	£0.27
1994	£0.25

Briefly state any assumptions made in using this model to value shares.

OTHER APPROACHES TO EQUITY VALUATION

In this section we will examine essentially three other approaches to equity or ordinary share valuation. The first approach we will consider relies on various **assets-based models,** the second is an **earnings-based model** and the third is **cash flow-based.** These approaches should not be considered as competing alternatives to the dividend valuation model but should be viewed as offering a range of other possible perspectives on the valuation process, depending on the circumstances.

It is possible that a company may have a policy of not paying any dividends, for example companies such as Genentech (a successful genetic engineering company), Microsoft and Toys 'Я' Us do not currently pay dividends. Instead these companies have a policy of retaining the funds for future growth and development.

Alternatively how can a company such as Shield Diagnostics—a UK health care company which continues to make losses—have a share price, at the time of writing, of around £6.60? The answer in Shield's case—and in other health care companies like it— is that most of the share value is derived from *expectations* about the value to be generated in the future from patented medical tests, therapies and treatments.

Shield Diagnostics has patented a blood test for the early detection of heart attacks, which if successful would give the company almost free rein in a market worth over £500m, according to stock market analysts. Clearly the shares in such companies are very risky and are prone to high degrees of variability. In circumstances such as this, alternative methods of equity valuation will need to be used.

As we shall, see each valuation approach has its own individual strengths and weaknesses and all of them will produce differing results. This is only one of the difficulties of valuation, different valuation methods will produce different results: there is no definitive answer. Added to the difficulties we encountered with the dividend valuation approach—estimating future growth rates, required rates of return and so forth—the entire task of asset valuation becomes fraught with difficulties.

These methods can also be applied to the valuation of companies as for example in the case of a merger or acquisition. However, the valuation of a company is not the same thing as simply valuing its equity. For example, when a company is financed by a mixture of debt and equity the value of the company is more than the value of its equity. Remember that the market value of the firm (MV) is equal to the market value of its debt (MV_D) *plus* the market value of its equity (MV_E), assuming both are regularly traded in the financial markets, thus:

$$MV = MV_D + MV_E$$

Thus the valuation of a company which is financed by a combination of debt and equity must reflect the value of both its sources of financing.

We will demonstrate the various valuation methods with reference to Example 8.

Example 9 *—Alternative valuation approaches*

Palm Tree Products International manufactures and distributes an extensive range of natural health and beauty products. The company's most recent profit and loss account and balance sheet are presented below.

Palm Tree Products International
Profit and Loss Account
For year ended 31 December

	£000s
Turnover	19,250
Cost of sales	16,250
Gross profit	3,000
Marketing & Admin. Expenses	1,651
Depreciation	100
Operating profit	1,249
Interest expense	380
Profit before tax	869
Taxation	261
Profit for the financial year	608
Dividend	202
Retained profit	406

Palm Tree Products International
Balance Sheet as at 31 December

Fixed Assets	£000s
Plant & Equipment	2,635
Depreciation	831
	1,804
Current Assets	
Stocks	4,180
Debtors	2,010
Cash	260
	6,450
Current Liabilities	
Creditors: *amounts falling due within one year*	
Taxation	261
Other	2,440
Net Current Assets	3,749
Total Assets less Current Liabilities	5,553
Non-current Liabilities	
Creditors: *amounts falling due after more than one year—*	2,123
Loans	
Net Assets	3,430
Capital and Reserves	
Called up share capital (£1 ord. shares)	2,300
Profit and loss account	1,130
Equity Shareholders' Funds	3,430

A firm of professional valuers has just submitted the following market valuation of the company's assets:

Fixed assets	£2.5m
Stocks	£4.6m

All other assets can be taken at their balance sheet values. The valuers also estimate that the current selling or liquidation costs of the company's assets would be £0.5m.

Palm Tree Products International is not listed on any stock exchange but a similar type company listed on the stock exchange has a current P/E ratio of 15.

Asset-based approaches to valuation

Asset-based approaches focus on valuing the company's equity in terms of the value of the company's net assets, rather than in terms of its expected future dividends or earnings. The key issue with asset valuation models concerns the basis on which the assets are valued. For example, are assets valued at book, market or replacement values? Do assets include intangible assets, such as brands, patents, trademarks or goodwill? If so, how are they valued?

There are a number of asset-based valuation approaches: specifically we will examine equity valuation methods based on determining the **book value, market value,** and **liquidation value** of the firm's net assets.

In terms of the balance sheet equation, a firm's net assets is given by:

Total Assets−Total Liabilities=Net Assets (or Equity)

Confusingly the term 'Net Assets' can also be variously referred to as 'Net Worth', 'Owner's Equity' or 'Capital'. These terms are all used to describe the value which remains (hopefully a positive figure) after the total value of all liabilities has been deducted from the total value of all assets. It is this remaining value which is then divided by the number of equity shares in issue to determine the net asset value per equity share.

It is also important to bear in mind that a firm's balance sheet shows the value of a firm's assets and liabilities *at a particular moment in time,* for example as at 31 December. Thus the balance sheet represents a financial snapshot or freeze-frame of a firm's assets and liabilities at a single point in time. In a dynamic business enterprise, the value of some of its liabilities and assets, for example stock and bank balances, will be continually changing.

The values stated in the balance sheet will also be affected by the accounting treatment of balance sheet items. For example, firms are free to adopt different depreciation policies in relation to their fixed assets. Fixed assets will tend to be shown at their historic cost less accumulated depreciation.

We will now proceed to review several methods of equity valuation based on different approaches to asset valuation, beginning with book value.

Net assets—book value

Of all the approaches to valuation this one is the most basic. It simply takes the net value of the company's assets (that is, total assets minus total liabilities) *at their balance sheet values* and divides by the number of equity shares issued to find the **net asset value (NAV)** per ordinary share, thus:

$$SV_0 = \frac{\text{Total book value of assets} - \text{Total book value of liabilities}}{\text{Number of ordinary shares issued}}$$

$$= \frac{\text{Net assets}}{\text{Number of ordinary shares issued}}$$

For Palm Tree Products this is equivalent to:

$$= \frac{£3,430,000}{2,300,000^{[1]}} = £1.49$$

[1] (Called up share capital=£2,300,000=2,300,000×£1 ordinary shares.)

If the company had preference shares in issue, then the book or balance sheet value of

these would also be deducted from the company's assets.

This method is appealing because it is relatively easy to calculate, however, it is not a very sophisticated method of valuation. Its major weakness concerns the actual values at which assets appear in a balance sheet, they are essentially **historic** values and most likely (perhaps with a few exceptions) bear no relation to current market or replacement values.

Other difficulties with this method relate the valuation of *intangible assets* such as *goodwill, brands* and *high value people,* such as professional footballers in the case of football clubs.

Such intangible assets may or may not be included in the balance sheet. If they are included the question arises as to how they are valued. For example, in its 1996 annual accounts Cadbury Schweppes included brand valuations of £1,547m in its balance sheet under intangible fixed assets. This accounted for 34 per cent of the company's total asset values on its balance sheet. In contrast tangible fixed assets were valued at £1,398m, 31 per cent of total assets. Cadbury Schweppes, in its annual report for 1996, explained its brand valuation policy as follows:

THE SWEET TASTE OF SUCCESS

Cadbury Schweppes—the valuation of brands
The Group calculates the cost of brands acquired by applying a multiple (which reflects growth rates and the cost of capital) to the average net earnings from brands over a period of years. No amortisation is charged as the annual results reflect significant expenditure in support of the brands and the values are reviewed annually with a view to write down if permanent diminution arises. This approach is consistent with the proposals in Financial Reporting Exposure Draft 12, 'Goodwill and Intangible Assets' issued by the Accounting Standards Board in June 1996. [6]

In contrast Reuters, the worldwide news and information service, believes that it has the following strengths and resources (i.e. value) which are not recognised in its balance sheet:

- Reuters' independence;
- goodwill attached to the Reuters name;
- software and other intellectual property;
- global databases of financial and other information;
- integrated global organisation including a skilled workforce.

With regard to football clubs, of which there is an increasing number listed on the stock market, the accounting practice for dealing with the 'valuation' of high value players differs between clubs. In some cases the costs of player registrations are treated as intangible fixed assets and appear on the balance sheet (e.g. Tottenham Hotspur), in other cases they are dealt with through the profit and loss account and transfer reserves (e.g.

Manchester United).

As it essentially relies on the historic accounting information contained in a company's accounts, the net asset book value method is a retrospective approach and ignores future earnings or cash flow potential. Thus the valuations obtained are unlikely to give any accurate indication of the real worth or market value of the company.

Net assets—market value

The net assets approach outlined above can be refined by systematically revaluing the balance sheet assets at their current market values. While undoubtedly an improvement over the basic book value method it still ignores the future earnings potential of the company's assets. The acquisition of assets is a means to an end, assets are not ends in themselves. The end is value maximisation and firms acquire assets for the purpose of creating value.

In the case of Palm Tree Products revaluing the assets in accordance with the professional valuers' figures would give a revised net asset value based on current market valuations of:

$$SV_0 = \frac{\text{Market value of assets} - \text{Total liabilities}}{\text{Number of ordinary shares issued}}$$

$$= \frac{(£2.5m + £4.6m + £2.01m + £0.26m) - (£2.701m + £2.123m)}{2.3m}$$

$$= \frac{£4.546m}{2.3m}$$

$$= £1.98$$

As we would expect, the net asset value per share based on updated market valuations is significantly higher than the simple book value.

Obtaining fair market values may not always be easy. In some instances assets may be unique or so highly specialised that obtaining current or comparable market values may be very difficult. If, for example, a company uses highly specialised production equipment there may be very few objective measures, or even none, of current market value available.

The difference between the balance sheet value and the market value of assets can be dramatic as the vignette 'A Room with a View' illustrates.

A ROOM WITH A VIEW

In its 1996 annual accounts the Savoy Group—which owned among its assets the prestigious Claridge's (at £2,100 per night for some of its rooms), Connaught and Savoy hotels—increased the value of its hotel properties by a factor of five, bringing the total valuation to almost £400m. The revaluation of assets, which was carried out by a professional firm of chartered surveyors, had a spectacular impact

on the company's balance sheet: the value of net assets leapt from £91.2m to £372m. [7]

Net assets—liquidation value

The previous two net asset valuation methods assume the company as a going concern. In contrast, liquidation value per share is the net asset value attributable to each ordinary share in the event of a company's winding up or liquidation. Liquidation value is the final amount per share which an ordinary shareholder would realise if all the company's assets had to be sold in a liquidation after liquidation expenses and all other creditors have been paid from the proceeds. Liquidation value per share is calculated as follows:

$$SV_0 = \frac{(\text{Market value of assets} - \text{Liquidation costs}) - \text{Total liabilities}}{\text{Number of ordinary shares issued}}$$

For Palm Tree Products the liquidation value per share would be:

$$= \frac{(£2.5m + £4.6m + £2.01m - £0.26m - £0.5m) - (£2.701m + £2.123m)}{2.3m}$$

$$= \frac{£4.046m}{2.3m}$$

$$= £1.76$$

The liquidation value is higher than book value but less than current market value because of the effect of disposal or liquidation costs.

In an actual liquidation, assets will probably be sold at auction and are likely to realise substantially less than their market values. The circumstances of liquidation, whether for example the company is forced into liquidation by a creditor or is voluntarily liquidated by the shareholders, will clearly affect the realisable value of the assets.

In a forced or pressurised sale the assets are likely to fetch substantially less than if the liquidation process is orderly and unhurried. In a forced sale for instance, when all legal and administrative costs have been taken into account, the company may only realise half of its current market value! Liquidation is an expensive process.

Thus in reality the above net asset liquidation value of £1.76 per share would probably be substantially discounted to obtain a more realistic figure.

Liquidation value is the 'floor' or 'rock bottom' value per share as it represents an estimate of what an ordinary share would be worth in the worst case scenario—the ultimate winding up of the company. In contrast the market valuation method is probably the 'ceiling' or top end of the range of asset-based valuations as it represents the sale value as a going concern.

Earnings-based approaches to valuation

We have noted that one of the key weaknesses in the asset-based valuation methods is that they all ignore the future earnings or cash flow generating potential of a company. The following price/earnings (P/E) method, by focusing on expected future earnings, overcomes this weakness.

The price/earnings (P/E) ratio

The price/earnings (P/E) ratio is an extremely popular, perhaps the most popular, share valuation method used by investment analysts, managers and shareholders alike. It values a company's shares in relation to its earnings growth potential. The P/E ratio is often referred to as the **earnings multiple,** as it shows the number which a company's **earnings per share (EPS)** must be multiplied by to arrive at the share's market price.

Before using the P/E ratio we need to first understand what is meant by earnings per share. A company's basic earnings per share (EPS) is, according to Financial Reporting Standard (FRS) 14, 'calculated by dividing the net profit or loss attributable to ordinary shareholders by the weighted average number of ordinary shares outstanding during the period.' Net profit (or loss) is essentially the net profit (or loss) for the period after deduction of tax, exceptional and extraordinary items, minority interests and any preference dividends. The weighted average number of ordinary shares reflects the fact that a number of shares in issue may have varied during the relevant period, for example, as a result of new share issues or buybacks. However, for our practical purposes, we will largely ignore this 'weighted average' complication.

Essentially EPS is calculated as follows:

$$\frac{\text{Net profit or loss for the period attributable to ordinary shareholders}}{\text{Weighted average number of ordinary shares outstanding during the period}} - \text{pence}$$

As we shall discover in later chapters, there is more than one way to calculate an EPS figure, but that need not concern us here. The P/E ratio is determined by dividing the market price of the company's ordinary share by its EPS, as follows:

$$\frac{\text{Market price of share}}{\text{Earnings per share (EPS)}} = \text{P/E ratio}$$

Which rearranging gives:

Market price of share=EPS×P/E ratio

For Palm Tree Products the EPS is calculated as:

$$\frac{£0.608m}{2.3m} = 26p$$

Palm Tree Products is not a quoted company but we are told that a similar type company listed on the stock exchange has a current P/E ratio of 15. At its simplest interpretation this implies that it will take 15 years for the company to recover the share price from its earnings, this is the earnings multiple effect. Applying this multiple to Palm Tree's EPS, the resulting share value is:

$S_{V_0} = £0.26 \times 15 = £3.90$

> In practice, because a perfect match seldom exists, it will generally be necessary to modify the proxy or look-a-like company's P/E ratio to reflect some individual differences in circumstances between the two companies. Modifying look-a-like P/E ratios also introduces another element of subjectivity into the valuation process, so at best the subsequent valuation can only be considered approximate.

The market price of a company's share at any point in time reflects the consensus view of the market about the future prospects of the company, its potential for generating future cash flows, and so forth. A high P/E ratio implies that the market is very confident about the company's future performance and has high expectations of future returns: conversely, a low P/E ratio generally indicates lack of market confidence and low expectations about future returns.

Interpreting P/E ratios

However, the P/E ratio, as with all other financial ratios, needs to interpreted with care. A company's returns should not be considered in isolation from its risk. The market will expect high risk shares to provide high returns, so a high risk share is likely to have a high P/E ratio. The fact that a company has a low P/E ratio may imply that the share is unexciting in terms of future prospects but is nonetheless a 'safe bet', as the management's attitude to risk may be very conservative.

You will have noted the connection between share price and the P/E ratio, they are interdependent; to calculate the share price we need the P/E ratio and to find the P/E ratio we need the share price! In practice P/E ratios often emanate from an overall assessment of a company by analysts, actuaries, investors, market-makers and so forth.

A word of caution is an appropriate conclusion here. Be careful not to confuse historic and forward or prospective P/E ratios. Many financial publications quote historic P/E ratios based on the most recent year's annual accounts. By definition historic P/E ratios are calculated with reference to past earnings and prices: forward or prospective P/E ratios are calculated with reference to forecast or projected future earnings.

As appropriate valuation tools, it is the forward or prospective P/E ratios which are relevant. In a dynamic business world, a firm's past earnings record may not be an appropriate guide to its future earnings. A judgement has to be made about the overall quality of a firm's earnings. For example, past earnings may have been exceptional due to a period of rapid growth, this may not be sustainable in the future. Alternatively if a

company is dependent on just a few major customers, this would also pose a high risk to earnings.

A further limitation of the P/E ratio is that the earnings/profits figures on which the ratio is based can be manipulated.

To illustrate some of the potential pitfalls in using P/E ratios we will consider the interesting case of the Ladbroke Group. According to its 1996 annual accounts the Ladbroke Group, which operates hotels, casinos, and betting shops, had a P/E ratio of 131. However, this reflected the effects of non-recurring charges against profits for the year of £104m.

To use this historic P/E ratio as a valuation tool would be meaningless, especially when by comparison the average P/E ratio for the leisure and hotels sector in which the firm operates is around 29, and the prospective P/E ratio for Ladbroke at the time was 19.

The Ladbroke example illustrates a further general point about valuation, that is the benefit of comparing the valuation measures derived for an individual company or share with recognised benchmarks or standards for the same measure.

In Ladbroke's case, once the historic P/E ratio was compared with the average, at the time, of 29 for its relevant market sector (Leisure & Hotels), or even for the average for the market as a whole, its futility as a valuation measure became clear. The P/E ratio is a standardised number, in the sense that it allows comparison between companies of different sizes, scales of operation, and share prices.

Obtaining P/E ratios

The P/E ratios for most listed companies are published daily by the Financial Times Share Information Service. The Financial Times, in conjunction with the Faculty and Institute of Actuaries, also publishes the FTSE Actuaries Share Indices which includes average P/E ratings for a range of industry sectors, for example, construction, chemicals, leisure and hotels, retailing, financial services and so forth.

Prospective or forecast P/E ratios, together with comprehensive company analysis and research data, are obtainable from Extel, part of Financial Times Information Ltd which is a member company of Pearson Plc, and also from Datastream International.

Free cash flow approach to valuation

Despite its undoubted popularity as a valuation technique, one of the drawbacks of using the price/earnings ratio is that it is essentially an accounting profits-based valuation method; however, in financial management we have a preference for estimating expected future returns in terms of cash flows rather than profits. To use a model based on cash flow returns we could convert the earnings figure in the profit and loss account to a cash flow figure by simply adding back the depreciation. Remember from Chapter 1 that the simplest definition of cash flow is:

Cash flow=Operating profit+depreciation±other non-cash items

Which in Palm Tree Products' case would be:

£1.249m+£0.1m=£1.349m

However, as we also noted in Chapter 1, analysts and financiers prefer the notion of free cash flow. Free cash flow can have different definitions, for our purposes here we will define free cash flow as:

Free cash flow=Cash flow−(investment expenditures+taxes)

This definition represents the amount of cash available for discretionary purposes such as additional investments or the repayment of loans. In this context dividends are considered discretionary, the firm is not oblidged to have a dividend payment policy. In using the free cash flow approach our objective is to calculate the free cash flow *per equity share.* The method is analogous to the dividend valuation model, where dividends are in effect the free cash flow to investors.

The first step is to actually forecast the expected future free cash flows. The next step is then to compute the present value of the forecast free cash flows using an appropriate discount rate and then deduct from this all outstanding liabilities. Thus free cash flow value per share is given by:

$$SV_0 = \frac{\text{Present value of expected future free cash flows} - \text{total liabilities}}{\text{Number of ordinary shares in issue}}$$

We could also build a growth factor into the future cash flows by adapting the Gordon Growth Model as follows:

$$SV_0 = \frac{\dfrac{(FCF_1)}{(r-g)} - \text{Total liabilities}}{\text{Number of ordinary shares in issue}}$$

Where FCF_1 equals the free cash flow expected one year from now, r is the discount rate and g is the expected constant growth rate. An example will illustrate how the method works.

> ### *Example 10 —Free cash flow valuation*
> The financial manager of Palm Tree Products has stated that the operating cash flow for next year should be equal to this year's operating cash flow plus 5 per cent for growth. She has also stated that the company has planned investment expenditures next year of £0.5m. Assuming the cost of capital or discount rate is equal to 10 per cent and that the operating cash flow growth rate and investment expenditures are expected to remain constant indefinitely, determine

the free cash flow value per share.

The first step is to compute the free cash flow for next year, FCF_1, thus:

FCF_1=Operating   cash   flow$_1$−(investment expenditures+taxation)

=[£1.349m(1.05)]−(£0.5m+£0.261m)=£0.655m

The next step is to calculate the present value of the free cash flow assuming the constant growth rate of 5 per cent:

$$= \frac{£0.655}{(0.10 - 0.05)} = £13.1m$$

Finally we deduct total liabilities (in this case minus taxation which has already been accounted for in step one above) and divide by the number of equity shares in issue:

$$SV_0 = \frac{£13.1m - (£2.44m + £2.123m)}{2.3m}$$

$$= \frac{£13.1m - £4.563}{2.3m}$$

$$= £3.71$$

Note that taxation is included in the year in which it is actually due to be paid, not the year in which it becomes liable; thus the tax liability of £0.261m will have its cash flow effect (it will be paid) in the following year. This timing difference between incurring a tax liability and the actual tax payment is one further complication of using free cash flow for valuation purposes. There is a time lag between incurring the tax liability and its actual cash flow effect.

Generally speaking the tax liability accrued in one accounting year is due to be paid in the following accounting year, it therefore appears in the balance sheet as a current liability.

Practical problems

In common with the dividend valuation models the practical difficulties associated with the free cash flow technique include:

- estimating the expected future free cash flows (e.g. the difficulties of estimating future investment requirements, taxation rates and payments and so forth);
- specifying the time horizon over which the calculation will be based;
- estimating a future cash flow growth rate; and

- specifying the required rate of return or discount rate and assuming it remains constant.

Summary

Table 8.4 presents the range of equity values which we have calculated for Palm Tree Products International. In this case the asset-based valuations show significantly lower equity values than the future-oriented earnings or cash flow-based models. It is important to remember, however, that the different approaches are based on different assumptions and depending on the circumstances some methods may be more appropriate than others.

In any valuation scenario a range of values such as those presented in Table 8.4, probably combined with dividend-based equity values, will provide the framework for the valuation process.

LIMITATIONS OF VALUATION MODELS

The approaches to debt and equity valuation which we have just studied provide financial managers, analysts and investors with extremely useful valuation tools. However, it is

Table 8.4 Palm Tree Products: range of equity valuations

Palm Tree Products International: summary of equity valuations

Valuation basis	Share value (£)
Net assets:	
Book value	1.49
Market value	1.98
Liquidation value	1.76
Price/earnings	3.90
Free cash flow	3.71

important to bear in mind that these valuation models are—like all other business or financial models—representations of reality.

Some of the models are future-oriented and are of necessity built on a number of critical assumptions about an individual company's future prospects, future growth rates, investors' rates of return and so forth: they do not purport to be, nor can they be used as, *accurate* predictions of future value. Thus valuation models are only as sound as the input figures, underlying assumptions and judgements used to create them.

In practice, cash flow forecasts and projections are notoriously difficult to estimate and, as we learned in the previous chapter, using the CAPM to determine the required rate of return, r, is in itself fraught with practical difficulties. It is hardly surprising therefore that the process of asset valuation is by no means a precise science.

Despite their shortcomings, valuation models provide useful benchmarks or reference points for share valuation.

APPLICATION OF MODELS

Hopefully the foregoing sections will have demonstrated that there are no definitive answers in the valuation process; it is not by any means an exact science. Despite the existence of the various models which aim to make the valuation process more objective, there still remains an inescapable subjective and behavioural element in valuation.

As we have noted, valuation models can be applied in a variety of circumstances: buying shares in company, floating a company on the stock market, raising additional funding, making a takeover bid for another company, or defending a company against an unwelcome takeover bid.

Some models will be more suitable or favoured than others depending on the circumstances. For example, a pension fund seeking both growth and income for the fund will likely favour a combination of dividend valuation and P/E models to evaluate existing or potential equity investments.

In new issues and share flotations, analysts and professional advisers are likely to emphasise the P/E ratio. For example, when Newcastle United Plc was being floated on the stock market, its ordinary shares were offered at a price between £1.20 to £1.35, the mid-range offer price of £1.28 was based on an EPS of 5.7p and a P/E ratio of 22.4. [8] It would be a useful exercise for you to now compare the current share price and P/E ratio of Newcastle United with the flotation figures and determine the reasons for any changes.

In contrast, during speculation about the flotation of Formula One, the organisation which runs formula one grand prix motor racing, the discounted cash flow valuation of expected future earnings from worldwide television and media coverage rights was emphasised in arriving at a reported valuation for the business of £2.4bn. (See 'In Pole Position?' vignette).

In mergers and acquisitions a greater emphasis may be placed on asset-based valuations. In acquisitions many predator companies actively seek out and target acquisition, companies with under-valued assets such as property and land. The goal would be to acquire the target company, break it up and then dispose of its assets at a substantial profit (a tactic known as asset-stripping).

Whatever the valuation setting, a range of methods are likely to be used (by both asset buyers and asset sellers) to provide a framework for valuation.

All of the valuation models which were examined are being applied *at a particular moment in time,* and clearly as time progresses a company's fortunes can change, sometimes dramatically. This can be either as a direct result of decisions and actions taken by the firm's management, or as a consequence of more general economic and business conditions, or possibly a combination of both.

FINANCIAL DECISION-MAKING AND SHAREHOLDER VALUE

If we exclude for the moment any external or extraneous influences, the financial manager and the management team, before making any investment decisions, will

evaluate the respective impacts of the various investment options on the firm's expected future returns and on its level of risk. Clearly any change in either of these two variables, risk or return, will change the value of the firm's equity and thus the wealth of its shareholders.

If investors perceive an increase in the firm's level of systematic or market risk (i.e. its beta) as a result of management decisions (that is decisions which directly impact on the firm's sensitivity to changes in market conditions) they will require a higher return to compensate, as implied by the capital asset pricing model (CAPM).

Remember that in terms of the CAPM, the required rate of return, r, on a share S, is defined as:

$$r_s = R_f + \beta_s(ER_m - R_f)$$

With the market return ER_m and the risk-free rate R_f held constant, r_s becomes a direct function of the share's beta, β_s. Any change in the share's beta will affect the share's required return, r_s.

Implementing investment decisions which lead to a higher required return, r, will result in a lower market price or value for the firm's shares and vice versa.

Alternatively any investment decisions undertaken by management which investors perceive will produce improved future returns by way of enhanced dividend rates, and not at the same time alter the firm's systematic risk, will lead to higher share values as implied by the dividend valuation models.

However, in reality it is likely that increased returns will only be achieved at the expense of some increase in risk—the risk-return trade-off. Although it is possible for the increase in returns to exceed the increase in risk, resulting in a net increase in returns.

Clearly there is a direct connection between the financial decisions taken by the firm's management, the level of the firm's risk and of its returns, and ultimately its share value.

KEY LEARNING POINTS

1 **The intrinsic value of an asset, or the firm, is equal to the present value of its expected future cash flows discounted at the investor's risk-adjusted required rate of return.**
2 **The value of an asset is inversely related to its return. An increase in value implies a reduction in return.**
3 **Asset valuation is not an exact science. It inevitably includes subjective opinions and judgements.**

IN POLE POSITION?

Throughout 1997 the world of formula one racing figured prominently in financial press headlines. Various reports have suggested that the organisation which manages the sport is

considering a $4bn flotation…

At one stage the Formula One Constructors Association, which manages formula one racing, stated that its president, Bernie Ecclestone, had determined the valuation figure by calculating, on a discounted cash flow (DCF) basis, the value of existing television contracts.

These contracts, it was claimed, were worth more than £100m a year in revenue, and additional revenues were also included for digital television pay-per-view (PPV).

The DCF valuation technique is often used to value companies at an early stage of their development and which are likely to generate profits in the future. Methods such as DCF have been used to value companies in industries such as mobile telecoms and cable television.

The financial and investment community was quite sceptical about the $4bn valuation figure, with some analysts having described it as 'extremely optimistic'.

RECENT DEVELOPMENTS IN VALUE MEASUREMENT

Today the search for the 'true' measurement of value by company managers, market analysts, stockbrokers, management consultancy firms and so forth resembles the prolonged quest for the Holy Grail by medieval knights; it is unlikely ever to be found.

In recent years a number of 'new' approaches to measuring shareholder value creation have been developed and actively promoted. Whether these are current management fads or represent something more substantial and enduring remains to be seen. A few years ago, for example, an approach to valuation called **Shareholder Value Analysis (SVA)** was the new star valuation topic.

Shareholder value analysis (SVA)

The objective of SVA is to maximise the net present value (NPV) created for shareholders through focusing on what are termed the seven key *value drivers.* These value drivers have been identified as the critical factors which determine or drive the firm's value, the first five of which are used to derive future cash flow estimates (Rappaport 1986; Mills 1995). They have been identified as follows:

1 sales growth rate;
2 operating profit margin;
3 cash tax rate;
4 fixed asset investment;
5 working capital investment;
6 planning horizon;
7 cost of capital.

The SVA approach focuses on maximising the cash flow generating potential of a company's operations and one of its attractions is that it can be applied throughout a company by the managers in its various business units or divisions. It directs managers' attention to, and links together, the two vital areas of cash flow generation and shareholder value maximisation.

The SVA approach can be illustrated with reference to the accounts of Palm Tree Products International and assuming other values as appropriate:

1 Sales growth rate	=20% per year
2 Operating profit margin	=6.5% (operating profit/sales)
3 Cash tax rate	=30% (tax/profit before tax)
4 Fixed asset investment	=5% of incremental sales value
5 Working capital investment	=8% of incremental sales value
6 Planning horizon	=5 years
7 Cost of capital	=10%

Depreciation also needs to be taken into account, and we will assume that it will grow at 10 per cent per year. The free cash flow estimate based on these figures and assumptions is shown below:

Palm Tree Products
Free cash flow estimate
£m

Sales	23.10
Operating profit	1.50
Less Tax	0.45
	1.05
Depreciation	0.11
Operating cash flow	0.94
Less Investments:	
Fixed Assets	0.19
Working capital	0.31
Free cash flow	*0.44*

The sales for the most recent year were £19.25m and the sales growth rate is 20 per cent, therefore next year's sales would be estimated at £23.1m (£19.25m×1.20). Based on last year's operating profit margin of 6.5 per cent, the operating profit would be calculated as £1.50m (£23.1m×0.065).

Applying a cash tax rate of 30 per cent yields a cash tax payment of £0.45m. Depreciation is assumed to grow at 10 per cent per year, therefore depreciation is forecast at £0.11m (£0.1m×1.10).

The incremental or additional investments in fixed and working capital are equal to fixed percentages of the annual increment or increase in sales value. Thus the incremental investment in fixed assets=(£23.1m−£19.25m)×0.05=£0.19m, and in working capital=

(£23.1m−£19.25m)×0.08=£0.31m. Deducting these two figures from the operating cash flow of £0.94 produces a free cash flow figure of £0.44m.

This process would be repeated to produce a free cash flow estimate for each year of the five-year planning horizon. This five-year free cash flow profile is then discounted at the cost of capital discount rate of 10 per cent, which could have been estimated using the capital asset pricing model, to find the net present value of the five-year free cash flow stream.

The SVA approach involves a few other complexities and refinements which it is not necessary for us to pursue here in order to appreciate the relevance of the SVA approach. There are for example the difficulties of extending the planning horizon beyond the five year period chosen. For a fuller discussion of SVA see Rappaport and Mills referred to above.

Shareholder value analysis (SVA) is just one of the more recent valuation techniques and new ones are being created continuously.

The fact that new techniques or approaches to value measurement are continually being developed and promoted is testimony to the importance of the value concept in business and finance and also of the inherent complexity in its measurement. We will now briefly review two other approaches to value measurement which have come to the fore in recent years, **Market Value Added (MVA)** and **Economic Value Added (EVA).**

Market value added (MVA)

We have stated that the primary goal of financial management is to maximise shareholder wealth or value and that to maximise shareholder wealth managers should maximise the market value of the firm's ordinary share price. Unfortunately there are ways in which managers can increase the market value of the equity share price without necessarily maximising shareholder wealth.

For example, managers could raise as much money as possible from shareholders and lenders and then simply invest it in bank deposit accounts. This would increase the total market value of the firm but it is an investment strategy which is hardly of any real benefit to the shareholders.

Market value added (MVA) is a technique which has recently emerged as a means of directly measuring the *real* value added to the market value of the firm's equity share price. It is viewed as an indicator of how good the firm's managers are at shareholder value creation.

According to the MVA approach what should be maximised is not simply the share price but the difference between the market value of the firm's equity and the equity capital invested (including retained profits). Thus:

MVA=Market value of the firm's equity−Equity capital invested

While MVA can also be defined in terms of all capital invested, that is, equity plus debt, we will confine our definition of MVA to the less complex equity definition.

The concept of MVA can be illustrated with reference to a few examples. As MVA, like most of these valuation techniques, originated in the United States the most striking

examples are of necessity US-based.

For example, according to *Fortune,* the US business magazine, in 1994 Coca-Cola had a market value of $61bn but investors had only supplied $8bn of capital (including retained earnings) resulting in an MVA for Coca-Cola at the time of $53bn. [9] In other words, over the years since its founding to 1994, the managers of Coca-Cola had created $53bn of wealth or value for its shareholders. General Motors in contrast had in 1994 a market value of $81bn with capital supplied by the owners amounting to $88bn resulting in a negative MVA of −$7bn.

Similar to General Motors in the US, British Aerospace in the UK, according to the MVA measurement, has 'frittered away much of the capital entrusted to [it] over the years,' (Jackson 1997). On the other hand, according to MVA principles, Marks & Spencer in the UK is a recognised value creator.

Economic value added (EVA)

Economic value added (EVA) is another shareholder value measurement technique—originally developed by a firm of New York management consultants Stern Stewart—which has recently grown in popularity. EVA is being promoted as a technique for measuring the real economic value created for shareholders by a firm's management *for a given year.* MVA in contrast proclaims to measure value created for shareholders over the lifetime of the company.

EVA purports to measure a firm's 'true' economic profit for a year by making adjustments to the traditional accounting profit reported in the profit and loss account. Profits will for example be adjusted to take account of any non-cash items such as depreciation. One method of calculating EVA is as follows:

EVA=Operating profit−cost of capital
where,
Operating profit=Total revenues−operating costs−taxes
Cost of capital=Total capital supplied×cost of capital

The cost of capital is equal to the total value of all the capital supplied, debt and equity, multiplied by the weighted average cost of capital (WACC). The weighted average cost of capital is usually given as a single composite percentage figure. It is derived by multiplying the cost of each individual source of capital—ordinary shares, preference shares, bonds and loans, all valued at their market, not book, values—by the respective proportion or percentage that each individual source forms of the total capital structure.

The weighted average cost of capital (WACC) thus reflects the relative importance of each individual source of long-term finance in the firm's overall capital structure. The weighted average cost of capital is discussed further in Chapter 12.

We can illustrate the derivation of EVA by taking an example. Suppose a firm for its most recent financial year reported sales of £ 100m, operating costs of £70m, and taxes of £10m, then its operating profit according to the EVA definition would be £20m (£100m −£70m−£10m). Assuming the firm was financed by a mixture of debt and equity capital amounting to £50m in total and that the weighted average cost of this capital has been

computed as 10 per cent, the resultant EVA would be:

$$\text{EVA}=£20m-(£50m\times0.10)=£20m-£5m=£15m$$

As can be observed even for this very simplified example—in which many of the real world financial accounting issues such as depreciation and stock valuation and the use of leasing finance have been ignored—there is a substantial difference between profit as defined by the EVA method and the traditional accounting method of computing profit.

The key distinction between the EVA profit and the traditional accounting profit is that the EVA reflects a charge for the opportunity cost of capital, particularly the cost of equity capital. While the traditional accounting methods of measuring profit do reflect the cost of using debt capital—in terms of the interest costs charged to the profit and loss account—they ignore the opportunity cost of using equity capital.

The crucial point being made is that shareholder value is only being increased if a company is making a return which is greater than its cost of capital.

MVA and EVA compared

You may have noticed one key distinction between MVA and EVA. MVA is based on the market value of a quoted firm's equity and therefore, at least in a weak to semi-strong efficient market, will incorporate all information that is currently publicly available about the firm's economic prospects. MVA in other words reflects market expectations and is future-oriented and forward-looking. EVA in contrast is retrospective, it is a measure of historic performance.

However, there is a direct link between EVA and MVA. The MVA of the firm could be defined in terms of the EVA as the present value of all the EVA profits that the firm is expected to generate in the future.

MVA, EVA and executive pay—linking performance to value

As we discovered in Chapter 2 when we reviewed the Cadbury and Greenbury reports, companies today are only too aware of public and shareholder concern and resentment over the seemingly excessive levels of executive pay and remuneration. Consequently companies are increasingly seeking out more appropriate methods of rewarding executives; methods which directly relate executive pay to the creation of shareholder wealth or value added.

In recent years many leading companies (e.g. AT&T, Coca-Cola, Eli Lilly, Polaroid Corporation and Quaker Oats) have introduced executive incentive schemes related to EVA, on the grounds that it is linked more directly to the creation of shareholder wealth than traditional profits-based systems of executive remuneration.

In the UK the Burton Group and Lucas Varity use sophisticated approaches to EVA as a managerial incentive and reward system. They are sophisticated in the sense that the companies take a longer-term perspective on the creation of EVA and thus try to eliminate any attempts by managers to artificially inflate EVA figures in the short term. For example, as EVA measures performance over the period of a single year, managers

of a company business unit or division might very well be tempted to defer important investment expenditures in order to inflate the annual EVA.

The more sophisticated approaches to the application of EVA as an incentive measure recognise, and attempt to eliminate through their resource planning and control procedures, the inherent dangers and potential abuses in using what is essentially a short-term tool to create consistent, long-term shareholder value.

Conclusion

There is conflicting evidence and views on the efficacy of MVA and EVA; each model has its ardent supporters and also its vociferous critics. It is perhaps not surprising that the original developers and promoters of EVA, US consultants Stern Stewart, insist that they have done innumerable studies which demonstrate that changes in a company's EVA can explain more than 50 per cent of changes in stock prices. In contrast, they say that no such correlation exists between the traditional earnings figures and stock prices (Jackson 1997).

In the UK the two techniques, particularly EVA, have been eagerly adopted by many stock market analyst and management consultancy firms as measures of company performance.

Whether MVA and EVA are passing valuation fashion fads or are destined to become a more permanent feature of the valuation landscape only time will tell. However, despite the conflicting views and opinions there is at least one consensus view of the two approaches and that is that they compel managers to focus more critically and objectively on the return they are achieving for investors.

In the words of John Hoerner, Chief Executive of the Burton Group: 'The key benefit (of EVA) is to get people to realise that what managers get paid for is making a return on the money in the company.'

RECAP

The concept of value: The concept of value and the valuation process are central to financial management. Their understanding is essential if sound value-creating financial decisions are to be made and the goal of shareholder wealth maximised.

Types of value: Four types of value, *book value, market value, intrinsic value* and *liquidation value* were explained.

The components of value: The *size, timing* and *riskiness* of expected future cash flows form the key components of value. An asset's value is equal to the present value of its expected future cash flows, discounted at the investor's required rate of return.

The fundamental valuation model: The formula for the fundamental valuation model is expressed as:

$$V_0 = \sum_{t=1}^{n} \frac{CF_t}{(1 + r)^t}$$

The value of a bond: A bond is a long-term debt instrument, which may be

redeemable or irredeemable. The value of an **irredeemable bond** is similar to a perpetuity and is given by:

$$BV_0 = \frac{I}{r}$$

The value of a **redeemable bond** is the present value of the future interest payments plus the present value of principal to be repaid to the investor on maturity and is given by the following formula:

$$BV_0 = \left[\sum_{t=1}^{n} \frac{I_t}{(1+r)^t} \right] + \frac{R_n}{(1+r)^n}$$

The value of a redeemable bond changes in relation to its *time to maturity.* Assuming a constant required rate of return, the value of a bond will move closer to its par value as its maturity date approaches.

The closer a bond gets to its maturity date, the less sensitive its value is to changes in required rates of return. Expressed another way, shorter-term bonds have less *interest rate risk* than longer-term bonds.

The yield to maturity (YTM): The yield to maturity (YTM) is the compound rate of return that an investor can expect to earn from the time when a bond is purchased and held until maturity.

Preference shares: The valuation of irredeemable preference shares is very similar to that for consols or perpetual bonds, thus:

$$PV_0 = \frac{D_P}{r}$$

Ordinary shares: The value of an ordinary or equity share is equal to the present value of all future expected dividend payments discounted at the appropriate rate of return. The basic share **dividend valuation model (DVM)** is given by:

$$SV_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

This basic dividend valuation model can be modified to reflect a range of different assumptions about future dividend growth rates: *zero dividend growth; constant dividend growth;* and *variable dividend growth.*

Other approaches to equity valuation: Other non-dividend based approaches to equity valuation include various **asset-based** models, the **price/earnings (P/E) ratio** and the **free cash flow model.** Asset-based models centre on establishing the *book value, market value* and *liquidation value* of the firm's net assets.

The **price/earnings (P/E) ratio** values shares in relation to the earnings growth potential of a company. By emphasising expected future earnings it overcomes the

major weaknesses of the asset-based valuation methods.

The **free cash flow model** is based on the amount of cash available for discretionary purposes, such as additional investments or the repayment of loans, after investment and tax obligations have been met. The free cash flow value per share is given by:

$$SV_0 = \frac{\text{Present value of expected future free cash flows} - \text{total liabilities}}{\text{Number of ordinary shares in issue}}$$

Recent developments in value measurement: Recent developments to measuring the value created by a company include: Shareholder Value Analysis (SVA), Market Value Added (MVA) and Economic Value Added (EVA). **Shareholder Value Analysis** (SVA) seeks to maximise the net cash flow generating potential of the company. **Market Value Added (MVA)** is a method of directly measuring the *real* value added to the market value of the firm's equity share price. **Economic Value Added (EVA)** is advocated as a technique for measuring the 'true' economic value created for shareholders by a firm's management *for a given year.*

APPENDIX I VARIABLE AND SUPERNORMAL DIVIDEND GROWTH

Variable dividend growth

While the Gordon Growth Model may reflect the general tendency in practice for companies to maintain stability in their rate of dividend payments, the variable dividend growth model recognises the potential for change in rates of dividend growth. Maintaining a constant growth in dividends is a growth pattern which may not be feasible for a variety of reasons, for example, due to the stage of the company in its life cycle (growth, maturity or decline) or because of changing economic circumstances.

A company may for example experience very high growth rates for a number of years, followed by a period of reduced or even zero dividend growth (perhaps as a result of cash being needed for substantial capital investment), followed in turn by a resumption of high dividend growth (when the investments have paid off).

Clearly the possible variations in dividend growth rate patterns are endless; consequently the valuation of shares in a scenario of expected variable growth is more complex than under zero or constant growth assumptions.

We will illustrate this valuation approach with an example.

> ### *Example 11 —Share valuation with variable dividend growth*
>
> The Corporate Leisure Group's dividend payment for its last financial year was £0.55 per share. Because of substantial investment requirements the directors are not predicting any growth in dividends for the next two years. However, they do then expect dividends to grow at 10 per cent for the subsequent two years, after which time the growth rate is expected to reduce to 5 per cent per year indefinitely.

Investor's currently require a return of 15 per cent from shares in this risk class.

We will now use this information to calculate the current value of the company's share. The most straightforward approach is to break the expected growth pattern down into its separate phases and then value each phase as follows:

1 Find the value of the dividend payments for the initial phase, years 1 and 2, assuming zero growth:

D_0 = D_1 = D_2
Year 1 = D_t = £0.55
Year 2 = D_2 = £0.55

2 Find the value of the dividend payments for the second phase, years 3 and 4, assuming two years constant growth at 10 per cent:

Year 3 = D_3 = £0.55(1.10) = £0.61
Year 4 = D_4 = £0.55(1.10)2 = £0.67

Alternatively, year 4 can be calculated as:

Year 4 = D_4 = £0.61(1.10) = £0.67

3 Find the value of the dividend payments for the third phase, year 5 to infinity, assuming constant dividend growth at 5 per cent:

Year 5 = D_5 = £0.53$(1.10)^2$(1.05) = £0.70

4 The final step is to find the present value of this expected cash flow stream:

SV_0=£0.55$(PVIF_{15\%,1})$+£0.55$(PVIF_{15\%,2})$+£0.61$(PVIF_{15\%,3})$
+£0.67$(PVIF_{15\%,4})$+[£0.70/(0.15−0.05)]$(PVIF_{15\%,4})$
=£0.55(0.870)+£0.55(0.756)+£0.61(0.658)
+£0.67(0.572)+£7.00(0.572)
=£5.68

Notice that the total cash flow for the third phase—constant growth to infinity—beginning in year 5 is designated as being received at year 4, that is one year before the first constant growth rate dividend is paid. The present value of these constant growth cash flows, £4.00, is the value of all expected future dividends after year 4. A cash flow timeline will illustrate this point (Figure 8.4).
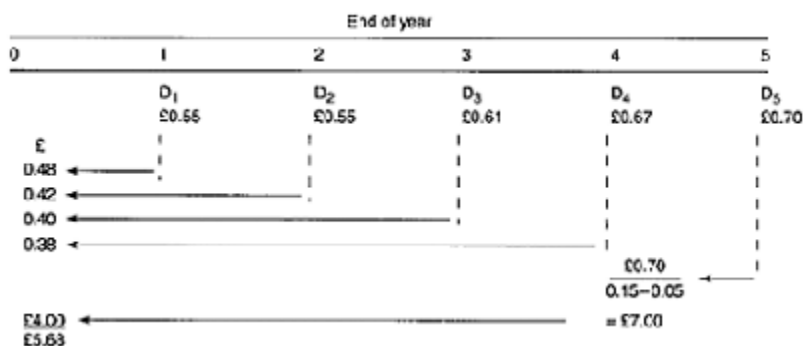
Figure 8.4 Cash flow time-line for variable dividend growth

Supernormal dividend growth

Fast-growing companies will often experience periods of supernormal dividend growth. In such cases the expected future dividend growth rate, g, may exceed the required rate of return, r, and this makes the use of the Gordon Growth Model inappropriate. We will explore an example.

Example 12 —Supernormal dividend growth
   The directors of the Blue Velvet Chocolate Company expect to pay a dividend next year of £0.40 per share. The company is expanding very rapidly and the directors anticipate a dividend growth rate of 30 per cent per year for the following two years, after which time the growth rate will fall to 10 per cent per year indefinitely. The required rate of return for similar risk companies is currently 15 per cent. How much is a share in this company worth today?

1 Find the value of the dividend payment for the initial phase, year 1, which in this case is equal to £0.40 per share. Thus:
   Year 1   = D_1 =   £0.40
2 Find the value of the dividend payments for the second phase, years 2 and 3, where on this occasion g > r:
   Year 2   = D_2 =   £0.40(1.30)   =   £0.52
   Year 3   = D_3 =   £0.40(1.30)^2 =   £0.68
3 Find the value of the dividend payments for the third phase, year 4 to infinity, which is the first year with r > g:
   Year 4   = D_4 =   £0.40(1.30)^2(1.10)   =   £0.74
4 The next step is to find the present value of the variable cash flow stream, thus:

$=£0.40(PVIF_{15\%,1})+£0.52(PVIF_{15\%,2})+£0.68(PVIF_{15\%,3})$
$=£0.40(0.870)+£0.52(0.756)+£0.68(0.658)$
$=£0.35+£0.39+£0.45$
$=£1.19$

5 Now we have to convert the third phase cash flow stream—year 4 to infinity. We can do this by using Gordon's Growth Model as follows:

$$\frac{D_4}{r-g} = \frac{£0.74}{0.15-0.10} = £14.80$$

Converting this cash flow to its value at time 0.

$=£14.80(PVIF_{15\%,3})=£14.80(0.658)$
$=£9.74$

Notice that as before, this value is discounted for three years, as it is the value as of year 3.

6 The final step is to sum up all the discounted values of the cash flow stream to find the value of the share now at time 0. Thus:

$SV_0=£1.19+£9.74=£10.93$

REVIEW QUESTIONS

Concept review questions

1 (a) Define the fundamental valuation model (FVM). (b) Why should the financial manager be concerned with the valuation process?

2 Define, compare and contrast the following terms:
Book value: Market value: Intrinsic value: Liquidation value.

3 Explain the following: (a) the relationship between a bond's value and the required rate of return; (b) how the value of a bond changes in relation to its time to maturity; and (c) why you might wish to invest in bonds with a short term to maturity rather than those with a long term to maturity.

4 Discuss the limitations of valuation models.

5 Explain the connection, in terms of risk and return, between financial decision-making and the value of the firm.

6 (a) Briefly explain each of the following terms:

(i)   Shareholder Value Analysis (SVA)

(ii)   Market Value Added (MVA)
(iii) Economic Value Added (EVA)

(b) How do Market Value Added (MVA) and Economic Value Added (EVA) compare?

Practice questions

7 **Asset Valuation—General.** Your client is considering purchasing an asset which is expected to return a cash flow of £1,250 at the end of each year for the next five years. At the end of year five it is estimated that the asset would have a net realisable value (after selling expenses) of £500.
To purchase this asset your client would have to cash in some other investments, estimated to be of a similar risk category, on which he is currently earning an annual rate of return of 7 per cent. You are required to:

(a) Identify the relevant cash flows and their timings.
(b) Advise your client of the maximum price he should pay to purchase the asset.

Calculations should be to the nearest £. State clearly any assumptions you make.

8 **Bond Valuation.** MacIntyre Industries issued a £100 par value 20 year bond with a 10 per cent coupon five years ago.
(a) Assuming annual interest payments, what is the value of the bond today if the required rate of return is currently: (i) 8 per cent; (ii) 10 per cent; and (iii) 12 per cent? Your answer should show for each case whether the bond is trading at a premium, par or at a discount.
(b) What is the value of the bond, using its coupon rate, if interest is paid semi-annually?
(c) If the bond is currently trading at £108, calculate its yield to maturity (YTM)—to the nearest whole per cent.

9 **Preference Share Valuation.** MacIntyre Industries has preference shares at a nominal value of £2.00 on which it pays an annual dividend of 8 per cent. If investors holding similar risk shares currently earn a return of 6 per cent, determine the current value of MacIntyre's preference shares.

Test questions

10 **Equity Share Valuation,** (a) The Sci-Fi Entertainment Company currently pays a dividend on its ordinary shares of £0.12 per share. The required rate of return in the market on such shares is 9 per cent. Calculate the value of an ordinary share assuming the following conditions:

1) zero dividend growth;
2) a constant dividend growth rate of 4 per cent forever; and
3) a constant dividend growth rate of 4 per cent per year for the next three years

followed by a constant annual growth rate of 3 per cent per year indefinitely thereafter.

(b) State the limitations of the above valuation models.

11 **Equity Share Valuation—P/E Ratio.** (a) Calculate the market value of equity in the following companies using the price/earnings (P/E) multiple:

Company	No. of ordinary shares in issue	Earnings after interest and tax	P/E multiple
A plc	10m	£3.56m	9.84
B plc	24m	£5.64m	11.38
C plc	57m	£10.72m	16.55
D plc	115m	£3 1.97m	18.76

(b) State the limitations of the above approach to company valuation.

12 (a) **Dividend Growth Rate Calculation.** Set out below is the dividend per ordinary share paid by Airtours plc, a major holiday tour operator quoted on the London Stock Exchange, for the years 1992 to 1996. Calculate, to the nearest whole per cent, the average growth rate in dividend per share over the period. Does the share reflect the constant dividend (Gordon) growth rate model? Taxation is to be ignored.

Year	DPS pence
1996	16.00
1995	14.00
1994	12.00
1993	8.81
1992	7.09

(b) **Equity Share Valuation—Various Methods.** The following information has been taken from the annual report and accounts of Airtours plc for the financial year end 1996.

Profit and Loss Account	£000
Profit before interest and tax (PBIT)	76,805
Net interest receivable	10,021
Tax	21,701
Minority interests	223
Preference dividend	3.201

Balance Sheet	£000

Tangible fixed assets	256,428
Investments	16,232
Cash and deposits	425,588
Stocks	6,821
Debtors	235,898
Creditors and other liabilities	733,465
Number of Ordinary shares	125,322,221
P/E ratio (historic—1996)	12.2
P/E ratios (forecast):	
1997	19.9
1998	17.4
EPS (forecast):	
1997	51.0p
1998	58.2p

Required:

Calculate the value of an ordinary share in Airtours plc according to the following methods:

(i) Net assets;
(ii) Price/earnings ratio. Use the historic P/E ratio for 1996 and compare this with valuations using the forecast P/E ratios for 1997 and 1998.

(c) Check the current P/E ratio and share price in the *Financial Times.* You will find Airtours listed in the Leisure and Hotels sector. How do they compare with the figures you calculated in (b) above?

Taxation is to be ignored.

13 **Equity Share Valuation—Various Methods.** CDC Ltd owns a chain of tyre and exhaust fitting garages in the West of England. The company has been approached by ATD plc, which owns a large chain of petrol stations, with a view to a takeover of CDC Ltd. ATD plc is prepared to make an offer in cash or a share-for-share exchange. The most recent accounts of CDC Ltd are summarised below:

Profit and Loss Account for the year ended 30 November 19×1

	£m
Turnover	18.7
Profit before interest and tax	6.4
Interest	1.6
Profit before tax	4.8
Corporation Tax	1.2
Net profit after taxation	3.6
Dividend	1.0
Retained profit	2.6

Balance Sheet as at 30 November 19×1

	£m	£m	£m
Fixed Assets			
Freehold land and premises at cost		4.6	
Less accumulated depreciation		0.6	4.0
Plant and machinery at cost		9.5	
Less accumulated depreciation		3.6	5.9
			9.9
Current Assets			
Stock at cost		2.8	
Debtors		0.4	
Bank		2.6	
		5.8	
Less: creditors amounts due within one year			
Trade creditors	4.3		
Dividends	1.0		
Corporation Tax	1.2	6.5	(0.7)
Total assets less current liabilities			9.2
Less: creditors amounts due beyond one year			
Loans			3.6
Net assets			5.6
Share capital and reserves			
Ordinary £1 shares			2.0
Profit and loss account			3.6
Equity shareholders' funds			5.6

The accountant for CDC Ltd has estimated the future free cash flows of the company to be as follows:

	19×2	19×3	19×4	19×5	19×6
£m	4.4	4.6	4.9	5.0	5.4

Free cash flows for the 12 years after 19×6 are estimated to be the same as 19×6. The company's overall cost of capital is 10 per cent.
CDC Ltd has recently had a professional valuer establish the current resale value of its assets. The current resale value of each asset was as follows:

	£m
Freehold land and premises	18.2
Plant and machinery	4.2
Stock	3.4

The current resale values of the remaining assets are considered to be in line with their book values.

A company which is listed on the Stock Exchange and which is in the same business as CDC Ltd has a *gross* dividend yield of 5 per cent and a price earnings ratio of 11 times.

Assume a standard rate of income tax of 25 per cent. (Hint: multiply the DPS by a factor of 100/75 to give the gross DPS).

Required:

(a) Calculate the value of a share in CDC Ltd using the following methods:

   (i)   Net asset methods (book value and market value)
   (ii) Dividend valuation model
   (iii) Price earnings ratio
   (iv) Free cash flows

(b) Briefly evaluate each of the share valuation methods above.

Practical project

   Obtain a copy of the most recent annual report and accounts of a company in a business sector relevant to your studies. Annual reports for many of the leading companies can be obtained free of charge from the Financial Times Annual Reports Service or by contacting the company directly. Most leading companies also have an online service where company information, including annual reports and accounts, is available on the Internet. In addition, survey the financial media for information relevant to your company, particularly any information relating to its future prospects.

   Based on your research:

1 Determine the annual and average compound growth rate in dividends per share over the past five years. Does the growth rate conform to the constant growth rate model? How does the company's dividend per share compare with other companies in the same sector? Ignore taxation in your calculations.

2 Check if the company has preference shares. How is the preference dividend calculated?

3 Determine the relevant EPS and P/E ratios. How do they compare with other companies in the same business sector and with the averages for the sector overall?

4 Determine the value of the company's ordinary share using the net assets and P/E ratio methods. Can you obtain forecast or forward EPS and P/E ratios? If so, calculate the share value using the forecast ratios. How do the valuations compare with the historic data? Do the company's assets include intangibles

such as brands, copyrights, patents and trademarks? Is the basis
of valuation stated?

5 Compare and contrast your findings with the current share value
quoted in the financial media. Can you explain any variations?
Do you consider the share to be a worthwhile investment? Give
your reasons.

6 Do the reports give details on executive incentive schemes? Are
they linked to the creation of shareholder value?

Keep your report and analysis for future reference.

CASE STUDY 2

Share Valuation—Carlson Pharmaceuticals plc

The dividend per share for Carlson Pharmaceuticals plc—a
company engaged in the research, development and manufacture of
medical drugs—for the past five years is set out below:

Year	Dividend per Share (DPS)
1999	£0.15
1998	£0.13
1997	£0.12
1996	£0.11
1995	£0.10

The Board of Directors currently expects that the future dividend
growth rate will continue indefinitely, at the same rate as in the past.
Carlson's financial manager has determined that, at the present time,
the risk-free rate, R_f, is 7 per cent, the market return, ER_m, is 15 per
cent, and Carlson's beta, β, is 1.37.

Using the above information you are required to:

1 Calculate the current value of the company's share.

2 The Board of Carlson has just announced that the company has
achieved a breakthrough in its therapeutic drug technologies for
some of the major forms of cancer. This medical advance, which
it has patented, will give it a considerable competitive advantage
in the market-place for many years to come.

The directors anticipate that this breakthrough will now enable
the company to increase its dividend payments to shareholders
by an additional 5 per cent per year indefinitely. At this stage,
the investors' required rate of return will remain unchanged.
Calculate the new share value and comment on the difference in
share value between (1) and (2).

3 Suppose that investors perceive an increased risk element in the firm, as a result of the new technology, which causes the firm's beta to increase to 1.50. If the risk-free rate, R_f, and the market return; ER_m, are to remain unchanged, and ignoring any increase in dividend returns, show how this increase in risk is likely to affect Carlson's share value.

4 It is unlikely that an investment decision would have an effect exclusively on either the firm's risk or its return, more likely both aspects will be affected simultaneously. Recalculate the share's value assuming the scenario of an increase in dividends, as stated in (2) above, combined with the simultaneous increase in risk as indicated in (3) above.

5 Comment on your findings. Include comments on how accurate you consider your valuations to be, and identify what factors could possibly be the cause of significant errors in your valuations.

NOTES

1 For convenience we are working in discrete timeframes of one year.

2 Alternatively, the basic redeemable bond valuation model can be expressed as:

$$BV_0 = \left[\sum_{t=1}^{n} \frac{I_t}{(1+r)^t} \right] + \frac{P_n}{(1+r)^n}$$

3 Financial Reporting Standard 4—Capital Instruments.

4 Alternatively,

$$SV_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

5 In the UK dividends are, for all practical purposes, paid to the shareholder on a net basis, that is, after deduction of tax at the lower income tax rate by the company. Yet it is the return before tax, that is the gross dividend return or yield, which is often more useful to the shareholder to compare with many other investments on which returns are usually quoted gross. The net dividend per share can be converted to a gross dividend per share by multiplying by $1/(1-t)$ where t=the relevant tax rate. For example, if the tax rate is 10 per cent and a net dividend per share of £0.18 is paid, the gross dividend per share would be [£0.18× $(1/1-1)$]=£0.18×1.11=£0.20.

6 Financial Reporting Exposure Draft 12, subsequently replaced by Financial Reporting Standard (FRS) 10, 'Goodwill and Intangible Assets', December 1977.

7 Source: Annual Report 1996 and financial media.

8 Newcastle United Plc, listing prospectus, 28 February 1997.

9 'America's Best Wealth Creators', *Fortune,* 28 November 1994.

FURTHER READING

Specialised investment textbooks usually provide the main source of further reading on valuation topics However, some of them can be very mathematical in their approach.

A very useful introduction to investment theory and valuation in general is provided by:
• *Investments: An Introduction* . Mayo, H.B., 5th edition, The Dryden Press, 1997.

A general reader on investments is:

he Investments Reader . Kolb, R.W., 2nd edition, Blackwell, 1995.

For a slightly more advanced but nonetheless readable treatment see:

nvestments . Bodie, Z., Kane, A. and Marcus, A.J., 2nd edition, Irwin, 1992.

On risk and return and valuation see:

Risk and Return: Start with the Building Blocks.' Siegel, J., *Mastering Finance ,* Issue 1, Financial Times, 1997.

Further insights into Economic Value Added (EVA) and other topical valuation models are provided in:
• 'EVA's Charm as a Performance Measure.' Milbourn, T., *Mastering Finance ,* Issue 5, Financial Times. 1997.
• 'Motivations to Manage Value.' Monnery, N., *Mastering Finance ,* Issue 5, Financial Times, 1997.
• 'Using Economic Profit in Assessing Business Performance.' Mills, R., Rowbotham, S. and Robertson, J., *Management Accounting ,* November 1998.

REFERENCES

Blair, A. 'EVA Fever.' *Management Today ,* January 1997.

Financial Reporting Standard 14. *Earnings Per Share* . Accounting Standards Board, October 1998.

Gordon, M.J. *The Investment, Financing and Valuation of a Corporation* . Irwin, 1962.

Hawanini, G. and Vora, A. 'Yield Approximations: an Historical Perspective.' *Journal of Finance ,* March 1982.

Jackson, T. 'A Serving of Added Value.' *Financial Times ,* 13 January 1997.

Mills, R. 'Strategic Value Analysis: Linking Finance and Strategy.' *Management Accounting ,* April 1995.

Mills, R. and Print, C. 'Strategic Value Analysis: Shareholder Value and Economic Value Added—What's the Difference?' *Management Accounting ,* February 1995.

Mills, R.W., Robertson, J. and Ward, T. 'Strategic Value Analysis: Trying to Run Before

You Can Walk.' *Management Accounting ,* November 1992.

Rappaport, A. *Creating Shareholder Value: The New Standard Business Performance .* The Free Press, 1986.

Tully, S. 'The Real Key to Creating Wealth.' *Fortune ,* 30 September 1993.

part three
FINANCIAL ANALYSIS AND PERFORMANCE EVALUATION

PART 3 CONTAINS THE FOLLOWING:
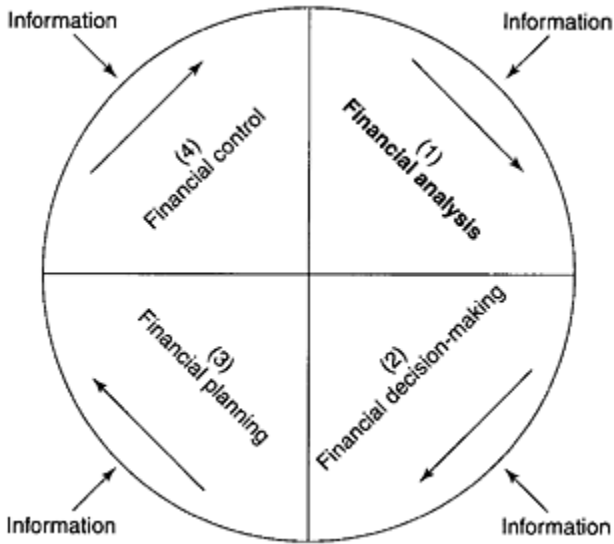
Part 3 diagram The financial management process: **financial analysis**

In this part we begin our examination of the financial management process proper. The various stages of the financial management process model were first introduced in Chapter 1.

Chapter 9 examines the preliminary, diagnostic stage of the process, which is essentially an analysis and review to evaluate the firm's past, current and anticipated future financial performance and financial condition.

The outcome of this analysis stage will shape the firm's future financial decisions and plans.

This part concludes with an integrative case study on financial analysis and performance evaluation.

9
FINANCIAL ANALYSIS AND PERFORMANCE EVALUATION

This chapter provides an introduction to corporate financial analysis and performance evaluation. It covers the following topics:

an overview of financial analysis and performance evaluation;
the parties interested in financial analysis;
a framework for financial analysis;
the tools and techniques of financial analysis;
the limitations of financial analysis;
corporate failure;
special financial conditions.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the nature and role of financial analysis;
2 understand and apply the tools and techniques of financial analysis;
3 recognise the limitations of financial analysis;
4 appreciate the process of corporate failure;
5 recognise the special financial conditions of overtrading and undertrading.

OVERVIEW

Recall from Chapter 1, when we introduced the financial management process, that the initial stage in the process is a **financial analysis** or review of the firm. Financial analysis is an essential first step towards gaining a sound understanding of a business (e.g one's own or a competitor's)—its financial strengths and weaknesses, its financial opportunities and risks.

F**inancial analysis** is the evaluation of a firm's past, present and anticipated future **financial performance** and **financial condition.** Its objectives are to identify the firm's financial strengths and weaknesses and to provide the essential foundation for financial decision-making and planning.

F**inancial ratios** are the principal tools of financial analysis and they can be used by a variety of people to help diagnose the financial well-being of a firm.

Interested parties, such as accountants, analysts, bankers, managers, investors and owners, use financial ratios as a tool to help evaluate a firm's financial performance and financial condition and to compare these with other like firms or with itself over time. As we shall see, it is helpful in financial analysis to distinguish between financial performance and financial condition. *Profitability ratios,* for example, measure financial performance, whereas *liquidity ratios* measure financial condition.

It is important to remember that financial analysis is much more than a number-crunching exercise. It requires interpretative skills to assess future strategic potential as well as evaluating past performance.

INTERESTED PARTIES

The various people who might be expected to employ financial analysis skills can be grouped as follows:

- *Analysts and advisers* (accountants, investment analysts, credit rating agencies);
- *Business contacts* (creditors, customers, employees, suppliers, trade unions);
- *Investors* (banks, debenture holders, financial institutions, shareholders);
- *Others* (competitors, government agencies e.g. tax authorities, other public bodies and society in general).

Each party will be interested in different aspects of the firm's finances. For example, *lenders* will be particularly interested in:

1 the firm's ability to meet loan repayments plus interest, in other words in the firm's *liquidity* and cash flow position;
2 the level of existing borrowings, that is in the firm's *gearing* position; and
3 the assets available as *security* for the loan.

In contrast, employees and trades unions will be primarily interested in issues of job security and wage negotiations. Shareholders will be concerned with the firm's ability to pay and grow dividends and increase the value of the firm's shares.

A FRAMEWORK FOR ANALYSIS

To gain an understanding of a firm's financial position we will essentially seek to find answers to four key questions which we use to develop a general framework for financial analysis:

1 Is this business making money, that is, is it *profitable* ?
2 Can this business pay its bills on time, that is, is it *liquid* ?
3 Is this business using its assets productively, that is, is it *operating efficiently* ?
4 Is this business overly dependent on borrowed money, that is, is it too *highly geared* ?

We will use a **selection of ratios** to examine a firm's finances in order to provide answers

to the above questions. Specifically we will develop ratios to measure:

1 profitability;
2 liquidity;
3 operating efficiency;
4 capital structure (gearing)

This approach to financial analysis can be related to the financial objectives we discussed in Chapter 1. Recall that these were related to *profitability, liquidity* and *capital structure.* If objectives are set specifically in these terms, then financial ratio analysis can be used to measure progress towards their achievement.

It should be noted that there are many ways of presenting financial ratios. They can, for example, be shown in the form of 2:1, 1:1, that is, like football scores, or as percentages, or as so many times.

RISK AND RETURN

Two of the key outcomes which the analyst will hope to achieve from the analysis is an assessment of the firm's **level of return** and its **level of risk.** Recall from preceding chapters that the concepts of risk and return are intimately connected. There exists a positive correlation between them and you cannot look at either in isolation, seeking higher returns usually means accepting higher risk and vice versa.

In financial ratio analysis, *profitability ratios help measure a firm's financial return,* while *liquidity, efficiency and gearing ratios help measure financial risk.*

PERFORMANCE MEASURES

It is important to bear in mind that performance measures are only as good as the information on which they are based—garbage in, garbage out (GIGO). Before proceeding with our examination of financial ratios, it will be helpful to consider what, in general terms, constitutes a 'good' performance measure.

The 'what' and the 'how' of performance measurement

In designing effective performance measures, two key issues need to be clarified:

1 **Specify the appropriate unit or model for measurement.** This involves a definition of *what* precisely it is we are trying to measure: is it the performance of an individual manager? The performance of a team or group? Or is it the performance of a specific business unit or division?
2 **Specify a relevant and appropriate performance measure.** This involves a clear definition of *how* the performance of the chosen unit or model is going to be measured: what is the most appropriate measure or indicator?

FINANCIAL RATIOS

Financial ratios are the main **diagnostic tools** of financial analysis. We use them to evaluate a firm's financial health and performance, to check its 'financial vital signs'. However, a word of caution is appropriate at this stage, financial ratios, while very useful analytical tools, do have their **limitations** as we shall see later in this chapter. Ratios need to be applied with care and more importantly their results should be interpreted with care. Financial ratios only tell one part of the story as far as a firm's overall business performance is concerned.

As is the case with so many financial and non-financial business ratios, there is often no definitive answer as to which is *the* best measure to use in many cases, but you should be aware of the alternatives available and some of the ambiguities associated with them. Using different methods will clearly produce different results, but it is often at the discretion of the interested party to define the ratio that best suits the objectives of their analysis.

Financial analysis can therefore be a very *subjective process.* However, for now, we shall concentrate on the techniques of calculating the various ratios and their relevance in the process of financial analysis.

To demonstrate the techniques of financial analysis we shall use as an example the profit and loss accounts and balance sheets of a fictitious company, Bio-Tech Enterprises Ltd, for the years 19×9 and 19×8 as presented below. We will first calculate the ratios for 19×8. In the exercises which follow you should calculate similar ratios for 19×9 and compare them with those for 19×8. A complete solution is given in Appendix B.

Financial analysis—Bio-Tech Enterprises Ltd

Bio-Tech Enterprises Ltd is a small but rapidly growing company involved in the design, manufacture and supply of medical and scientific equipment and consumable supplies to hospitals, research, clinical and industrial laboratories. Its financial results for the past two years were as follows:

BIO-TECH ENTERPRISES LTD

Profit and Loss Account for year ended 31 December	*19×9 £000s*	*19×8 £000s*
Turnover	3,573	2,320
Cost of Sales	2,036	1,206
Gross Profit	*1,536*	*1,114*
Marketing and distribution costs	679	394
Administration expenses	322	186
Other operating costs	214	116
Operating Profit	*322*	*418*
Interest Payable	140	80
Profit Before Tax	*182*	*338*
Tax	49	91

Profit for the Year	*133*	*247*
Dividends	53	99
Retained Profit for Year	*80*	*148*

BIO-TECH ENTERPRISES LTD

Balance Sheet	*19×9*	*19×8*
as at 31 December	*£000s*	*£000s*
FIXED ASSETS		
Tangible Assets	1,190	950
	1,190	*950*
CURRENT ASSETS		
Stocks	509	205
Debtors	607	290
Cash and bank	18	63
	1134	558
CURRENT LIABILITIES		
Creditors: Amounts falling due within one year	852	437
Net Current Assets (Liabilities)	282	121
Total Assets less Current Liabilities	*1,472*	*1,071*
NON-CURRENT LIABILITIES		
Creditors: Amounts falling due after more than one year:		
Loans	822	501
NET ASSETS	*650*	*570*
CAPITAL AND RESERVES		
Called up share capital (500,000 ordinary shares of £1 each)	500	500
Profit and loss account	150	70
Equity Shareholders' Funds	*650*	*570*

We will begin by analysing Bio-Tech's profitability. For ease of presentation in calculating ratios all money figures are shown in £000s, unless otherwise stated.

Profitability assessment

A study of the following ratios will help answer Question 1 in our framework for analysis: is this business making money and earning a satisfactory return on its investment? Profitability is the one area where, without exception, the higher the ratios the better.

Return on investment (ROI)

   This is also known as the **'primary ratio'.** It is also sometimes referred to as *return on assets (ROA)* or *return on capital employed (ROCE).* However expressed, the ratio is attempting to measure the overall return the firm is generating on the amount of money invested in its assets.

ROI can be something of a controversial ratio as both its component parts, profit and investment, can be ambiguous. There are also many ways of calculating ROI and a common method is:

$$\frac{\text{Profit before interest \& tax (PBIT)}}{\text{Investment (total assets – current liabilities)}} \times 100 = \%$$

This method, by using a profit *before* interest and tax figure, tends to avoid distortions due to different financing policies, as interest and tax charges depend on the financing structure of the firm. The more money a firm borrows, the greater will be the interest charge in the profit and loss account. Taxation charges will be affected by the degree of tax relief granted on qualifying loan interest, as well as the tax rates and rules currently in operation. This method also facilitates comparisons between firms with differing capital structures.

Depending on the availability of information, investment could also be calculated on an *average basis.* For example, if more than one year's figures are available, average investment could be calculated as:

(Investment at beginning of year+investment at end of year)/2

This highlights another difficulty when using a ratio in which the numerator and the denominator are taken from separate financial statements. In the case of ROI the numerator (profit) is taken from the profit and loss account which is a period statement showing the amount of profit earned over a defined *period of time.*

The denominator is taken from the balance sheet, which is a point of time statement showing asset and liability balances *at a single point in time,* for example, as at 31 December. These balances may not be representative of the balances throughout the accounting period, thus average investment figures during the accounting period would be more compatible with the total profit figure for the same period, if they are available.

For Bio-Tech Enterprises the ROI ratio for 19×8 is as follows:

$$\frac{£418*}{£1,071} \times 100 = 39.0\%$$

*(Appears as 'operating profit' in published accounts.)

As mentioned above, some of the difficulties with this ratio (see also the net profit ratio below) relate to the definition and interpretation of both the numerator (profit) and the denominator (investment). In an effort to clarify the picture, we will look first at what is meant by 'profit' and then we will consider what is meant by 'investment'.

What is meant by profit? Should the profit figure used be before tax or after tax? You will note that the term 'Operating Profit' appears in published accounts, this is the profit figure before deduction of interest and tax. Some analysts and managers believe that taxation, many aspects of which are outside the firm's control, can distort the analysis and so it is best omitted.

Other interested parties such as shareholders would consider that it is the profit after

tax figure which is important as their dividends are paid out of after-tax profits. Should profit include or exclude any non-recurring items, such as profit on disposal of assets? What about profits from non-trading sources, for example, property rental or investment income, should these be included?

What is meant by investment? Is investment measured by total assets or net assets, that is total assets less current liabilities? Should intangible assets such as patents, trademarks, brands and goodwill be included as part of the investment figure?

There is also the question of asset values. Have assets been fairly valued, including appropriate revaluations? Are asset values based on closing balance sheet valuations only or has an average investment figure been used? What about the treatment of high value assets which may be leased and which do not appear on the balance sheet?

What about the replacement of essential fixed assets? Capital expenditure may be deferred to improve the appearance of the ratio in the short term by lowering the denominator in the ratio. It will be to the detriment of the business and to shareholder value in the longer term if essential fixed assets are not properly maintained and replaced when necessary. This issue is particularly relevant where management rewards are linked to a performance measure of this kind: the higher the ratio the higher their rewards.

These are just some of the issues which can make the determination of the ROI and related ratios controversial, making the task of financial analysis more confusing and challenging.

Gross profit ratio

This is a more straightforward ratio which indicates the gross profit margin a firm is earning on its sales. In business terminology sales, net of any returns, are frequently referred to as *turnover*. Gross profit is simply the excess of the sales value over the cost to the firm (of buying in or manufacturing) the same goods.

Thus gross profit is the profit earned before deduction of operating expenses such as administration and selling expenses. It represents the *mark-up* on goods and products sold and is thus a reflection of price-setting policies.

The gross profit (GP) ratio is a very important profitability measure for any business, it essentially measures the **trading effectiveness** and basic **profit earning potential** of a firm. Should a firm not be earning a gross profit then there is no point in staying in business. The GP ratio is conventionally calculated in percentage form as follows:

$$\frac{\text{Gross profit}}{\text{Sales (Turnover)}} \times 100 = \%$$

For Bio-Tech the 19×8 ratio is:

$$\frac{£1,114}{£2,320} \times 100 = 48.0\%$$

The GP ratio will be affected by factors such as the following:

1 changes in selling prices;
2 changes in buying policies and practices;

3 changes in sales mix, that is, the respective proportions of the range of products sold;

4 stock valuation methods.

Net profit ratio

Net profit is gross profit minus operating costs: it is the profit remaining after all the firm's administrative, marketing, distribution and other operating costs have been deducted from gross profit. It should be noted that 'net profit' in financial management is also frequently referred to as **earnings.**

Similar to the ROI ratio, there are several ways of calculating this ratio, depending on how we wish to define net profit or earnings. Is it operating profit before interest and tax, or profit after interest and tax, or profit after interest but before tax? Should net profit include profits from non-trading activities such as property rental income and investment income?

Here are a few net profit or earnings measures which are commonly applied; again they are conventionally calculated as percentages:

(1) $\dfrac{\text{Profit } \textit{before} \text{ interest and tax (PBIT)}}{\text{Sales}} \times 100 = \%$

(2) $\dfrac{\text{Profit } \textit{after} \text{ interest and tax (PAIT)}}{\text{Sales}} \times 100 = \%$

Often the numerator will be referred to as earnings before or earnings after as the case may be. For example, earnings before interest and tax (EBIT) may be used instead of PBIT, but they both essentially mean the same thing.

As we mentioned in relation to ROI, method (1) avoids distortions due to different financing policies.

For Bio-Tech the respective calculations for 19×8 are:

(1) $\dfrac{£418}{£2,320} \times 100 = 18.0\%$

(2) $\dfrac{£247}{£2,320} \times 100 = 10.6\%$

Return on equity (ROE)

Return on equity (ROE), or return on shareholders' funds (ROSF), measures the return the firm is earning on the equity funds invested by its shareholders—the firm's owners. In this case net profit, or earnings, represents the *residual profit* left, and available for distribution to the ordinary shareholders after provision has been made for all other financial obligations such as taxation, interest and any preference share dividend.

$$\dfrac{\text{Profit } \textit{after} \text{ interest \& tax (PAIT)}}{\text{Ordinary shareholders' funds*}} \times 100 = \%$$

(*Ordinary share capital+reserves.)

The ROE for Bio-Tech is:

$$\frac{£247}{£570} \times 100 = 43.3\%$$

The next three ratios are often categorised as **investment ratios** because they are the key ratios widely used by investors, present and potential, in making their decisions as to the attractiveness of a firm's shares as an investment. They are included here under profitability because they do largely measure the return on a company's shares, specifically from the investor's perspective.

Earnings per share (EPS)

Earnings per share (EPS) was introduced in Chapter 8 in connection with earnings-based approaches to valuation. From a financial analysis viewpoint, the EPS ratio is widely used by investment analysts, managers and shareholders (both present and potential) to evaluate how profitably the company is using investors' money; it specifically reveals how much money the company is earning for every share invested.

Earnings per share (EPS) should be reported in the annual accounts of all stock market listed companies in accordance with **Financial Reporting Standard** (FRS) 14— **Earnings Per Share** issued by the Accounting Standards Board (ASB).

A company's basic earnings per share (EPS) is, according to Financial Reporting Standard (FRS) 14, 'calculated by dividing the net profit or loss attributable to ordinary shareholders by the weighted average number of ordinary shares outstanding during the period.' Net profit (or loss) is essentially the net profit (or loss) for the period after deduction of tax, exceptional and extraordinary items, minority interests and any preference dividends. The weighted average number of ordinary shares reflects the fact that a number of shares in issue may have varied during the relevant period, for example, as a result of new share issues or buybacks. However, for our practical purposes, we will largely ignore this 'weighted average' complication.

Essentially EPS is calculated as follows:

$$\frac{\text{Net profit or loss for the period attributable to ordinary shareholders}}{\text{Weighted average number of ordinary shares outstanding during the period}} = \text{pence}$$

Bio-Tech's EPS is determined as:

$$\frac{£247}{500} = 49.4\text{p}$$

The ratio represents the number of pence earned for each ordinary share issued. As we mentioned when we studied the use of the P/E ratio in equity valuation, there is more than one way to calculate EPS. For example, the Institute of Investment Management and Research (IIMR) published a 'statement of investment practice' in September 1993 in which it defined a 'headline' earnings figure. The IIMR headline earnings figure consists of all the trading profits and losses for the year, including interest, and profits and losses

arising from operations discontinued or acquired during the year. It does not include any profits or losses arising from the sale or termination of a discontinued operation, or from the sale of fixed assets or businesses or from any permanent diminution in their value or write-off.

This headline EPS figure is to be reported separately in the annual accounts of listed companies in addition to the FRS 14 basis.

The P/E ratios for most listed companies are published daily by the Financial Times Share Information Service and the IIMR earnings figure is the one which the *Financial Times* uses in reporting its daily calculations of price/earnings (P/E) ratios.

Price earnings (P/E) ratio

The P/E ratio was also examined in some depth in Chapter 8, primarily as a valuation tool. In the context of financial analysis, the ratio is used by investment analysts, managers and shareholders, essentially to evaluate the earnings growth potential of the company and is closely related to the EPS ratio.

Recall that the P/E ratio is often referred to as the **earnings multiple,** as it shows the number which the EPS must be multiplied by to arrive at the share's current market price. It is determined as follows:

$$\text{P/E ratio} = \frac{\text{Market price of share}}{\text{Earnings per share (EPS)}}$$

Since Bio-Tech is not a quoted company, no market share price exists. However, for illustration purposes suppose the market value of a share for 19×8 was £3.50, then the P/E ratio would be calculated as:

$$\frac{£3.50}{49.4\text{p}} = 7.1$$

As the market price of most shares will fluctuate (some will be more volatile than others) some analysts prefer to use an *average share price* for the period under review.

You will remember that the P/E ratio is a favoured tool for equity valuation where an investor can obtain a share valuation by multiplying a company's EPS by its P/E ratio.

In circumstances where no quoted share price exists for a company, a common practice is to try and find a suitable proxy or look-a-like company (one in the same line of business and of similar size and risk) and apply its P/E ratio, perhaps with some subjective modification, to obtain an approximate equity valuation.

Thus an alternative way of calculating Bio-Tech's share price would be to find a comparable company and apply its P/E ratio, again probably with some adjustment to allow for individual circumstances. The P/E ratios of similar type companies would clearly be useful as comparative indicators of Bio-Tech's performance.

In using the P/E ratio as a performance indicator care should be taken to distinguish between *historical* and *forward* P/E ratios. The P/E ratios published in the financial press are typically historical, as the figures are calculated using the latest year's published accounts and these may include some unusual or non-recurring features. Forward P/E

ratios in contrast are based on market assessments of future earnings.

It is important to appreciate that stock markets are future-oriented, they are all about evaluating *future expectations* and that forward P/E ratios represent the market's consensus view of the company's *future* growth prospects. The forward P/E ratio is thus, in contrast to many other indicators, a future-oriented performance indicator.

Dividend yield

The dividend yield measures the return (dividend) received by the investor (ordinary shareholder) in relation to the share's market value or price. It is calculated as:

$$\frac{\text{Dividend per ordinary share}}{\text{Market price per ordinary share}} = \%$$

Using the assumed market price of £3.50 as above, the dividend yield for Bio-Tech for 19×8 would be determined as:

$$\frac{19.8\text{p*}}{£3.50} = 5.7\%$$

> * (Dividend/number of shares=£99,000/500,000)

As we know from our studies of risk and return, the yield or return on a share is inversely related to its price. For a quoted company, if its share price in the market is rising, the dividend yield will be falling. However, a rising price gives the investor the opportunity for an increased capital gain.

In the above example we have ignored any taxation effects in the dividend yield calculation. Under UK taxation shareholders effectively receive their dividends net of tax. Tax at the lower income tax rate (which may be changed from time to time in the Chancellor of the Exchequer's annual budget) is deducted by the company and paid to the Inland Revenue.

However, shareholders and investors frequently prefer to calculate dividend yield on a '*gross*' basis, where gross dividend is the dividend calculated before any deductions for tax. Gross dividend yield is used by investors to make the return more comparable with returns from other investments (which are usually quoted gross, that is, before any tax effects) in which the investor may be interested.

For example, if the dividend per ordinary share is given as a net figure (as in the Bio-Tech case above) it can be converted to a gross figure by multiplying it by 1/(1−t), where t=the relevant tax rate. Thus a net dividend per share of £0.18 would be equivalent to a gross dividend per share of £0.20, if the relevant tax rate is 10 per cent, £0.18×1/(1−0.10).

For Bio-Tech the gross dividend yield for 19×8, assuming a lower tax rate of 10 per cent, would be:

$$19.8p \times 1/(1-0.10) = 22p$$

$$\frac{22p}{£3.50} \times 100 = 6.3\%$$

EXERCISE 1 —PROFITABILITY ANALYSIS

For practice you should now attempt to complete the profitability analysis of Bio-Tech by calculating the same range of profitability ratios for 19×9. Where relevant, assume the market price of Bio-Tech's ordinary share at the end of 19×9 to be £3.00. Keep your answers for use later. A comprehensive ratio analysis solution is given in Appendix B.

Liquidity assessment

A study of the following ratios will help answer Question 2 in our framework for financial analysis: can this business pay its bills on time? Essentially liquidity ratios will be used to assess an organisation's ability to 'pay its way'. Liquidity, or **solvency,** means being able to satisfy financial obligations, without difficulty, as and when they become due.

A firm is considered technically **insolvent** if it is unable to settle its debts when they become due for payment. Liquidity is a measure of how easily or speedily an asset can be converted into cash without any significant loss of value.

In liquidity management we are concerned with how the business manages its short-term funds. These are the funds which are continuously circulating through the business and of which it needs to have a constant flow to keep it running smoothly on a day-to-day basis. By comparison, gearing or capital structure management, as we shall see shortly, is
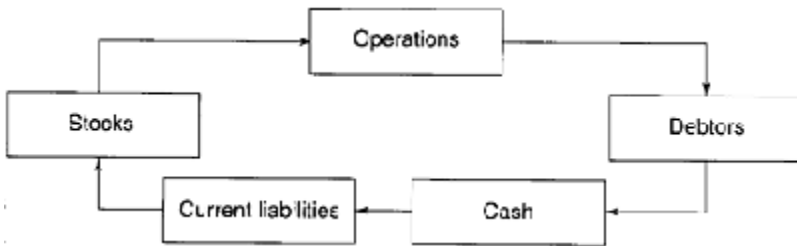
Figure 9.1 Short-term funds flow

to do with managing the firm's long-term funding and solvency. A model of the short-term funds flow is illustrated in Figure 9.1.

As we have seen, profitability measures focus on assessing the firm's return, actual or potential, in contrast liquidity measures focus more on **risk assessment.** Profitability

ratios tell us something about a firm's ***financial performance,*** what it has actually achieved. Liquidity ratios are indicative of a firm's ***financial condition,*** the financial state it is in. Like an athlete, performance and condition are closely related: an athlete in poor physical condition is unlikely to achieve an outstanding performance.

Effective liquidity management is of paramount importance for the survival and future development of any organisation, profit-making or not-for-profit. While profitability is clearly extremely important for a commercial enterprise, it is more often a lack of liquidity rather than a lack of profitability which causes a business to fail.

For example, even though a company may be generating profitable sales, it can run into liquidity problems if credit control is weak and the cash is not being collected from customers and/or if too much money is tied up in stocks (raw materials, work-in-progress and finished goods).

In contrast, it is possible for a company to survive—at least in the short term—and weather periodic economic storms, even if it is not making profits, by exercising good liquidity management. This can be done, for example, by managing stocks and debtors efficiently and keeping the levels of both under tight control. Clearly, survival and growth in the longer term require a combination of good profitability and sound liquidity. Like using a map to find your position, a company's financial position in relation to profitability and liquidity can also be plotted on a chart, where the coordinates are degrees of profitability and liquidity as shown in Figure 9.2.

The matrix in Figure 9.2 shows four discrete zones or sectors, in one of which a business firm can theoretically be positioned. It should be appreciated that there are many intermediate shades or degrees of profitability and liquidity. Firms at the extremes, that is, those in zones 1 or 4 are easy enough to identify, it is the intervening zones that are more problematic.

	Liquid	Illiquid
Profitable	(1) Survival and growth	(3) At risk of failure
Non-profitable	(2) Short-term survival possible	(4) High risk of failure

Figure 9.2 Profitability-liquidity matrix

As we shall see later, the central problem with such an analysis is being able to identify the danger signals of potential business failure at an early enough stage so that remedial action can be taken to avoid ultimate failure. Some kind of financial early warning system is desirable.

The safe and desirable zone is clearly that of being liquid and making money, namely zone 1. Here the firm is financially healthy and is well positioned to grow and develop successfully. A firm which finds itself in zone 2, can feasibly survive in the short term but taking action to improve profitability is imperative.

A firm in zone 3, despite making money, is at risk of slipping into liquidation, consequently an action plan to improve liquidity becomes the imperative. Should a firm be located in zone 4, where risk of failure is very high, then, unless some kind of survival or rescue strategy can rapidly put in place, failure is virtually imminent.

We will now proceed to examine the financial ratios commonly used to assess

liquidity.

Working capital

A firm's total capital is found from its balance sheet by subtracting its total liabilities from its total assets. This is represented by the balance sheet equation:

Assets−Liabilities=Capital
A−L=C

Working capital can similarly be found by subtracting current liabilities from current assets:

Current asset−Current liabilities=Working capital
CA−CL=WC

Technically the difference between current assets and current liabilities is a firm's *net working capital,* or *net current assets,* assuming current assets exceed current liabilities. However, in practice, the difference between current assets and current liabilities is often simply referred to as working capital.

Bio-Tech's working capital at the end of 19×8 is calculated as:

£558,000−£437,000=£121,000

Working capital, also known as *circulating capital,* is the amount of money which a business needs to survive on a day-to-day basis. It should be sufficient to cover:

1 paying creditors (without difficulty);
2 allowing trade credit to debtors;
3 carrying adequate stocks.

The key questions are: is the level of working capital positive? Is it sufficient in relation to current liabilities?

Sufficient working capital is needed, not only to be able to pay bills on time (e.g. wages and suppliers), but also to be able to carry sufficient stocks and also to allow debtors a period of credit to pay what they owe.

Working capital is the kind of short-term capital required to finance a firm on a day-to-day basis. It is a key measure of business liquidity. The more working capital a firm has, the less risk there is of the firm not being able to pay its creditors when the bills become due. Conversely the less working capital a firm has, the greater the risk of the firm not being able to pay its creditors when the bills are due. These, and other, aspects of working capital management are explored more fully in Chapters 17 and 18.

Current ratio

This ratio, also called the working capital ratio, measures the relationship between current assets and current liabilities. As current liabilities should technically be paid from

current assets, this ratio highlights the firm's ability to meet its short-term liabilities from its short-term assets. In other words the firm should not have to sell fixed assets to pay suppliers for raw materials: if it does then it is clearly in trouble.

The current ratio will be very important to anyone who is supplying short-term funds to the firm such as banks and trade creditors. It is usually shown in the following way, like a football score with the away score being shown as 1:

Current assets: Current liabilities e.g. 2:1

Bio-Tech's current ratio is:

£558: £437=1.3:1

It is difficult to say what the 'ideal' current ratio should be, and this can be a contentious area, but a 2:1 ratio—where current assets are two times the level of current liabilities—is commonly cited as desirable. However, a ratio less than this does not necessarily suggest that a firm is in financial trouble. It depends on the circumstances of the individual firm and the normal parameters of the business sector in which the firm operates.

Current ratios tend to be sector-specific, that is, different business sectors are likely to have different 'typical' current ratios. For example, what is considered a normal or typical current ratio for a football club, is likely to be different from that for a firm in the retail or manufacturing sectors. Therefore care needs to be taken to ensure that like is being compared with like and that individual ratios are not being considered in isolation.

It is also possible that an apparently healthy current ratio could actually indicate inefficient management of stocks and debtors as these may have been allowed to accumulate. Conversely an apparently low current ratio may be the result of efficient stock and debtor management, as these current assets are being turned over quickly and stock management systems, such as Just In Time (JIT), may be in operation.

Acid test (or quick) ratio

This is a more stringent test of liquidity than the current ratio. It is 'the acid test' of liquidity and compares the firm's quick assets (i.e. current assets less stocks) to its current liabilities. By stripping the stock figures out of the equation, it is suggested that this ratio gives a more immediate indication of the firm's ability to settle its current debts.

The acid test ratio is shown in a similar manner to the current ratio:

Quick assets*:current liabilities e.g. 1:1
*(Quick assets=current assets minus stocks)

The acid test ratio for Bio-Tech is:

£353*: £437=0.8:1
*(£558−£205)

The rationale for omitting stock figures is that they are generally considered to be the current assets which take longest to convert into cash. Stocks (raw materials, work-in-progress and finished goods) are needed to produce saleable products, which in turn are billed to customers, and customers then usually take a period of credit to pay. This conversion process—of turning stocks into cash—especially for a manufacturing concern can sometimes be very protracted.

This ratio may not be so relevant in the case of a supermarket, where stocks are quite readily turned into cash. In fact a supermarket will in all likelihood have a positive cash flow as it will have sold the stock on the shelves and obtained the cash before it is due to pay the supplier.

It should be noted that the use of different **stock valuation methods** (e.g. LIFO and FIFO) can distort comparisons of the current ratio. Again it is difficult to give a norm for what this ratio should be, but a 1:1 ratio is commonly considered desirable: it depends on the characteristics and circumstances of the individual firm.

As with the current ratio, the acid test ratio tends to be sector-specific, where different business sectors will have different norms for the acid test ratio.

The intelligent use of liquidity ratios will enable the firm's management to detect conditions of: **(1) overtrading** (that is, carrying on a level of business activity which cannot be supported financially), and **(2) over-investment** (that is, carrying an excessive volume of assets in relation to the level of business activity). Management can avoid either of these conditions by paying attention to effective liquidity management.

EXERCISE 2 —LIQUIDITY ANALYSIS

For practice you should now attempt to complete the liquidity analysis of Bio-Tech by calculating the same range of liquidity ratios for 19×9. Keep your answers for use later.

Assessment of operational efficiency

Here we are concerned with assessing how efficiently the firm uses its assets (fixed and current) to generate sales and profits. From a purely financial point of view, the only reason a firm invests in assets is to generate value for the business. A study of the following ratios will help answer Question 3 in our framework for financial analysis: is the business using its assets efficiently?

Total asset turnover

Efficiency, or productivity, measures the *outputs* of a system in relation to its *inputs;* the greater the volume of outputs produced from a given level of inputs the more efficient the system. A business invests in assets (resource inputs) to generate sales and profits (outputs). The more sales and profits a business can generate from a given level of investment in assets the more efficient or productive it is.

The total asset turnover ratio measures how efficiently or productively the firm is using its total assets, (fixed assets plus current assets), to generate sales. It is calculated as:

$$\frac{\text{Sales}}{\text{Total assets (fixed + current)}} = \dots \text{ times}$$

Bio-Tech's total asset turnover ratio is calculated as:

$$\frac{£2,320}{£1,508 \ (£950 + £558)} = 1.5 \text{ times}$$

In general terms, the higher the total asset turnover ratio the better; it suggests the business is utilising its assets productively. However, such asset-based ratios (remember the ROI ratio) can be manipulated by deferring investment thus improving the appearance of the ratio.

This is a very short-sighted approach, as not replacing existing assets or not purchasing new assets when necessary may be more damaging in the longer term. Problems could easily arise in relation to a deterioration in, for example, product quality or customer service, with the risk that business could be lost permanently.

Fixed asset turnover

This ratio focuses specifically on measuring the productive use of fixed assets. It is calculated as:

$$\frac{\text{Sales}}{\text{Fixed assets}} = \dots \text{ times}$$

For Bio-Tech this ratio is:

$$\frac{£2,320}{£950} = 2.4 \text{ times}$$

By comparing the total asset turnover ratio with the fixed asset turnover ratio, we can establish how efficiently the total volume of current assets is being used.

Stock turnover ratio

A business can assess how efficiently it is utilising its current asset of stock or inventory to generate sales by calculating its stock turnover ratio. It is calculated by taking the cost of sales for the period (as stocks are also usually valued at a cost price) and dividing this by the *average* of the opening and closing stocks for the same period. The answer is given as the number of times stock has been turned over or replaced during the period.

$$\frac{\text{Cost of sales}}{\text{Average stock*}} = \dots \text{ times}$$

*(Average stock=(opening stock+closing stock)/2.)

$$\frac{£1,206}{£205*} = 5.9 \text{ times}$$

*(As the opening stock figure for 19×8 is not available in this case, an average stock figure cannot be calculated.)

The ratio indicates that Bio-Tech has replaced its stock almost six times during the year. Alternatively it could be said that Bio-Tech generated £5.90 worth of sales for every £1.00 invested in stocks.

It is also helpful to express stock levels in terms of 'days stock held'. Taking Bio-Tech's figures the closing stock of £205,000 represents 62 days' stockholding, determined as follows:

$$\frac{£205}{£1,206} \times 365 = 62 \text{ days}$$

A few points need to be made about the stock turnover ratio:

1 if the ratio is an average figure for the full year, it is important to bear in mind that some stock levels may be subject to significant *seasonal variations* (e.g. toy manufacture);
2 different categories of stocks (e.g. raw materials and finished goods) may have different turnover rates;
3 in some years high *price inflation* (e.g. the increasing price of raw materials) may significantly account for the difference between opening and closing stock values.

A high rate of stock turnover usually indicates efficient use of stocks, the more frequent the turnover, the lower the level of investment in stocks required. A low stock turnover rate may suggest that money is unnecessarily tied up in large stock holdings, or that there is a significant proportion of stock obsolescence or slow-moving stock. In any event, a low stock turn warrants further investigation.

The key task in stock management is to balance stock levels with sales levels and to effectively meet customer demand—the business does not want to risk the loss of sales and customer dissatisfaction as a result of 'stock-outs'. In this connection stock inventory models such as Economic Order Quantity (EOQ) (discussed in Chapter 17) can be employed to complement the stock turnover analysis.

Cash turnover ratio

This ratio is used to indicate how efficiently a business is using its current asset of cash. It is measured similar to stock turnover.

$$\frac{\text{Sales for period}}{\text{Average cash balance*}} = \text{times}$$

*(Opening cash balance+closing cash balance)/2.

Cash turnover for Bio-Tech is:

$$\frac{£2,320}{£63^*} \quad = \quad 36.8 \text{ times}$$

* (Similar calculation to stock turnover: only the closing cash balance for 19×8 is available, therefore, in this case, an average balance cannot be calculated.)

As in the case of stock turnover, a high cash turnover ratio *usually* suggests an efficient use of the firm's cash assets.

Debtor days collection period

When goods and services are sold on credit, the timely collection of cash from customers (debtors) is vitally important to the efficient financial management of any business. A commercial business uses a debtor days ratio to establish how quickly cash is being collected from credit sales.

The ratio is calculated by taking the debtors' balance at the end of the accounting period (or an average figure if this available), dividing this by the **credit sales** for the same period and then multiplying this by 365 days, as follows:

$$\frac{\text{Debtors}}{\text{Credit Sales}} \quad \times \quad 365 \quad = \quad \text{days}$$

Bio-Tech's debtor days ratio (assuming all sales are credit sales) is determined as:

$$\frac{£290}{£2,320} \quad \times \quad 365 \quad = \quad 45.6 \text{ days}$$

For the debtor days ratio, as with so many ratios, there is no universally accepted benchmark of performance, although some analysts suggest that the debtor days figure should not be greater than 1.33 times the firm's normal credit period. For example, if the normal credit period allowed to customers by a firm is 30 days, then the debtor days ratio should not exceed 40 days.

The difficulty often faced by many firms is trying to collect cash promptly from customers, especially important customers, without loss of goodwill or business. Credit practice may often be dictated by the competitiveness of the market in which the firm operates. If customers have a choice of suppliers then they may select the one which offers the longest period of trade credit, other things being equal.

To assist with credit control procedures, all but the smallest of firms will be able to use standard computerised sales ledger packages to produce a periodic **aged debtors' listing.** The aged debtors' list will typically show how much is owed, by whom, and whether the account is considered current or overdue and requires prompt action for collection.

Creditor days payment period

This ratio establishes the length of time it takes the firm to pay its suppliers and is determined as follows:

$$\frac{\text{Creditors}}{\text{Purchases}} \quad \times \quad 365 \quad = \quad \dots \text{ days}$$

Bio-Tech's creditor days ratio is given by:

$$\frac{£437}{£1,206*} \quad \times \quad 365 \quad = \quad 132.3 \text{ days}$$

*(As the purchases figure is not given, cost of sales has been used as a proxy figure.)

By comparing the two ratios of debtor and creditor days we can see if the firm is in the fortunate position of getting longer credit from its suppliers than it allows to its debtors, thus yielding a positive cash flow, or vice versa.

In Bio-Tech's case the difference between creditor and debtor days for 19×8 is positive:

Creditor days−Debtor days=132.3–45.6=86.7 days

The firm takes considerably longer (86.7 days longer, on average) to pay its creditors than it does to obtain payment from its debtors.

It should be noted, however, that at the end of the financial year the creditors figure as shown under current liabilities (i.e. liabilities which have to be settled *within one year from* the balance sheet date) in the accounts is likely to include amounts owing for tax and proposed dividends (and conceivably bank overdraft balances) in addition to normal trade creditors.

If we assume Bio-Tech at the end of 19×8 has no bank overdraft balances and that the creditors figure of £437,000 includes the tax of £91,000 and proposed dividends of £99,000, then the revised *trade* creditor days would be:

$$\frac{£247}{£1,206} \quad \times \quad 365 \quad = \quad 74.8 \text{ days}$$

The period of credit taken from suppliers is an important source of short-term funds for most businesses, particularly small businesses. However, any business clearly should be careful not to abuse the tolerance of suppliers and run the risk of having essential supplies suspended. Nor should the business forgo cash discounts from suppliers for early payment of invoices, as to do so is a costly way of borrowing short-term funds.

The **balance of power in the buyer—supplier relationship** is a dimension which needs to be considered in the interpretation and understanding of both the debtor days and creditor days ratios.

If the buyer is very powerful in relation to the supplier, for example a small firm supplying a large important customer like a major retail chain, then the small firm is virtually at the mercy of the large chain in terms of trying to obtain payment, resulting in a high debtor days figure. On the other hand, if it is the supplier who has the power, as in

the case of a large brewer supplying a small pub, then the supplier is in the position to insist on prompt payment or probably a direct debit arrangement through the bank.

Due to the difficulties often experienced by small companies in obtaining payment from their larger and more powerful customers, the UK government in 1996 introduced a requirement for UK companies to publish their supplier payment policies and performance in their annual reports. In addition, the Late Payment of Commercial Debts Act came into force on 1 November 1998. The Act allows small firms to charge interest of 8 per cent above the base rate on overdue accounts.

EXERCISE 3 —ANALYSIS OF OPERATIONAL EFFICIENCY

You should now attempt to complete the analysis of Bio-Tech's operational efficiency by calculating the same range of efficiency ratios for 19×9. As before, keep your answers for use later.

You will probably have recognised that liquidity and efficiency are intimately connected. For example, both the stock turnover and debtors days ratios indicate the degree of efficiency with which these two current assets are being managed. A low stock turnover ratio and a high debtor days ratio would probably suggest that cash is being unnecessarily tied up in these assets and consequently is not available to pay the bills, thus directly increasing the risk of illiquidity or insolvency.

We will explore these liquidity management issues in more depth when we study working capital management in Part 7 of this text.

Capital structure assessment

A study of the following ratios will help answer Question 4 in our analytical framework, i.e. is this firm overly dependent on borrowed funds?

In a commercial company capital structure ratios measure the relationship between the amount of **debt finance** (money borrowed externally) and the amount of **equity finance** (money provided by the ordinary shareholders) in the company's capital structure.

As was discussed in Chapter 1, the relationship between debt and equity finance is also frequently referred to as the level of **financial gearing** or **leverage.** In terms of returns, a company will normally be obliged to pay a contractually *fixed rate of return* to the providers of its debt or borrowed capital.

The return to equity shareholders will be in the form of *dividend payments,* which are, in contrast, discretionary payments determined by the company's directors. Companies are not obliged to pay their shareholders a dividend.

The objective of the capital structure assessment is to obtain an indication of a firm's **longer-term solvency** and its degree of **financial risk,** thus the main focus here is on the firm's *long-term* funding arrangements. Financial risk is the risk of the firm not being able to pay its financial commitments—for which the ultimate penalty is liquidation.

In basic terms, if the ratios of debt to equity finance appear too high this usually

suggests over-dependence on external financing, and the firm *may* be considered to be at risk financially.

The capital structure ratios we are about to examine would be of interest to lenders and shareholders, to help them assess their risk of advancing capital to the firm.

Figure 9.3 illustrates two firms with differing capital (gearing) structures. Firm A's assets are financed by a high proportion of borrowings, that is debt finance. By comparison Firm B is low geared, its assets are financed largely by equity.
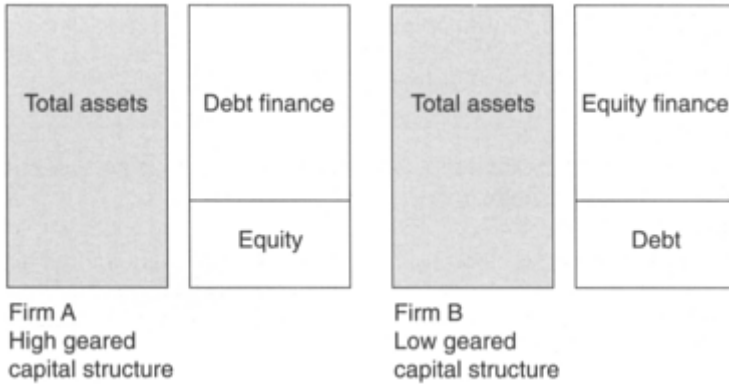
Figure 9.3 Comparative capital structures

Gearing (or leverage) ratio

Equity finance is said to be geared or levered up by the use of debt or fixed-return finance. The financial gearing ratio measures the proportion of debt in relation to equity finance in a firm's capital structure—for this reason the ratio is also frequently called the **debt- equity ratio.** Like the ROI ratio, there are a variety of methods of calculating a gearing ratio, a common method is:

$$\frac{\text{Total debt capital}}{\text{Total debt capital + equity shareholders' funds}} \times \ 100 \ = \ \%$$

Total debt capital includes all long-, medium- and short-term loans. Many analysts would also include any long-term lease commitments with debt capital. Essentially debt will be taken to include all capital on which the company is committed to paying a fixed, or contractually binding, rate of return. Thus in determining a firm's gearing level many analysts also treat preference share capital, if it exists, as debt capital.

Recall from Chapter 4 that preference shares are hybrid securities (part debt and part equity) and as they carry a fixed rate of dividend which is paid prior to the ordinary shareholders' dividend, they are for all practical purposes similar to debt.

However, the preference dividend is distributed out of after-tax profits, thus there is no tax relief or **tax shield** on the dividends, as there is for loan interest. The absence of any tax shield mainly explains why preference shares are not widely adopted as a form of

long-term financing. Calculating the gearing ratio where there is preference share capital in a firm's capital structure would be as follows:

$$\frac{\text{Total debt capital (including preference shares)}}{^*\text{Total debt capital} + \text{equity shareholders' funds}} \times 100 = \%$$

*(The denominator will also include preference shareholders' funds where relevant.)

The gearing ratio for Bio-Tech, in the absence of any preference share capital, is given by:

$$\frac{£501}{£501 + £570} \times 100 = 46.8\%$$

In Bio-Tech's case the debt capital consists only of the long-term loans: we do not know if current liabilities includes any short-term borrowings.

Including any **short-term debt** (bank overdrafts and short-term loans) in the debt proportion of the gearing calculation is a more stringent test of gearing: it provides a more accurate picture of the firm's borrowing position than simply limiting debt to long- and medium-term loans.

Bank overdrafts and short-term loans are an important source of finance for many businesses, particularly small and medium-sized enterprises (SMEs), and tend to become a permanent feature in many SME balance sheets. For all practical purposes they are used as a source of medium- to long-term finance. In addition, bank overdrafts are inherently a more risky source of finance as technically they are repayable on demand.

An alternative method of measuring gearing is simply to calculate a straight debt to equity ratio as follows:

$$\frac{\text{Debt capital}}{\text{Equity capital}} \times 100 = \%$$

The gearing for Bio-Tech using this ratio is:

$$\frac{£501}{£570} \times 100 = 87.9\%$$

As you will appreciate, the company's gearing using this measure is significantly greater than the previous measure.

Where available, the **market values** for debt and equity should be used in the computation of gearing ratios, as there is likely to be a large discrepancy between book values as shown in the balance sheet and actual market values, particularly for the equity capital.

It is worth repeating that the gearing ratio is an important indicator of a firm's longer-term solvency and a key measure of its financial risk. If the ratio reveals a high

proportion of debt finance in the capital structure this may indicate an over-dependence on external financing and financial risk may be high: *high debt usually means high financial risk.* If the debt/equity ratio is greater than 100 per cent then the firm may be considered as highly geared, but, as with the various liquidity measures, this is only a general guide.

Debt finance is considered a more risky source of finance than equity, as the interest on debt has to be paid whether the firm is making money or not—interest is a fixed commitment. The risk is that if a firm is experiencing a difficult trading period, the interest and principal repayments will be an added strain on the firm's cash flows, and the risk of loss (of dividends or even total investment) to shareholders increases.

On the other hand, debt is generally regarded as a cheaper source of finance than equity as interest payments can be charged against pre-tax profits, whereas dividends have to be paid out of after-tax profits.

Debt ratio

This ratio shows the proportion of a firm's total assets which is financed by external borrowings. The debt ratio too is an indicator of financial risk and is closely related to the gearing ratio which we calculated above. The higher the debt ratio the higher the gearing.

$$\frac{\text{Total debt finance}}{\text{Total assets (fixed + current)}} \times 100 = \%$$

The value for Bio-Tech equals:

$$\frac{\pounds 501}{\pounds 1,508} \times 100 = 33.2\%$$

Just over one third of Bio-Tech's assets are financed by borrowed money.

Interest cover

This ratio is also related to the gearing ratio as it too gives an indication of longer-term solvency and financial risk by assessing the firm's ability to meet its interest commitments from its profits. It indicates the vulnerability of interest payments to a drop in profits.

$$\frac{\text{Profit } \textit{before} \text{ interest and tax (PBIT)}}{\text{Total interest payable}} = \dots \text{times}$$

Bio-Tech's interest cover is:

$$\frac{\pounds 418}{\pounds 80} = 5.2 \text{ times}$$

This indicates that Bio-Tech's profits for 19×8 are sufficient to cover interest payments five times over, this would seem to be a reasonable safety margin in this case. Notice that

it is the profits *before* interest and tax figure which is used.

Dividend cover

This ratio closely resembles the interest cover ratio by assessing the firm's ability to pay dividends to shareholders from its discretionary profits, which are the profits remaining after all other commitments such as interest and tax liabilities have been met.

Shareholders provide the risk capital to the firm, they are the residual risk bearers and will only receive dividends after all other financial obligations (e.g. tax and interest payments) have been satisfied. Like the interest cover ratio, dividend cover indicates the vulnerability of dividend payments to a drop in profits. It is calculated as follows:

$$\frac{\text{Profit } after \text{ interest and tax (PAIT)}}{\text{Dividends payable}} = \text{ ... times}$$

We calculate the dividend cover for Bio-Tech as:

$$\frac{£247}{£99} = 2.5 \text{ times}$$

This indicates that the level of 19×8 profits, *after interest and tax,* were sufficient to cover the dividend payment almost three times over.

You will recall from our section on profitability assessment that other dividend ratios, such as dividend yield, measured the return to shareholders. Clearly shareholders, actual and potential, would be keenly interested in the dividend cover ratio in evaluating the risk of their investment in the firm.

All of the capital structure ratios considered above will be of particular interest to potential investors and lenders, as they will wish to assess the existing level of indebtedness and risk before advancing any new funds.

In summary, a firm should seek to have a healthy balance of debt and equity finance in its capital structure. It makes good financial sense to have some debt in the firm's capital structure as it is generally regarded as less expensive financing than equity, due to the tax relief on the interest and thus lowers the overall cost of capital.

The critical factor is not to have excessive amounts of debt. The burden of fixed commitments (interest and principal payments) will increase the firm's financial risk, increase its overall cost of capital as equity holders may require an increased return to compensate for the additional risk and make further financing more expensive to raise.

Debt covenants

Gearing and coverage ratios will often be specified in loan agreements or covenants. Lenders may place 'restrictive covenants' on a borrower in relation to the borrower's debt or gearing ratios. In other words, the loan agreement or covenant may specify that the firm's gearing ratio should not exceed a certain level, for example 60 per cent, or that its dividend and/or interest cover ratios must not fall below 2.0.

Failure to comply with debt covenants can result in the lender demanding immediate repayment of the loan.

EXERCISE 4 —CAPITAL STRUCTURE ANALYSIS

For practice you should now attempt to complete the analysis of Bio-Tech's capital structure by calculating the same range of efficiency ratios for 19×9.

EXERCISE 5 —COMPLETE FINANCIAL ANALYSIS OF BIO-TECH ENTERPRISES LTD

You should now complete the analysis of Bio-Tech's financial performance and financial condition by setting out the complete range of financial ratios for 19×9 and then comparing them with the identical ratios for 19×8. Comment upon and interpret your findings. After completing your analysis you can refer to the comprehensive solution which is given in Appendix B.

The pyramid of ratios

If the number of financial ratios seems confusing then there is *a* simple technique available which links together the key ratios. The relationship between the key ratios can be brought together and shown in the form of a ratio pyramid or 'family tree'. The pyramid is based on the *DuPont system of financial analysis* which is an approach to financial performance analysis developed by the DuPont company in the early pan of the twentieth century and has since been widely applied in practice.

The system presents a **systematic framework** for the analysis of financial statements, with the aim of specifically seeking out the key factors contributing to the firm's financial performance and condition.

The pyramid approach (Figure 9.4) clearly shows the *interdependence of profitability and operational efficiency ratios* and their contribution to the overall ROI. The profitability ratios are shown down the left side of the tree and the operational efficiency ratios are shown down the right side.

The pyramid model reveals how ROI breaks down into two key components, **a profit-on-sales component** and an **asset-utilisation** or asset-turnover component. This emphasises the relationship between a firm's profitability and its *investment strategy* and helps to identify any weaknesses in either or both. In particular the model highlights the importance of both asset turnover and profit margin in generating the firm's overall return on investment.

In certain business sectors, for example food retailing, the net profit margin is typically low but is compensated for by a relatively high asset turnover or utilisation (stock turnover tends to be high) leading to a reasonable overall return on total assets.

Figure 9.4 Pyramid of ratios
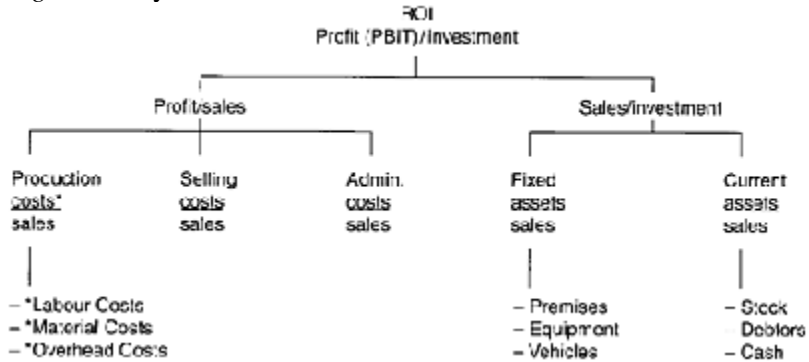
A simple example will demonstrate how the model works.

Example 1 —Pyramid of Ratios

Let:

Sales   =   £5,000,000
Profit   =   £200,000
Investment =   £1,000,000

Then:

ROI

£200,000/£1,000,000

= 20%

Profit/Sales   **Sales/Investment**
£200,000/£5,000,000   £5,000,000/£1,000,000
= 4%   = 5 times
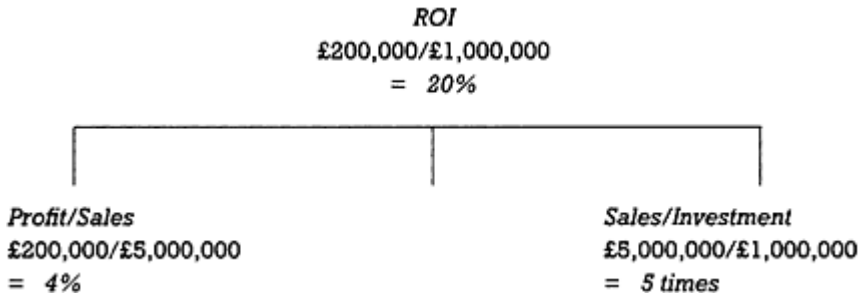
Thus: 4%×5 times=20%=ROI

A 4 per cent net profit margin is earned on sales of £5,000,000 and sales represent a turning over of total assets (investment) of 5 times.

Applying the pyramid approach to the analysis of Bio-Tech's financial statements for 19×8 this would be:

ROI

£418/£1,071

= 39.0%

Profit/Sales

£418/£2,320

= 18.0%

Sales/Investment

£2,320/£1,071

= 2.17 times

Thus: 18.0%×2.17 times=39%=ROI
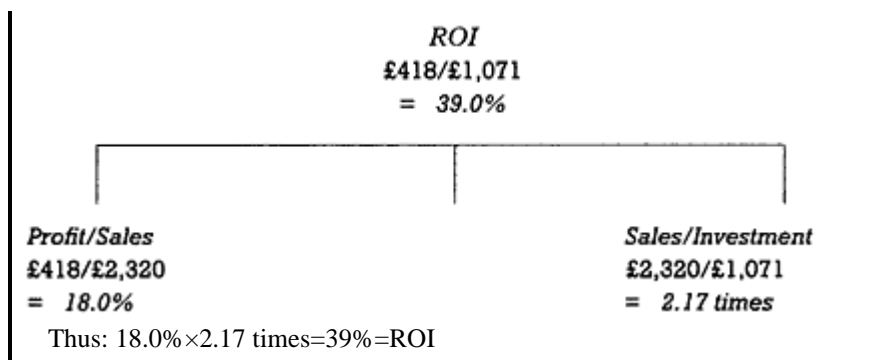
EXERCISE 6 —RATIO PYRAMID

For practice you should now apply the pyramid approach to the analysis of Bio-Tech's financial statements for 19×9. Compare and interpret your findings.

With the aid of a proprietary spreadsheet package it is possible to develop quite detailed computerised analytical models using the pyramid or DuPont approach.

Limitations of ratios

Applied and interpreted intelligently, financial ratios are very powerful analytical and planning tools, but they should carry a 'wealth warning' as their improper use can lead to erroneous diagnoses and invalid conclusions. We will now review some of the main limitations of ratios of which the user should be aware.

Many ratios are available

It is important to be aware that there are many ratios available for use in evaluating a firm's financial performance, and financial analysts may even use different methods of calculating the same ratios! The skill is in selecting those which are most appropriate and revealing for the purposes of the analysis.

Interpret with care

Financial ratios are essential diagnostic, decision-making and planning aids but they have to used with care. Ratios need to be used selectively for the purpose at hand and their results interpreted with skill and judgement.

Accounting policies and practices

The use of different accounting policies (e.g. depreciation and stock valuation policies) and practices (e.g. different accounting periods) even between like firms may distort comparisons.

Financial ratios are derived from the information in the firm's financial statements;

they are therefore only as sound as the accounting information on which they are based. Despite the best efforts of the accountancy profession to standardise and tighten up on financial reporting arrangements through the use of **Financial Reporting Standards (FRSs)** and **Statements of Standard Accounting Practice (SSAPs),** there still remains significant discretion available to a company's directors in the public reporting of a company's financial position.

For a clear insight into the tactics companies can, and do, legally adopt to enhance the presentation of the figures in their annual accounts see, for example, Griffiths (1995).

Different interpretations of accounting rules and regulations, and the adoption of different accounting practices will clearly affect the validity of comparisons with other firms, and with the financial benchmarks for the industry overall. Changing accounting policies and practices may even limit the usefulness of analysing an individual firm's performance over a number of years. Where necessary, previous years' ratios should be restated to reflect any material accounting changes.

Consistency

Whatever method of calculating a ratio is chosen it should be applied consistently to facilitate meaningful comparisons over time.

Information availability

The quality and amount of the financial information available will affect the quality of the ratios calculated and hence the analysis. For example, a firm's internal management will have access to a greater volume and much more detailed and commercially sensitive information than would be available to parties outside the firm—remember *information asymmetry* in relation to the agency problem. An external analysis therefore will by its nature be limited by the amount of information publicly available.

Historic

Ratios are static, historic, and retrospective and should be viewed in this context: they may not be appropriate as a basis for making future projections and forecasts.

Partiality

Financial ratios are partial. They only reveal part of a firm's overall performance, other non-financial measures, e.g. on marketing, production, product quality, and human resource effectiveness are also required for a more complete appraisal.

Financial ratio analysis on its own can give a 'tunnelled vision' perspective of a business and needs to be used in conjunction with a more thorough and balanced analysis of the company's overall performance and prospects.

In particular there is a need to link financial and non-financial performance measures together in order to provide what Kaplan and Norton (1992) referred to as the **'balanced scorecard'** (i.e. a weighted average of various financial and non-financial performance measures) and to create a powerful performance measurement system for the business.

According to Kaplan and Norton (1992):

> The balanced scorecard includes financial measures that tell the results of actions already taken. And it complements the financial measures with

operational measures on customer satisfaction, internal processes, and the organization's innovation and improvement activities—operational measures that are drivers of future financial performance.

Specifically non-financial performance indicators would be likely to cover the following

- **competitiveness** (as measured by e.g. relative market share);
- **quality** (as measured by e.g. level of repeat business);
- **responsiveness to customer needs** (as measured by e.g. average time taken to respond to customer enquiries, prepare quotations and project specifications);
- **innovation** (as measured by e.g. number of new products/services, and product/service improvements introduced in the past 3 years);
- **research and development** (as measured by e.g. expenditure levels).

A distinguishing characteristic of the balanced scorecard approach is that, in addition to the measures traditionally defined by an organisation's internal management, it utilises performance measures which have been defined by parties *external* to the organisation. For example, measures of responsiveness to customer needs, such as delivery times, would be defined by the customer.

Operating and financial review (OFR)

With the trends towards greater disclosure and transparency in company reporting, the Accounting Standards Board (ASB) in July 1993, produced a statement—not a mandatory accounting standard—entitled 'Operating and Financial Review' which aims to: 'build on the foundations of existing best practice by providing a framework within which directors can discuss the main factors underlying the company's financial performance and position'.

Overall the OFR should be 'reasonably comprehensive and informative', without disclosing any commercially sensitive or confidential matters, so that annual report users are given: 'a more consistent foundation on which to make investment decisions regarding the company'.

Although it is not a mandatory requirement for companies to comply with the statement and produce an Operating and Financial Review (OFR) as part of the annual report, its use is nonetheless commended by the Financial Reporting Council, the Hundred Group of Finance Directors and the London Stock Exchange.

While the OFR is not intended to be a detailed financial analysis of the year under review, it should nonetheless include: 'a discussion and interpretation of the business, the main factors, features as well as uncertainties that underlie it and the structure of its financing'. In addition, the review should offer some insights into future performance by highlighting: 'those aspects of the year under review that are relevant to an assessment of future prospects'.

Financial ratios—other considerations

Reasons for the analysis?

It is important to consider why the analysis is being carried out and by whom, as this will influence the choice of ratios. Is it a potential investor, a banker, a supplier, a competitor or an internal manager who is conducting the analysis? Clearly their perspectives and interests will differ and so may their interpretations of the ratios!

Corporate goals and objectives

Corporate goals and objectives are often expressed in the form of financial ratios such as earning a return on investment (ROI) of at least 20 per cent or achieving an increase in earnings per share (EPS) of 25 per cent. Financial target or budget ratios will be set for the level of financial performance the business wishes to achieve in all its different units or divisions over the period ahead. These will then be used as benchmarks against which actual financial performance (ratios) can be compared.

It should also be appreciated that in any organisation there will be **'trade-offs'** between measures. For example, it may only be possible to increase market share at the expense of lower profit margins.

Trend analysis

Use **time-series analysis** to determine and highlight trends in the firm's ratios over time. Trend analysis will indicate the degree of progress, or lack of it, towards the achievement of corporate goals and objectives. In analysing trends it is important that similar time periods are being compared as seasonal factors may distort comparisons.

Industry comparisons and benchmarking

Benchmarking simply means examining and understanding the firm's own performance, comparing this with the best firms in the sector and using the results to guide performance improvement.

Every firm should use **cross-sectional analysis** and benchmarking to look outside the individual firm, and compare the firm's own ratios with those of other 'look-alike' firms in the same market sector at the same time. Industry or service sector performance or league tables may be available to indicate the firm's relative strengths and weaknesses when compared to the ratio averages in its sector e.g. industrial or retail sector averages.

Information sources

Inter-firm comparisons in the UK are available from the Centre for Inter-Firm Comparisons Ltd. Ratios for comparison can also be found in the Business Ratio series produced by the ICC Company Information Service and ICC also publishes an annual report on all industrial sectors called *Industrial Performance Analysis.* There is also Dun and Bradstreet's *Key British Ratios: The Guide to British Business Performance,* which is compiled from the audited accounts of UK companies.

Comprehensive company analysis and research, with up to 10 years financial history, is available from Extel, part of Financial Times Information Ltd which is a member company of Pearson Plc and also from Datastream International.

Other specialist sources include: *Kelly's Business Directory, Kompass UK,* the *Stock Exchange Handbook* and periodic handbooks published by the leading accounting firms and financial institutions. Many of these are available in the reference sections of local libraries.

Information on corporate profitability by industry sector in the UK is also available once a year in the *Bank of England Quarterly Bulletin.*

Transfer pricing

Does the company operate a transfer pricing system, where goods and/or services are transferred internally between divisions or internal business sectors? With transfer pricing one division will be a 'seller' and the other a 'buyer' of goods or services and at other times the positions may be reversed.

Divisional performance will be affected by the volume of transfer activity, the nature and structure of the transfer pricing system used and the behaviour of managers in operating the system. Transfer pricing arrangements will be reflected in the performance measures used to compare the performance of divisions or sectors, and will need to be recognised in the performance appraisal.

International companies

Comparing the performance of subsidiaries of companies which operate internationally will add to the complexity of corporate performance appraisal. The subsidiaries may have to conform to different national accounting, taxation, and legal regimes. This will inevitably make the task of trying to arrive at valid comparisons more difficult.

Presentation

The use of **graphs and charts** to facilitate the presentation and understanding of any analysis is highly recommended, particularly for non-financial people.

Ensure comparability

Perhaps the 'bottom line' or golden rule in the use of any set of performance indicators is to ensure that you 'compare like with like, size with size and the same market sector'.

Summary

Financial ratios are key management tools which can help managers more accurately diagnose business problems, make better business decisions and formulate better business plans, but they are only one dimension of an overall business assessment which needs to include many other factors (e.g. the balanced scorecard approach).

Financial (like other business) ratios are simply *indicators* of performance, signalling potential problems and highlighting areas for further investigation. In many cases ratio analysis tends to raise important questions rather than provide definitive answers.

KEY LEARNING POINT

Financial ratios are key diagnostic and planning tools but they have to be used and interpreted with care.

> **EXERCISE 7 —RATIO LIMITATIONS**
>   Discuss the limitations and other considerations which might apply to your financial ratio analysis of Bio-Tech's financial performance and condition over the two years 19×8 and 19×9. A comprehensive analysis is presented in Appendix B.

CORPORATE FAILURE

Why study corporate failure you may well ask? Is this not a negative approach? Should the focus not be on determining the secrets of corporate success? The short answer is that, just as doctors study the cause of disease to discover more effective prevention and cures, the financial manager has much to learn by understanding the causes and processes of corporate failure. Understanding the causes and processes of failure will assist in its prevention and avoidance.

Most business failures will have occurred as a result of a particular combination of, usually complex, circumstances. However, despite each failure's individual characteristics, certain classic, common symptoms of corporate failure are discernible.

Classic symptoms of corporate failure

In the various classical models which have been developed to gain an understanding of the root causes of corporate failure, the following three main common elements or causes have emerged:

- **low profitability;**
- **low cash flow/liquidity;**
- **high borrowings/gearing.**

These classic symptoms are interrelated and the close circular relationship between them can be presented diagrammatically as in Figure 9.5. This relationship has often been referred to as the *'Bermuda Triangle'* (Letza 1992). The analogy arises presumably
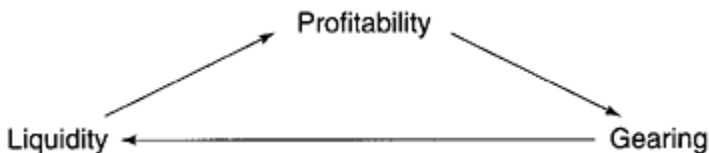
Figure 9.5 The Bermuda Triangle

because once a company enters this high risk area there is every likelihood that it may soon disappear—permanently! The analogy of the Bermuda Triangle serves to emphasise the importance and the interrelationship of the three key financial areas, profitability,

liquidity and gearing.

The road to failure

In many instances the road to failure typically begins with, for whatever reason, a decline in profitability; perhaps through increased competition, a 'price war', loss of a major customer, or as a result of wider economic events such as a recession or high interest rates.

Declining profitably will reduce cash inflows. As profitability problems accentuate and cash inflows reduce, the company may approach a lender for money. This will increase gearing and the level of financial risk, with the interest commitments and loan repayments placing a further strain on cash flows.

Eventually the stage may be reached where profits may no longer be sufficient to cover loan repayments or even the interest payments. In an effort to survive the company may then seek more 'refinancing'.

Perhaps a temporary reprieve is secured, but with the additional burden of new refinancing the cycle of declining profits and pressures on cash flows intensifies and soon the liquidity position becomes critical. The company cannot secure any more financing and the terminal phase is reached where the company now has not enough cash to pay its debts and is technically insolvent. By this stage anxious creditors are likely to have petitioned for the company's winding up.

This is a pretty bleak scenario, it implies that no action is being taken to reverse the decline. In most cases attempts at survival are made (and some succeed) but often they may be no more than 'panic measures', or they simply prove ineffective or are frustrated by other sets of circumstances or by other parties and ultimately the company is wound up.

Can corporate failure be predicted?

The financial ratio analysis framework presented here gives a fair indication of a company's financial health, but it has its limitations as we have discussed; a key one being that they are generally historic and lack predictive utility. The past is not necessarily a good guide to the future and good past performance does not necessarily guarantee good future performance.

Today's business environment is characterised by greater environmental turbulence and discontinuity—the future is not a continuation of the past. There is increased environmental complexity and increased rapidity of change (e.g. technological and social). All of these combine to make trying to predict the future a very inexact science.

The ability to use financial ratios as **predictive tools** clearly has its appeal. If ratios could be used to predict business failure then this would be of acute interest not only to investors and managers, but to employees and society in general.

In the past research has been carried out to determine the usefulness and relevance of ratios as a tool to predict failure and today there are many models available which combine ratios into a single 'easy to use' score. These are often called **'Z' scores**—such as Altman's Z score (1968)—and claim to provide a composite predictor of health or

failure from a distillation of the company's available financial information.

Altman's Z score model, originating in 1968, uses a statistical technique called **multiple discriminant analysis (MDA)** to predict corporate failure. Altman's research identified five key ratios most likely to predict failure and his model expresses these ratios in the form of a statistical relationship with each ratio in the model assigned a relative weighting. The model was determined as follows:

$$Z = 1.2*X_1 + 1.4*X_2 + 3.3*X_3 + 0.6*X_4 + 1.0*X_5$$

where,

X_1=*working capital/total assets*—**liquidity indicator**

X_2=*retained earnings/total assets*—indicates the firm's age and its past profitability

X_3=*earnings before interest and tax (EBIT)/total assets*—**profitability indicator**

X_4=*market value of equity/book value of total liabilities (current+long-term)*—**gearing indicator**

X_5=*sales/total assets*—**asset efficiency indicator**

Altman then classified Z scores as follows:

Z score	Probability of failure
1.8 or less	Very high
1.81–2.99	Not clear
3.0 or higher	Unlikely

The model has been shown to be about 90–95 per cent accurate in predicting failure one year ahead and about 70–80 per cent accurate in predicting failure two years into the future. Beyond two years ahead the success rate of the model diminishes.

Subsequent research by Taffler (1983) in the UK, using a multiple discriminant analysis (MDA) similar to Altman's, developed a Z score model based on four ratios as follows:

$$Z = 0.53*X_1 + 0.13*X_2 + 0.18*X_3 + 0.16*X_4$$

where,

X_1=profit before tax/current liabilities—**profitability indicator,** showing the firm's ability to cover its current liabilities from its earnings.

X_2=current assets/total liabilities—**liquidity measure** related to the traditional current ratio and indicating the firm's working capital strength.

X_3=current liabilities/total assets—financial **gearing indicator.**

X_4=immediate assets less current liabilities/operating costs less depreciation—**liquidity measure** indicating the length of time a firm is able to finance its continuing operations from its immediate assets should all other forms of short-term finance be withdrawn; similar to the conventional acid test ratio.

Taffler then suggested classifying the Z scores as follows:

Z score	Probability of failure
0.2 or lower	Very likely
0.3 or higher	Unlikely

Moon and Bates (1992) applied Taffler's model to the Maxwell Communications Corporation plc (MCC) and have argued that the evidence of failure was there in the company's financial statements. They calculated that the Z score for MCC declined from 0.37 in 1989 to 0.24 in 1990 and to 0.22 in 1991. While the absolute Z scores for 1990 and 1991 are in the 'grey area', the downward trend is apparent.

Z score and other predictive models are used extensively by banks and credit analysts to assess the likelihood of financial distress by borrowers, actual and potential, and are available from organisations such as Datastream International.

A 'Z score' model could be used to assess any firm's financial future; perhaps that of a critical supplier(s) or customer(s) or a potential takeover target. Some users claim the various models to be very successful, but each has its limitations and it pays to be aware of these if using them.

EXERCISE 8 —'Z' SCORES

Calculate Altman's 'Z' scores for Bio-Tech for 19×8 and 19×9. Compare and interpret your findings.

Limitations of predictive models

As the models essentially rely on the information contained in a company's published accounts, they are subject to the same limitations as financial ratios in general when using published information: ambiguities in accounting policies and practices; timeliness of information; historic orientation, and so on.

As Argenti (1977, 1984) has pointed out, managers invariably engage in **'creative accounting'** to window-dress the published information when they realise that the company may be in difficulties. MCC, for example, seemingly engaged in creative accounting: 'it appeared joint first in a table of companies using the most "unhealthy" accounting techniques' (Moon and Bates 1992).

The second limitation concerns **timeliness of information.** Published accounting information always lags behind real events. Even in the best of cases the information is likely to be at least several months out of date and in some cases publication could even be purposefully delayed. Alternatively a company may have already gone under before publication of the report and accounts!

A third limitation is that the models rely on **historic data** and this may not be appropriate for making predictions, given that future events are unlikely to replicate past events.

There is also the notion of the **'forecaster's paradox'.** If a financial analysis reveals signs of impending trouble then management may take remedial action to avoid it, thus neutralising the forecast! Remedial action could include any or all of the following: deferring investment plans, reducing dividends and overheads, and seeking a refinancing package.

Overtrading

One type of financial condition, in which many rapidly expanding small businesses typically find themselves, is that of **overtrading** or **undercapitalisation**—the firm has a low capital base in relation to its volume of business or turnover. It is a particular financial condition that occurs as a result of a firm trying to trade at a higher volume of sales than it has the financial resources to sustain.

In a typical scenario the firm will have a very successful product or service and understandably will try to grow rapidly to exploit the market opportunity. The difficulty arises when the firm then does not have access to sufficient capital to support the rate of growth. The rapid growth in sales will be accompanied by a disproportionate growth in stock and debtor investments and extra cash will be needed to finance these.

On the revenue side, because of credit terms, the sales to customers are not being translated into cash quickly enough; this places liquidity under strain and a financing gap opens up. In addition, productive capacity may need to be expanded and/or new sales outlets opened, new fixed assets may need to be acquired, perhaps new employees are recruited and trained and so forth, all of these factors contributing to severe cash flow difficulties.

In such a situation, short-term financing in the form of bank overdrafts and loans will not suffice—borrowing capacity will soon be at the limit. The firm may consider *invoice discounting* or *factoring* and this may alleviate the problem as a proportion of the invoiced amounts (usually 80 per cent) will be received immediately from a factor, for a price. Invoice discounting and factoring are examined in Chapter 19.

However, a permanent solution needs to be found and this will require financing of a more permanent nature, such as a fresh injection of equity and/or long-term loans—although borrowing capacity is always going to be constrained by the amount of equity in the capital structure. Venture capital or a strategic alliance with another suitable 'partner' company are other options likely to be explored.

The symptoms of overtrading

The financial diagnosis will usually reveal **high asset turnover ratios:** typically the turnover ratios for the current assets of stocks and debtors will be unusually high. There may well be evidence of **substantial cash discounts** being offered to debtors as an incentive for early payment.

On the liabilities side, the **creditor days figure is likely to be very high** as the firm tries to delay payments as long as possible. The **equity turnover** will also be high reflecting the low equity base. **Borrowing capacity will be exhausted** and all assets will conceivably be fully mortgaged or leased.

Overtrading consumes cash at an alarming rate and the company will be continuously trying to stall creditors. It is only a matter of time before a creditor's tolerance is exhausted and legal proceedings are initiated to obtain payment. Other creditors may swiftly follow suit and the firm's future then becomes bleak.

If the firm is forced to sell essential assets to pay short-term creditors, its operating capacity will be severely hampered and it may not even raise enough money to pay of mortgages. The end result is almost certainly liquidation.

How do companies get into an overtrading situation?

Clearly overtrading is a condition to be avoided. So how do companies get into such a state? How can a potentially very profitable business end up facing liquidation? A company can easily be enticed into an overtrading position by the prospect of earning high profits and increasing its market share.

But as we have learned, profitability is certainly a necessary, but not a sufficient, condition for long-term survival: it has to be balanced with good liquidity management. Liquidity is of paramount importance in maintaining sound long-term financial health: it is more often a lack of liquidity rather than a lack of profitability that causes a business to fail.

Undertrading

The opposite of overtrading is **undertrading** (or overcapitalisation): a condition where the business has in effect too much capital invested for the volume of business it is achieving. On inspection all the financial ratios will probably seem very healthy, especially the current ratio. In fact the business is likely to have a very sound balance sheet overall, having accumulated substantial liquid balances (in the form of cash and short-term investments) and reserves.

Even though the prospect of the business failing will be extremely remote, (reflected in a high Z score), it must nevertheless be considered inefficient as capital will be underemployed and this will probably be evidenced by a relatively low ROI ratio. The performance may reflect lazy, minimal risk-taking or complacent management attitudes and such a business could very well become a takeover target.

RECAP

Financial analysis: This is the evaluation of a firm's past, present and anticipated future *financial performance* and *financial condition.* Its objectives are to identify the firm's financial strengths and weaknesses and to provide the essential foundation for financial decision-making, planning and control.

Financial analysis framework: A framework for financial analysis can be developed by posing a series of questions about a firm's ***profitability, liquidity, operational efficiency*** and ***capital structure.***

Financial ratios: These are the principal tools of financial analysis and they can be used by a variety *of interested parties* to help evaluate a firm's financial performance and financial condition and to compare these with other like firms or with itself over time.

Limitations of ratios: It is important that users of financial ratios understand their limitations. Financial ratios should be applied, and their results interpreted, with skill and care.

Corporate failure: An understanding of the nature and causes of corporate failure contributes to its avoidance. Some authors suggest that financial ratios can be used to predict corporate collapse. A number of *'Z score' models* based on various combinations of specific financial ratios have been developed and are widely used as a tool to assess the likelihood of a firm's financial failure. The conclusions of these models need to be interpreted with care.

Special financial conditions: The special financial conditions of *overtrading* (where a business has a low capital base in relation to its turnover) and *undertrading* (a condition where a business has excess capital invested in relation to its turnover) were analysed.

APENDIX I OTHER USEFUL RATIOS

Clearly it is not possible to list all the ratios that might conceivably be used in the analysis of firms in specific business sectors such as construction, catering, leisure, manufacturing, retailing and tourism.

In financial analysis the skill lies in the judicious selection of the ratios which will be most revealing in relation to the objectives of the analysis. The following selection of ratios is simply intended to illustrate the possibilities available in different business sectors.

Sales activity ratios

The following ratios, which measure the rate of sales generation or productivity in relation to key resources such as staff and space occupied, are particularly useful in measuring the efficiency of retailing firms, where staff and premises are high cost

resources.

1 **Sales per employee.** This ratio gives an indication of the sales productivity of staff and can be analysed by different categories of staff (direct sales staff, indirect and administrative staff, etc.).
2 **Sales per square metre of floor space.** This ratio gives an indication of how efficiently floor space is being utilised.

Value added ratios

Value added ratios seek to measure the value (that is, the wealth) which the business creates. In simple terms, value added is the difference between the cost of inputs (that is, the cost to the firm of the goods and services which it buys in) and the sales value of its outputs.

Value added is not the same as profit. The difference between value added and profit is that the cost of bought in goods and services does not include the firm's labour costs. In terms of the concept of value added, labour is regarded as a 'stakeholder' and shares in the distribution of wealth, rather than being treated as a cost to be charged against profits.

Value Added Statement

Sales to customers (value of outputs)	£1,000,000
Less: cost of bought in goods and services (inputs)	400,000
=Value added	600,000

There are a number of different value added ratios possible; the following are two examples:

$$\text{Value added per employee} = \frac{\text{Value added}}{\text{No. of employees}}$$

(1)

$$\text{Value added: investment ratio} = \frac{\text{Value added}}{\text{Investment (net assets)}}$$

(2)

Sector-specific ratios

In addition to the virtually universal financial ratios which we discussed in the preceding sections, most business sectors (e.g. banking, catering, construction and retail sectors) will have sector-specific ratios which they will use to complement their financial analysis.

By way of illustrating sector-specific ratios, the following are a few examples of ratios commonly used in the performance assessment of **hotel and catering management.** The hotel sector is one which actually operates a *Uniform System of Accounts* for the industry as a whole. The Uniform System describes the performance measures widely in use and their method of computation.

They following ratios relate primarily to the assessment of operational efficiency.

Guest/bed occupancy $= \dfrac{\text{Actual no. of guests}}{\text{Guest capacity}} \times 100 = \%$

(1)

This ratio indicates the extent to which hotel capacity is being utilised by showing the number of guests staying in the hotel relative to total guest capacity. It is a more accurate measure of how a hotel's capacity is being utilised than room occupancy, which simply relates the number of rooms occupied to the number of rooms available.

Restaurant occupancy $= \dfrac{\text{Actual meals served}}{\text{Seating capacity}}$

(2)

This ratio, also referred to as *seat turnover,* indicates the extent to which restaurant capacity is being utilised by relating the number of meals sold (i.e. covers) to normal seating capacity. For example, if a restaurant with a normal seating capacity of 100 serves both lunches and evening meals it actually has a total daily capacity of 200 and if in one day it sells 400 meals then its rate of occupancy is:

$$\frac{\text{Actual meals served}}{\text{Seating capacity}} = \frac{400}{200} = 2.0$$

In this case each tableplace available was re-laid twice during the day. Clearly the higher the rate the more efficiently the kitchens, restaurant and other related facilities are being utilised.

A further example relates to the **airline industry** where two key performance measures are:

1 **Revenue passenger kilometres (RPK)**. This is arrived at by multiplying the number of revenue passengers carried by the number of kilometres flown.
2 **Yield.** This is the average revenue per paying passenger on a flight.

APPENDIX II PERFORMANCE MEASUREMENT IN SERVICE ORGANISATIONS

Most of what we have discussed so far about financial performance measurement can be applied either directly or with some slight modifications to performance measurement in profit-oriented service organisations.

There are many different types of profit-making service organisations: professional services (e.g. accounting, architecture and design), banking, catering, leisure and tourism, and the needs of each in relation to utilising and developing suitable performance measures will differ. Appendix I, for example, examines a few ratios specifically applicable to performance appraisal in hotel and catering services.

However, there are some key distinguishing features of service organisations which have to be recognised in designing and utilising effective systems of performance appraisal. *Intangibility, inseparability of production and consumption, heterogeneity* and *perishability* are consistently cited as distinguishing services from goods.

I*ntangibility* appears to be the key distinguishing feature. 'What is significant about services is the relative dominance of intangible attributes in the make-up of the service

product' (Cowell, 1985). You will note that Cowell refers to 'service product' rather than simply services, this is common parlance among service marketers. Service products produce a series of benefits which cannot be stored as production and consumption take place simultaneously.

Given that services are intangible, they are not objects to be touched, stored, seen, felt or tasted in the same way as physical goods. A visit to a professional accountant, architect, bank, hotel, leisure or tourism centre cannot be stored away for later use—production and consumption take place simultaneously—and there is no tangible product produced by the visit.

There is also likely to be *heterogeneity,* in other words variability or lack of consistency, in the service experienced on a day-to-day basis. As services are provided by people, it is a difficult management task to ensure consistency of staff behaviour, constantly—ask any hotel or restaurant manager.

A customer visiting a hotel or restaurant, for example, will interact with staff, equipment and the physical environment and thus the customer participates in the service process. In contrast, in a manufacturing concern the manufacturing process is isolated from the customer and is designed for the efficient production of a physical good, which is the output.

One approach to performance measurement in service organisations is that of Brignall *et al.* (1991) which uses six dimensions of performance. Two dimensions seek to measure the **results** or success of the business strategy *(competitiveness and financial performance),* and four others they categorise as **determinants of success** (*quality of service, flexibility, resource utilisation* and *innovation*). Each individual dimension has then a range of performance measures as shown in Figure 9.6:

Dimension of performance		Measure
Results	*Competitiveness*	Relative market share and position Sales growth Measures of the customer base
	Financial performance	Profitability, liquidity, gearing and market ratios
Determinants	*Quality of service*	Access, availability and aesthetics, appearance, cleanliness, comfort, communication, courtesy, competence, friendliness, reliability, responsiveness, security
	Flexibility	Delivery speed flexibility Specification flexibility Volume flexibility
	Resource utilisation	Efficiency and productivity
	Innovation	Performance of the innovation process Performance of individual innovations

Figure 9.6 Service organisations: performance matrix

You will see that, Brignall *et al.*'s framework is broadly similar to the measures we have identified previously and it reflects a balanced scorecard approach to performance assessment in service organisations—that financial performance measures are necessary, but by themselves they are not sufficient.

One important feature of this approach is the categorisation of performance measures into those that measure the overall results or success of the business and those that can be used to measure how effectively the determinants of success are being managed. In this analysis, financial performance measures are considered as measures of results, they show, along with the measures of competitiveness, the relative success (or otherwise) of the chosen business strategy.

APPENDIX III PERFORMANCE MEASUREMENT IN NOT-FOR-PROFIT (NPO) ORGANISATIONS

Most not-for-profit organisations (NPOs) are service organisations, thus they have all the attributes of service organisations which were outlined in Appendix II. However, they possess the added complications that there is no profit measure of performance, and output measurement is extremely difficult, as for example, in charity services and in public sector services such as education, health and policing.

Traditionally, in the public sector, performance evaluation has been considered in terms of the *'three Es',* **economy, efficiency** and **effectiveness** and in providing **value for money (VFM).**

- **Economy:** This is really to do with cheapness. It means finding the cheapest (most economic) solution to the problem by not spending any more money than is necessary to acquire resources (inputs) of the appropriate quantity and quality. For example, occupying the cheapest accommodation, paying the lowest wage rates, or buying the cheapest equipment which will meet the organisation's needs in relation to quality and quantity of service.
- **Efficiency:** This is really *productivity,* it measures the volume of outputs obtained in relation to the volume of inputs or resources used to produce those same outputs. It is output divided by input, such as output per labour or machine hour. Efficiency focuses on ***how*** things are done and on trying to ensure that they are done in the most productive and least cost way.
  Improving efficiency usually means trying to obtain more output from a given level of resources (inputs), or achieving the same output with less resources—for example, a hospital may seek to improve its efficiency by treating more patients with the same level of staffing, or the same level of patients with less staffing.
- **Effectiveness:** In contrast to efficiency, effectiveness focuses on ***what*** is being done or should be done, on the achievement of results, goals and objectives. By this definition an effective manager is one who achieves his/her objectives and targets.
- **Value for money (VFM):** The concept of value for money encompasses the three Es described above. It means providing the customer, client or patient, etc. with a service which meets their needs at an appropriate standard or quality for the cost involved.

Perhaps the distinction between efficiency and effectiveness has been best summarised by Peter Drucker (1994): 'Efficiency is concerned with doing things right. Effectiveness is concerned with doing the right things.' The distinction emphasises the precedence of effectiveness, the importance of first ensuring that the organisation is doing the right things, setting the right objectives and targets and then ensuring that these are achieved in the most efficient way.

According to Drucker (1994): 'Effectiveness is the foundation of success—efficiency is a minimum condition for survival after success has been achieved.'

Since the early 1980s in the UK, government has continually sought to improve and reform public sector services by ensuring that they are managed in a more business-like way. There have been series of extensive management and organisational reforms in all aspects of the public sector, particularly in health, education and policing services.

These have included: the establishment of *'league tables'* for schools, hospitals and other services; the introduction of **charters** for citizens, patients and rail passengers; the formation of Next Step Agencies and so on. The various charters, for example, set out minimum performance standards such as maximum waiting times in hospitals.

One tool used to guide and direct service improvements has been the development by most public sector organisations of their own sets of **performance indicators**—at one stage the health service had developed a data base of over 300 performance indicators! However, virtually all of these indicators tend to be input and intermediate measures of performance, they do not measure outputs. There is, as yet, no generally accepted methodology for measuring the outputs of services like health care, social care, education and policing.

Examples of a National Health Service hospital Trust's performance indicators would include:

Volume-related measures	– number of patient days
	– number of cases
	– number of outpatient attendances
Performance-related measures	– length of stay per patient
	– energy consumption per cm^3
Finance-related measures	– return on net assets*
	– cost per case treated
	– cost per outpatient attendance

*(An NHS trust is required to earn a return of 6% on its net assets.)

The same limitations and caveats apply in the use of ratios in performance evaluation in not-for-profit organisations as apply in commercial profit-oriented enterprises.

REVIEW QUESTIONS

Concept review questions

1 (a) How would you define financial analysis? (b) In relation to financial analysis,

who are the interested parties? (c) In financial analysis how might the perspectives of these interested parties differ?

2 A general framework for financial analysis can be constructed around four key questions, what are they?

3 Briefly review the main limitations of financial ratio analysis.

4 Outline some of the major difficulties of performance measurement in:

(a) profit-making service businesses; and
(b) not-for-profit organisations.

5 What do you understand by the following terms: *balanced scorecard; gearing; working capital; Z scores?*

Practice question

6 **Financial Analysis.** The financial statements of Ambitious Ventures for the year ended 31 December 19×9 are presented below.

AMBITIOUS VENTURES PLC

Profit and Loss Account for year ended 31 December	*19×9 £m*
Turnover	320.10
Cost of Sales	208.39
Gross Profit	*111.71*
Marketing and distribution costs	35.64
Administration expenses	21.12
Other operating costs	19.76
Operating Profit	*35.19*
Interest Payable	11.54
Profit Before Tax	*23.65*
Tax	7.81
Profit for the Year	*15.85*
Dividends	5.63
Retained Profit for Year	*10.22*

AMBITIOUS VENTURES PLC

Balance Sheet as at 31 December	*19×9 £m*
FIXED ASSETS	
Tangible Assets	168.92
	168.92
CURRENT ASSETS	
Stocks	89.56
Debtors	55.74
Cash and bank	4.30
	149.60
CURRENT LIABILITIES	

Creditors: Amounts falling due within one year	139.89
Net Current Assets (Liabilities)	9.71
Total Assets less Current Liabilities	*178.63*

NON-CURRENT LIABILITIES
Creditors: Amounts falling due after more than one year:

Loans	46.87
NET ASSETS	*131.76*

CAPITAL AND RESERVES

Called up share capital (70 million ordinary shares of £1 each)	70.00
Profit and loss account	61.76
Equity Shareholders' Funds	*131.76*

You have also been given the following information.

Ambitious Ventures—Financial Ratio Analysis

Ratio	Industry Average	Actual 19×8
Return on Investment (ROI)	18.0%	18.0%
Return on Equity (ROE)	9.0%	9.5%
Gross Profit Margin	37.0%	33.0%
Net Profit Margin	10.0%	10.1%
Current Ratio	1.80	1.84
Acid Test Ratio	0.70	0.80
Stock Turnover	3.0	2.8
Debtor Collection Period	40 days	39 days
Gearing Ratio	35.0%	39.0%
Interest Cover Ratio	4.0	2.6

(a) Using the above information you are required to complete the analysis of Ambitious Ventures financial performance and condition over the two-year period and to compare its status with that of the industry average. Assume that the industry averages apply to both 19×9 and 19×8.
(b) Discuss the **limitations** of the analysis you have just carried out.
(c) State what **non-financial information** might be useful to complete your analysis.

Test questions

7 **Financial Analysis.** The summarised profit and loss accounts and balances sheets for Airtours Plc for the years 1993 to 1996 are presented below. Airtours is a leading leisure travel company with businesses in the UK, Scandinavia and North

America. Its principal activities are retail travel agents, tour operators, charter airline, cruise and hotel operations.

Airtours PLC				
Profit and Loss Account for year ended 30 September	*1996*	*1995*	*1994*	*1993*
	£m	*£m*	*£m*	*£m*
Turnover	1,718	1,318	972	616
Operating costs	1,641	1,268	907	581
Operating profit	77	50	65	35
Interest receivable	21	15	10	12
Interest payable	11	5	3	1
Profit before exceptional items	87	60	72	46
Exceptional items			4	
Profit before tax	87	60	76	46
Tax	22	16	23	17
Profit for the year	65	44	53	29
Dividends:				
Equity	22	16	14	8
Non-equity	3	3	3	2
Retained profit	40	25	36	19

Airtours PLC				
Summary Balance Sheet as at 30 September	*1996*	*1995*	*1994*	*1993*
	£m	*£m*	*£m*	*£m*
Fixed Assets	263	203	112	38
Current Assets				
Stocks	7	4	3	–
Debtors	245	173	169	105
Cash and deposits	426	305	292	221
	678	482	464	326
Less Current Liabilities	588	446	384	275
Net Current Assets	90	36	80	51
TOTAL ASSETS LESS CURRENT LIABILITIES	353	239	192	89
Non-Current Liabilities	145	120	45	17
NET ASSETS	208	119	147	72
SHAREHOLDERS' FUNDS				
Equity shareholders' funds	159	70	98	23
Non-equity shareholders' funds	49	49	49	49
Total Shareholders' funds	208	119	147	72
Average No. of ordinary shares (m)	125	114	100	94
Average share price	587	376	497	377

You are required to calculate the financial ratios for each year as listed below and

comment on your findings.

Annual Sales Growth %
Annual Earnings Growth %
Return on Investment (PBIT) %
Return on Shareholders' Funds %
Operating Profit Margin (before interest) %
Operating Profit Margin (after interest) %
Earnings per share (pence)
Price Earnings (P/E) ratio
Dividends per ordinary share (pence)
Current Ratio
Net Asset Turnover
Interest Cover
Dividend Cover
Net Asset Value per ordinary share (£)

8 **Performance Indicators.** The list below provides a selection of performance and
progress indicators. These indicators are generally associated with the private sector.
However, management of the public sector is beginning to follow more closely
private sector practices and procedures.
Requirements:
(a) Briefly explain why organisations use performance and progress indicators.
(b) Choose *two* financial and *two* non-financial factors from the list below and
discuss how they could be used to assess success in both the public and private
sectors. You should emphasise the differences and similarities between public and
private sector usage of these factors and, where necessary, explain how they could,
or should, be adapted for use by public sector organisations.

Financial	*Non-Financial*
Cash generation	Market share
Value added	Customer satisfaction
Profitability	Competitive position
Return on assets	Risk exposure

9 **Corporate Failure.**

(a) Discuss the theories, or arguments, which suggest that financial analysis can
be used to forecast the probability of a given firm's failure, and
(b) Explain why such an analysis, even if properly applied, may not always
predict failure.

Practical project

Obtain a copy of the two most recent annual reports and accounts for a company in a business sector relevant to your studies. Annual reports for many of the leading companies can be obtained free of charge from the Financial Times Annual Reports Service or by contacting the companydirectly. Most leading companies also have an online service where company information, including annual reports and accounts, is available on the Internet. In addition, survey the financial media for current information relevant to your company.

You should then:

1 Select five ratios which you consider appropriate to provide an essential financial analysis of your company over the past three years.
2 Draw a chart illustrating the trends in profitability and liquidity over the three-year period.
3 Discuss the financial performance and condition of your company over the three-year period. Can you explain any variations? Do the annual reports refer to any particular problems or future developments? Highlight these in your analysis. Briefly discuss any difficulties you encounter in making your analysis.
4 How does the company's EPS and P/E ratios compare with other companies in the same business sector and with the averages for the sector overall?
5 Do the company's assets include intangibles such as brands, copyrights, patents and trademarks? Is the basis of valuation stated?
6 See if you can compute a 'Z' score for your company. What does it indicate?

Keep your reports and analyses for future reference.

CASE STUDY 3

Financial Analysis—Red Queen Leisure Ltd

Red Queen Leisure Ltd owns and operates a chain of Red Queen themed pub/restaurants, several hotels and a number of quality gaming establishments. The company's strategy is to continue to expand and develop the business through the acquisition of new outlets in selected locations throughout the country and through the conversion of unlicensed premises into new pub/restaurants. Management is currently conducting a financial review as part of an

overall strategic review of the business.

Required

As a member of the review team you have been asked to carry out a financial analysis of the company's accounts (profit and loss accounts and balance sheets) for the two years as set out below and report to the board on your findings. Specifically you are required to:

1 calculate and interpret a selection of financial ratios which you consider will adequately reflect the company's financial performance and condition, over the two-year period, in the areas of profitability, liquidity, operational efficiency and gearing;
2 discuss in your report any limitations of your financial analysis;
3 discuss any further information (financial and non-financial) which you think would be helpful to your analysis; and
4 suggest appropriate recommendations based on your analysis.

RED QUEEN LEISURE LTD

Profit and Loss Account for year ended 31 December	19×9 £000s	19×8 £000s
Turnover	9,650	8,320
Cost of Sales	5,990	4,980
Gross Profit	3,660	3,340
Marketing and distribution costs	985	835
Administration expenses	820	710
Other operating costs	298	215
Operating Profit	1,557	1,580
Interest Payable	345	220
Profit Before Tax	1,212	1,360
Tax	364	408
Profit for the Year	848	952
Dividends	280	314
Retained Profit for Year	568	638

RED QUEEN LEISURE LTD

Balance Sheet as at 31 December	19×9 £000s	19×8 £000s
FIXED ASSETS		
Intangible assets	155	55
Tangible Assets	10,390	9,333
	10,545	9,388
CURRENT ASSETS		
Stocks	474	358
Debtors	686	568
Cash and bank	128	83

	1,288	1,009
CURRENT LIABILITIES		
Creditors: Amounts falling due within one year	1,320	972
Net Current Assets (Liabilities)	(32)	37
Total Assets less Current Liabilities	10,513	9,425
NON-CURRENT LIABILITIES		
Creditors: Amounts falling due after more than one year:		
Loans	2,850	2,350
NET ASSETS	7,663	7,075
CAPITAL AND RESERVES		
Called up share capital	2,000	2,000
(2,000,000 ordinary shares of £1 each)		
Share premium account	500	500
Revaluation reserve	533	513
Profit and loss account	4,630	4,062
Equity shareholders' funds	7,663	7,075

You are also given the following information:

	Industry Average
ROI %	18.5
Gross Profit %	60.0
Net Profit %	18.0
Return on Equity %	15.5
Earnings per share (EPS) pence	55.3
Dividend per share (DPS) pence	16.1
Current Ratio	1.5
Acid Test Ratio	1.0
Stock Turnover (times)	12.0
Debtor Collection Period (days)	26
Creditor Payment Period (days)	30
Total Asset Turnover (times)	1.8
Gearing Ratio %	40
Debt Ratio %	35
Interest Cover (times)	4.5
Dividend Cover (times)	3.0

FURTHER READING

General

An informative general reader on performance measurement and evaluation is:
• *Performance Measurement and Evaluation* . Edited by Holloway, J., Lewis, J. and Mallory, G., Sage Publications, 1995.
An excellent and comprehensive coverage of financial analysis is provided by:
Financial Analysis . Rees, B., 2nd edition, Prentice-Hall, 1995.
No study of financial analysis would be complete without reference to:
New Creative Accounting. How to Make Your Profits What You Want Them to Be . Griffiths, I., Macmillan, 1995.
An excellent treatment of financial analysis from a managerial perspective is provided in:
• *Financial Analysis: A Managerial Introduction* . Wilson, R.M.S. and McHugh, G., Cassell, 1987.

Corporate strategy and financial analysis

An exploration of the connection between corporate strategy and financial analysis is:
• *Corporate Strategy and Financial Analysis* . Ellis, J. and Williams, D., Pitman Publishing, 1993.

The balanced scorecard

For further insights into the operation of the balanced scorecard approach to performance analysis see:
• *The Balanced Scorecard: Translating Strategy into Action* . Kaplan, R.S. and Norton, D.P., McGraw-Hill, 1997.

Corporate failure prediction models

• 'Forecasting Bankruptcy: How Useful are Failure Prediction Models?' Morris, R. *Management Accounting ,* May 1998.

REFERENCES

Adnum, D. 'Using Performance Indicators for Effective Public Sector Management.' *Management Accounting ,* January 1993.
Altman, E.I. 'Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy.' *Journal of Finance ,* 1968.
Altman, E.I. *Corporate Financial Distress and Bankruptcy* . 2nd edition, John Wiley &

Sons, 1993.

Argenti, J. *Corporate Collapse: The Causes and Symptoms* . Nelson, 1977.

Argenti, J. *Predicting Corporate Failure* . Institute of Chartered Accountants in England and Wales, 1984.

Brignall, T.J., Fitzgerald, L., Johnston, R. and Silvestro, R. 'Performance Measurement in Service Businesses.' *Management Accounting ,* November 1991.

Cowell, D. *The Marketing of Services* . Heinemann, 1985.

Drucker, P.F. *Management: Tasks, Responsibilities, Practices* . Butterworth/Heinemann, 1994.

Eccles, P. 'Planning for Improved Performance.' *Management Accounting ,* January 1993.

Griffiths, I. *New Creative Accounting. How to Make Your Profits What You Want Them to Be* . Macmillan, 1995.

Hyndman, N. 'Next Step Agencies: Getting to Grips with Measuring Performance.' *Management Accounting ,* January 1993.

Kaplan, R.S. and Norton, D.P. 'The Balanced Scorecard—Measures That Drive Performance.' *Harvard Business Review ,* January-February 1992.

Kaplan, R.S. and Norton, D.P. 'Putting the Balanced Scorecard to Work.' *Harvard Business Review ,* September-October 1993.

Letza, S.R. 'A Review of the Corporate Failure Cycle.*' ACCA Students' Newsletter ,* March 1992.

Lewis, C. 'A Source of Competitive Advantage?' *Management Accounting ,* January 1993.

Moon, P. and Bates, K. 'Are Financial Statements Good Communicators?' *Management Accounting ,* June 1992.

Newing, R. 'Wake Up to the Balanced Scorecard.' *Management Accounting ,* March 1995.

Operating and Financial Review (OFR) Statement . The Accounting Standards Board Limited, July 1993.

Stead, M. 'Management Ratios: How They Fail the Shareholder.' *Management Accounting* , December 1995.

Taffler, R. 'The Assessment of Company Solvency and Performance Using a Statistical Model: A Comparative UK-based Study.' *Accounting and Business Research* , Autumn 1983.

part four
STRATEGIC FINANCIAL DECISION-MAKING

The Investment Decision

PART 4 CONTAINS THE FOLLOWING:

In this part we explore the activity which is central to the financial management process—financial decision-making. We begin by examining the firm's most important type of financial decisions, that is, its strategic investment decisions. It is the quality of the firm's strategic investment decisions which in essence determines its value. Stated simply, good quality investment decisions will enhance the firm's value, poor quality decisions will reduce it.

Chapter 10 reviews the strategic investment decision-making process, generally under conditions of certainty. Chapter 11 refines this approach by introducing risk, and techniques of risk analysis.

Chapter 12 explains the determination of the firm's cost of capital, which is the medium through which the firm's strategic investment decisions are connected to its strategic financing decisions.

This part then concludes with an integrative case study on strategic investment decision-making.
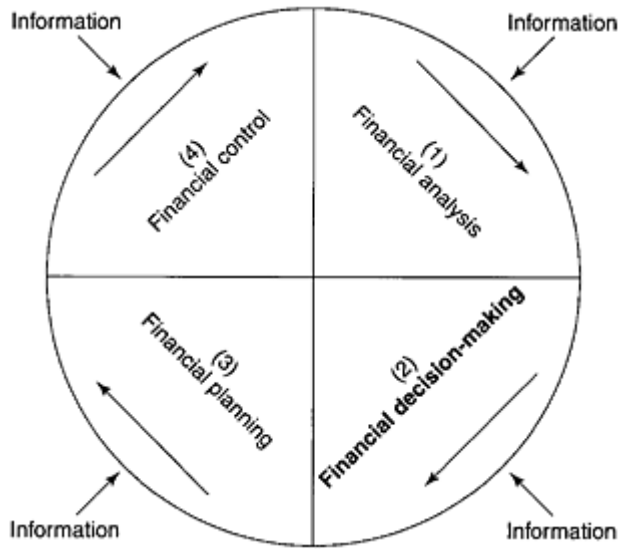
Part 4 diagram The financial management process: **financial decision-making—the investment decision**

10
INVESTMENT APPRAISAL

Introduction

This chapter provides an introduction to corporate investment decision-making and examines the various methods used to appraise potential investment projects. It covers the following topics:

the nature of investment;
an overview of the investment appraisal process;
an evaluation of the main investment appraisal techniques;
the consideration of non-financial and intangible factors.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the nature of corporate investment decisions;
2 explain the investment appraisal process;
3 apply the main investment appraisal techniques;
4 recognise the limitations of the main investment appraisal techniques;
5 appreciate the influence of non-financial and intangible factors in investment decision-making.

OVERVIEW

This chapter provides an introduction to investment appraisal, mainly under conditions of certainty. Subsequent chapters will develop and refine this approach to include investment appraisal under conditions of risk and uncertainty.

Investment appraisal is a **strategic decision-making process** for determining how a firm's management should allocate limited capital resources to long-term investment opportunities. Investment decisions (such as the one exhibited in our 'Bulk Buying' vignette), will not be made in isolation from other business decisions and plans; the question of *'strategic fit'* arises. Accordingly, investment decisions should be made in the context of the firm's **strategic business plan,** with the goal of maximising the long-term market value of the firm and the realisation of its strategic objectives.

The investment decision-making process involves ***identifying, evaluating and***

implementing long-term investment opportunities which will enhance shareholder wealth and achieve the firm's objectives. The costs and benefits of these investment opportunities will be spread out over time.

Because the outcome of long-term investment decisions, more so than any other type of business decision, will directly affect the firm's future and its value, it is vitally important that investment proposals are properly evaluated before they are implemented. Consequently in this chapter we will devote some time to the study of the techniques and methods available for the appraisal of investment decisions and the determination of their value.

Although our primary concern is with the evaluation of decisions to invest in *real* corporate assets (i.e. land, buildings, plant and machinery, etc.), the techniques and methods presented here are equally applicable to the evaluation of decisions (corporate and personal) to invest in other types of assets. For example, investments in bonds, equities, leases (usually referred to as *financial assets*); mergers and acquisitions; home mortgages; long-term savings plans; and so forth.

Before proceeding to analyse the main investment appraisal techniques and methods, it will be helpful to first define what is meant by the term 'investment'.

WHAT DO WE MEAN BY INVESTMENT?

The essence of investment is to: 'forego present consumption of resources in order to increase the total amount of resources which can be consumed in the future' (Dixon, 1994). Alternatively an investment can be viewed in terms of: 'making an outlay of cash now in the expectation of extra cash coming in the future' (Dixon, 1994).

The objective of an investment decision is to acquire an asset (real or financial) for less than its value, this way corporate or personal wealth can be increased. Acquiring an asset for at least its value will maintain wealth or value. It would not make good financial sense to acquire an asset for more than its value as wealth would be eroded. From the corporate firm's point of view the financial manager's objective should be to invest in projects which add to corporate and shareholder value.

The problem is that at the outset it is often difficult to determine which assets or projects will be wealth enhancing and which will be wealth reducing. All the more reason we should employ good appraisal techniques and procedures to help us make the right choice.

For a wealth-maximising business enterprise, the most common form of investment is in real corporate assets (i.e. land, buildings, plant and machinery, etc.). Such assets are clearly very important since, for most firms, they represent the largest financial investment and are the key earning assets of the firm.

Investment appraisal is not restricted to private sector, profit-seeking, business enterprises. Many public sector, not-for-profit organisations (NPOs) such as National Health Service (NHS) Trusts, are also faced with evaluating decisions to invest in fixed assets (e.g. ambulances, medical equipment, new hospitals or residential homes), usually in the context of having very limited financial resources. For such organisations investing in fixed assets also represents a strategic investment decision, as these are the key assets

necessary for delivering an effective and efficient service.

Capital expenditure

When a business buys new fixed assets, or when it spends money to increase the value of its existing fixed assets, this expenditure is called **capital expenditure** (often shortened to 'capex'). Fixed assets can be *tangible fixed assets* such as land, buildings, plant and machinery or *intangible fixed assets* such as brands, goodwill, patents and copyrights.

Capital items are *long-term* (that is, they will provide benefits which extend beyond the current year) and have an enduring influence on the profit-making and wealth-creating capacity of a business. The effects of capital expenditures are reflected in the firm's balance sheet. The assets side of the balance sheet will show the assets in which funds have been invested (the investment decision). The liabilities and capital side will show how the investments have been financed (the financing decision). See Example 3 in Chapter 1.

In not-for-profit organisations, such as health care trusts, seeking to improve profit-making capacity is not the primary concern, rather, they are vitally concerned with seeking to improve the organisation's capacity to provide cost-effective, high-quality services to their customers (e.g. patients and clients). Capital expenditure decisions are undertaken with this aim in mind.

Revenue expenditure

In contrast when a business spends money which is not concerned with increasing the value of fixed assets but represents the costs of running the business on a *day-to-day basis,* (e.g. salaries, wages and overheads), this is called revenue expenditure. Revenue expenditure will provide short-term benefits that is, within the current year. The effects of revenue expenditures are reflected in the firm's profit and loss account or income statement.

REASONS FOR INVESTMENT DECISIONS

In business, investment (capital expenditure) decisions are made for many reasons, but although the motives may differ, the techniques used to evaluate them are essentially the same. Typically investment proposals may be motivated by one or more of the following:

- **Competitiveness.** New investment may be required to improve the firm's competitive position and gain competitive advantage.
- **Expansion and growth.** New/additional facilities or operating capacity may be needed to meet increases in activity and sales.
- **Replacement.** Due to advances in technology and operating methods old equipment and buildings may need to be replaced.
- **Renewal.** Rebuilding, overhauling or refitting existing buildings and equipment may be necessary to improve operating efficiency, to comply with legislative requirements and/or to improve quality standards.

- **Acquisitions and mergers.** A firm may seek opportunities to grow by acquiring another suitable company.
- **Foreign direct investment (FDI).** There may be opportunities to grow by building a factory or acquiring a company in a foreign country.

BULK BUYING

Over the three years 1997–2000 Tesco plans to invest £100 million in developing the Irish supermarket businesses that it has purchased from Associated British Foods for £630 million. The investment will be on refitting and extending existing stores and building new ones.

The acquisition will take Tesco to the top of the food retailing leader board in both Northern Ireland and the Republic of Ireland.

The deal, which requires European Commission approval, will involve the acquisition of 75 Quinnsworth and Crazy Prices stores in the Republic and 34 stores of various trade names in the North. The deal will also include the Wine Barrel off-licence chain and the lifestyle Sport and Leisure chain of 47 sports shops. [1]

In other cases decisions may concern 'investments' that do not immediately translate into the acquisition of tangible fixed assets which will appear on the firm's balance sheet. In such cases substantial volumes of expenditure will be involved over an extended period of time and the benefits may or may not be realised at some future date. Examples would include:

- **research and development expenditures** (e.g. biotechnology, pharmaceutical and computer companies);
- **exploration expenditures** (e.g. oil, gas and mining companies);
- **other expenditures** (e.g. environmental, health, safety and welfare).

Frequently, investment expenditures will yield **intangible benefits,** that is, benefits which will be difficult to evaluate in financial terms, as they cannot readily be translated into streams of quantifiable cash flows.

For example, the decision to invest in the provision of staff welfare facilities, such as new dining, crèche, sports and social facilities, will not yield significant tangible benefits in the form of additional cash flows. However, they may yield considerable intangible benefits in the form of reduced absenteeism, improved staff morale, greater productivity, and better product or service quality.

BP—EXPLORATION AND RESEARCH EXPENDITURE

Exploration expenditure is accounted in accordance with the successful efforts method. Exploration expenditure is initially classified as an intangible fixed asset. When proved reserves of oil

> and gas are determined and development is sanctioned, the relevant expenditure is transferred to tangible production assets. All exploration expenditure determined as unsuccessful is charged against income.
>
> Research expenditure is written off in the year in which it is incurred. [2]

The nature of today's competitive business environment is such that it is *'intangible investments',* in areas such as maintaining brand image, research and development, information systems, marketing, and training, that are needed to maintain and improve a firm's competitive position.

Many of these expenditures possess the characteristics of investment in fixed assets. They involve very substantial outlays, have long-term payoffs, and are vitally important for the survival and growth of a competitive firm. However, from a traditional financial accounting perspective, expenditures of this nature are not viewed as capital investment. They are instead treated as revenue expenditures and are charged against profits as they are incurred.

While investment decisions of this nature do not add to the stock of real corporate assets, they are nonetheless vitally important to the firm's long-term survival and growth. Therefore it is our contention that they should be subject to the same type of rigorous investment appraisal process.

Mandatory and discretionary investments

Some capital investments will be **mandatory;** that is, management will have no choice but to undertake the investment (e.g. to comply with health and safety and other legislation or to stay up with the competition) in order to remain in business. Other investments can be categorised as **discretionary** as management will have a choice whether or not to undertake the investment depending on its business priorities and the availability of funds.

Characteristics of investment decisions

The typical characteristics of investment decisions include:

- **a commitment of resources into the future** (long-term), frequently in the face of considerable uncertainty;
- **substantial expenditures** are usually involved;
- **difficult and costly to reverse out** of such a decision (that is, there is a high 'crawl-out' cost if the decision goes wrong);
- **intangible costs and benefits** are difficult to evaluate;
- **high level approval** within the organisation is normally required.

THE INVESTMENT APPRAISAL PROCESS

As investment decisions normally involve committing large sums of money for the future it is clearly important that they are undertaken with care and that proper procedures and systems are in place for their analysis and selection.

The general framework of an investment appraisal process involves **six distinct but interrelated stages:**

1 **proposal generation;**
2 **proposal review and evaluation;**
3 **decision-making;**
4 **implementation;**
5 **follow-up and control;**
6 **post-implementation audit.**

As with the management process itself, a vital ingredient in the appraisal will be the need for **relevant information** (financial and non-financial) throughout the process.

This appraisal process itself can be costly and time-consuming to carry out. How rigorous or thorough should the process be? Clearly this will be related, among other things, to the size and scale of the investment. For example, for a large company a proposal to purchase a piece of equipment costing £50,000 will require much less evaluation effort than a project costing £50 million. On the other hand, in the context of a small, owner-managed business, a proposal to spend £50,000 on new equipment would be a significant investment.

Depending on individual circumstances, firms are likely to use sophisticated computerised project management packages to facilitate overall management of the project.

Proposal generation

Searching for new and profitable investment opportunities will be a continuous process throughout the organisation. Proposals for investments can originate from any sector within the organisation. The originator(s) of the proposal will usually refer it to someone at a higher level in the organisation for review. As mentioned above, large-scale proposals, involving substantial outlays will clearly be more closely scrutinised than smaller, less costly ones.

It is common practice in many organisations to offer incentives to employees to come up with ideas that could yield cost savings or improve efficiency.

Proposal review and evaluation

At this stage proposals are scrutinised to: (1) determine their relevance and contribution to the organisation's objectives, and (2) to evaluate their economic worth.

The **relevant costs and benefits** associated with each proposal will be evaluated and

translated into a series of *cash flows* (inflows and outflows), which will in turn be evaluated using recognised investment appraisal techniques. Recall, right from Chapter 1, the critical importance of using cash flows, as opposed to profits, in the valuation process.

Intangible costs and benefits also have to be recognised in the evaluation process, but by their nature they will be more difficult to evaluate than the tangible costs and benefits. In addition this stage will also include an evaluation of the *risks, opportunities* **and** *threats* associated with each proposal.

When the evaluation is complete, the next stage is usually to refer the proposal to an identified decision-making authority.

Decision-making

Next comes the crucial decision-making stage itself. The level in the organisation at which the decision is taken will depend upon the sums of money involved, the relative importance of the proposal in relation to organisational priorities and the structure of the organisation. Frequently, especially within large organisations, a delegation process will be in operation with specified expenditure limits preset for various organisational levels.

Implementation

If the project is approved, then implementation will follow typically in line with the **implementation plan** which will have formed part of the initial proposal submission. A phased implementation may require approval at the various phases. Management will also wish to ensure that outlays are in accordance with the budgeted levels set out in the proposal. A project management computer package may be used to help identify the *critical implementation phases* of the project.

Follow-up and control

This phase will involves monitoring and comparing actual outcomes with budgeted or planned outcomes. If actual outcomes deviate adversely from budget, *corrective action* will be taken to bring the project back on track, or if this does not prove feasible then the project may have to abandoned. On the other hand, if the variations are favourable, action will be taken to enhance or capitalise on the better than anticipated outcomes.

Where the project management system is computerised then the generation of budgetary control and progress reports will be greatly facilitated.

Post-implementation audit

This is a very important, but often neglected, stage of the investment appraisal process. Once the project is up and running, or 'live', then management's attention can all too easily get diverted to other problems or projects.

Usually a post-implementation audit will be carried out at various stages to test if the project has lived up to management's original expectations. If properly applied, the post-

implementation audit can be a very valuable learning tool, the lessons of which can be applied to the appraisal and management of future projects. Management can learn a good deal about improving the quality of future investment decisions from a rigorous post-implementation evaluation of previous projects.

In many organisations, initial capital expenditure proposals require a statement indicating the nature of the post-implementation audit and who is going to conduct it. Knowing that a project will be audited has a beneficial effect on its overall management!

Analysis of costs and benefits

All **relevant** costs and benefits arising from the investment decision will be evaluated in terms of the effect they have on the company's *cash flows.*

In making any long-term investment decision, it is essential to carefully identify and evaluate all the **relevant or incremental costs and benefits** likely to flow from the decision. These are defined as the *future and differential* costs and benefits, that is those costs and benefits which will change in the future as a direct result of undertaking the investment.

Changes in the company's cash flows will affect the company's tax liabilities and it is therefore only the **incremental, after-tax,** cash flows connected with the decision at hand which should be considered.

We will now look more closely at how to analyse incremental costs and benefits and to begin with they can be divided into two broad categories:

1 **capital items; and**
2 **revenue items.**

Capital items

Capital costs will consist of not only of the initial outlay on, for example, purchasing new equipment but also includes other costs necessary to get the equipment operational (e.g. delivery and installation costs, legal and professional fees, inspection and testing costs, etc.).

Capital items will also include any incremental investments in working capital, such additional stocks or debtors, necessary for the project to become operational.

Revenue items

Revenue items are the day-to-day recurring costs and benefits associated with the capital investment and will consist typically of the following:

1 **running costs and benefits;**
2 **incidental costs and benefits;**
3 **opportunity costs.**

Running costs and benefits
These will include all the relevant incremental cash operating costs of labour, materials

and overheads and all the relevant incremental cash flow benefits derived from additional sales and/or savings in operating costs. As we will be using cash flows to appraise the investment then non-cash items such as depreciation will be ignored.

Incidental costs and benefits

Will the new investment have repercussions for other units within the business beyond the acquiring unit? What are the incidental or 'spin off effects (also called *synergistic effects*) in terms of costs and benefits for other areas of the business? For example, the new investment may stimulate sales of existing (complementary) products or services. All relevant cash flows associated with the investment, from whatever part of the business they may arise, must be taken into account.

Opportunity costs

Managers are only too familiar with the problem of trying to manage with limited resources, of not being able to do all the things they would like to do to improve business operations. It is within this context of scarce resources that the concept of opportunity cost becomes relevant. If scarce resources are allocated to one purpose then they cannot be simultaneously allocated to another, in other words you cannot 'spend the same money twice'.

When faced with a choice, for example, between two competing projects A and B, the potential cash flows of A are foregone if the available resources are applied to B, and it is these foregone cash flows which constitute the opportunity cost of B. The sacrifice associated with choosing B is given by the benefits (cash flows) that have to be foregone by not choosing A.

Independent and mutually exclusive projects

Independent projects

Projects are said to be independent when the acceptance of one does not prevent acceptance of others. Independent projects are not in any way related. Management may decide to undertake all available independent projects (funds permitting), or invest in only a selection or even implement none.

Mutually exclusive projects

Projects are said to be mutually exclusive when the acceptance of one eliminates the other(s). It is an either-or choice of project—the projects are in fact substitutes for each other. Projects may be mutually exclusive because they fulfil the same function or provide the same solution (e.g. expand production capacity) or they may be mutually exclusive because they compete for limited funds.

Limited and unlimited funds

Rarely is management in the position of having unlimited funds available to invest in

capital projects. More than likely management will be faced with having to choose between projects due to limited funds; they will be making investment decisions under conditions of **capital rationing.**

Under capital rationing the budget for capital expenditure will be fixed and management must therefore allocate the funds that are available to the combination of projects which are expected to maximise shareholder value. However, for now we are making the simplifying assumption of having unlimited funds available.

INVESTMENT APPRAISAL TECHNIQUES

The judicious application of investment appraisal techniques will enable management to select projects that will advance the organisation's objectives and plans and add to shareholder wealth. Remember that these techniques facilitate good decision-making, they do not replace it. As with all decision-making aids, management still needs to apply **judgement** and professional experience in their use.

The financial techniques most commonly used to evaluate investment appraisal projects are:

1 **payback method;**
2 **accounting rate of return (ARR), or return on investment (ROI);**
3 **discounted cash flow (DCF) methods.**

In applying Discounted Cash Flow (DCF) the following techniques are commonly used:

1 **net present value (NPV);**
2 **profitability index (PI); and**
3 **internal rate of return (IRR).**

We will now examine each of the these techniques in turn.

The payback method

This is probably the most popular and the most easily understood of the three main appraisal techniques. It is essentially an expression of how long it will take to recover the initial cash outlay on an investment from the investment's cash flow returns. Many firms will set a *maximum payback period* (PBP) for projects and will use this as their decision rule. Thus the decision rule using payback is simply:

> **If the actual payback period is less than the predetermined maximum period, the project is acceptable; if the actual payback period is greater than the maximum period allowed, the project is rejected.**

The problem, however, is that there is no rational rule to say what the predetermined maximum period should be: it is a moving target, it will vary from case to case.

To calculate the payback period the annual net cash inflows from a project are accumulated until they equal the project's initial cash outlay. Net cash inflows can arise

from an increase in income and/or savings in operating costs.

Where the net cash inflows are constant annual amounts (that is, they form an **annuity** rather than a mixed stream) the payback period can be determined as follows:

$$\text{Payback Period (PBP) Years} = \frac{\text{Initial investment (cash outlay) on project}}{\text{Annual net cash inflows from project}}$$

Example 1 —Payback method

Turbocharge, a sports vehicle servicing and repair company, is considering an investment in one of two new machine tool projects. Their *operating cash flows* are estimated as follows:

	Machine A	Machine B
	£	£
Net cash inflow (after tax):		
Year 1	60,000	20,000
Year 2	40,000	40,000
Year 3	20,000	90,000
Total cash inflow	120,000	150,000
Initial investment (cash outlay)	100,000	110,000
Payback Period (PBP) =	(£60,000+£40,000)	
		$2\text{yrs} + \dfrac{50,000}{90,000}$
=	2.0 Years	2.6 Years

To determine the payback period we simply sum up the cash flows for each year, or part thereof, until they equal the initial investment. In the case of Machine A the firm will have recovered £60,000 of its initial investment at the end of year 1, and will have completely recovered its initial investment (£60,000+£40,000) by the end of year 2— assuming all cash flows occur evenly throughout the year.

With Machine B, the firm will have recovered £60,000 of its initial investment by the end of year 2 and will recover the remaining £50,000 part way through year 3 (i.e. £50,000/£90,000)—again assuming even flows of cash throughout the year.

Applying the payback method in Example 1, Machine A would be chosen as it has the shorter payback period (PBP), 2.0 years compared to 2.6 years for Machine B. However, Machine B generates greater cash returns, (£150,000−£110,000) compared to Machine A (£120,000−£100,000), and would therefore appear to be the more 'profitable' of the two investments. Note that both investments are expected to continue to generate cash flows after their respective payback periods.

Relying solely on the shorter payback period criterion would lead, in this case, to the seemingly less profitable alternative being chosen. However, as we shall soon see there are some serious weaknesses in applying the payback technique to investment appraisal.

Example 2 —Payback method
   Turbocharge is also considering one of the following two investments.

	Machine X	Machine Y
	£	£
Net cash flow (after tax):		
Year 1	4,000	15,000
Year 2	5,000	6,000
Year 3	16,000	4,000
Total cash flow	25,000	25,000
Initial investment (cash outlay)	25,000	25,000
Payback Period (PBP)	3 Years	3 Years

In Example 2, which project would be selected using the PBP, both have identical payback periods and generate identical total cash inflows? Consider this question for a moment before proceeding.

   The key difference between these two projects is the **timing** of the cash flows. Most of the cash inflows for Y occur early in the machine's life (60 per cent in the first year), whereas the bulk of the cash inflows for×(64 per cent) do not occur until the third year. In this case Turbocharge's financial preference would clearly be for Machine Y.

Payback limitations

Although a very popular method, payback is considered an **unsophisticated** investment appraisal technique as:

- it does not take account of ***all*** cash flows (it ignores cash flows occurring after the payback cut-off point);
- it treats the ***timing*** of cash flows within the payback period in a very cursory way (all cash flows occurring within the payback period are given equal weighting);
- it does not measure ***profitability*** or returns;
- it does not provide a ***rational decision-making rule,*** unlike the more sophisticated techniques of NPV and IRR. In other words, there is no generally accepted method of determining an appropriate payback period, it is an individual decision for each firm; and
- it ignores the ***time value of money*** by not discounting cash flows to find their present values.

The last point is the technique's most serious weakness, although this can be overcome by calculating a discounted payback period (see later in this chapter).

Payback virtues

Despite its limitations, payback is an intuitively appealing concept and is very widely

used in practice—usually as a secondary or supporting measure to other more sophisticated methods. Payback has the following specific virtues:

- it is *simple* to use and easy to understand (particularly for non-financial people);
- it takes the *timing of cash inflows* into account (albeit in a cursory way); and
- it can serve as a useful *risk screening device.*

Payback also deals with cash flows rather than accounting profits and it does suggest something about the timing of cash flows and therefore the time value of money. The fact that it can be used as a risk screening device—the longer it takes to recover the initial outlay, the greater the chances of something going wrong—means that in practice, payback is frequently used to supplement more sophisticated investment appraisal techniques.

Payback is particularly useful in circumstances where a company is facing liquidity difficulties and may therefore wish a project to return cash flows quickly, thus reducing the risk of insolvency.

EXERCISE 1 —PAYBACK

   Calculate the payback period for the following investment project.
   Initial investment £85,000

Net cash flow (£):

Year 1	12,000
Year 2	18,000
Year 3	26,000
Year 4	35,000
Year 5	27,000

   You will find the answer in Appendix B.

The accounting rate of return (ARR)

The accounting rate of return (ARR) appraisal method—sometimes also referred to as *the return on investment (ROI)* or *return on assets (ROA)* method—is closely related to the ROI/ROCE performance measure which we encountered in financial analysis.

However, from an investment appraisal point of view, ARR is an **unsophisticated** technique. It is calculated by dividing a project's **average accounting profits** by its **average investment.** The average profits figure is found by adding up the profits for each year of the investment and dividing by the number of years. The average investment is the sum of the initial investment or outlay plus the expected residual or realisable value of the asset, divided by two.

$$\text{Accounting rate of return (ARR)} = \frac{\text{Average accounting profit}}{(\text{Initial outlay} + \text{residual value})/2} \times 100$$

A variation on the above is to calculate the ARR by substituting **initial investment** for

the average investment in the denominator. This will yield a lower percentage rate of return figure than the former method. Sometimes the measure will also be calculated using after-tax profits in the numerator of the equation.

Many firms will set a *minimum or target ARR* for projects and will use this as their decision rule. Thus the decision rule using ARR is:

If the actual ARR is less than the minimum required ARR, the project is not acceptable; if the actual ARR is greater than, or equal to, the minimum required ARR, the project is acceptable.

Example 3 —ARR method
The accounting rate of return (ARR) for Turbocharge's proposed investment N calculated as follows:

ARR—Machine A:

YearCash Flow £		Depreciation £	Profit/ (Loss) £ I	A
1	60,000	30,000	30,000	
2	40,000	30,000	10,000	
3	20,000	30,000	(10,000)	
	120,000	90,000	30,000 1	

$$ARR = \frac{£10,000}{(£100,000 + £10,000)/2} \times 100 = 18.2\%$$

The initial investment of £100,000 (residual value £10,000) is depreciated on a straight-line basis over three years, (£100,000−£10,000)/3, giving £30,000 per year for depreciation expense.

Depreciation is an expense which is charged to the profit and loss account in determining the accounting net profit or loss for the period. However, depreciation is not a cash flow expense, thus it would have been omitted from the cash flow calculations for the payback method. The annual profit is the net cash flow less the depreciation charge.

ARR limitations

The major limitations of ARR are:

- it *ignores cash flows* (it uses accounting profits, not cash flows);
- it *ignores the timing of returns* (being a simple average it gives equal weight to each year's returns);
- like payback, it does not take the *time value of money* into account.

ARR virtues

- it does suggest something about a project's ***profitability,*** which payback does not; and
- it is ***simple*** to use and easy to understand by business people: rate of return is a concept which is generally understood in business.

Despite its weaknesses the ARR is widely used in practice. Return on investment (ROI) or capital employed (ROCE) is a familiar and favoured performance measure with business people.

ARR relates more closely to the financial accounting information contained in the published accounts and it is this information which is reported to shareholders and other stakeholders. For this reason it is often an easier method by which to inform shareholders and other stakeholders about the acceptability of investment projects.

ARR is also favoured by many managers because their remuneration packages may be tied to such short-term, profit-based performance measures, rather than the longer-term discounted cash flow techniques.

EXERCISE 2 —ARR—MACHINE B

Calculate the accounting rate of return (ARR) for Turbocharge's Machine B assuming a residual value of zero. Which investment would you recommend using the accounting rate of return (ARR)? Explain your recommendation. Compare your findings with the payback criterion. Keep your answer, you will need it later.

Discounted cash flow (DCF)

By focusing on **cash flows** *and* adjusting them to reflect the **time value of money,** the discounted cash flow (DCF) method overcomes the central weakness of the payback and ARR methods.

To evaluate investment alternatives effectively, the cash outflows and inflows relevant to each proposal must be determined. As it is cash—not accounting profit—which is needed to pay bills and shareholder dividends, an emphasis on cash flow is required. It is therefore important to ensure that depreciation and other non-cash expenses associated with each proposal are added back to the accounting profit (or operating surplus in the case of an NPO) figures in order to arrive at the operating cash inflows.

It is the **incremental operating *after-tax* cash inflows** which we use to measure the expected benefits from the project.

Relevant incremental cash flows

As has been mentioned earlier, the proper evaluation of any long-term investment decision demands a careful identification and evaluation of all the relevant, incremental

costs and benefits.

   You will remember that the relevant, incremental costs and benefits are the future and differential costs and benefits (that is, those costs and benefits which will change in the future as a direct result of undertaking the investment), we are thus concerned with how the firm's *total* cash flows will change as a result of the investment decision. To do this we must make a comparison between:

 1 the firm's current or existing total cash flows *without* the project; and
 2 the firm's estimated future total cash flows *including* the proposed project.

The difference between (**1**) and (**2**) are the relevant incremental cash flows—the cash flows under (**2**) should be greater than (**1**), if they are not then there is no point in proceeding. Example 4 illustrates the concept of incremental cash flows.

Example 4 —Incremental cash flows

   Alpha Limited is considering a new investment to modernise its production facilities. The company currently has total annual operating cash inflows of £150,000 and outflows of £100,000. If the new investment is undertaken then future annual operating cash flows are forecast at, inflows £175,000 and outflows £115,000. What are the relevant, incremental cash flows to be included in the investment appraisal? Ignore taxation. You should attempt this question before looking at the solution.

Incremental cash flows—Alpha Limited

	(1) *Current cash* *flows (without* *project)*	*(2)* *New cash* *flows (with* *project)*	*(3)=(2)−(1)* *Incremental* *Cash Flows*
Annual Operating Cash Inflows	£150,000	£175,000	£25,000
Annual Operating Cash Outflows	£100,000	£115,000	£15,000
Annual Net Operating Cash Flow	£50,000	£60,000	£10,000

   The relevant, incremental operating cash flows are calculated at £10,000 per year.

The above exercise told you to ignore taxation—if only it were possible! Changes in a company's cash flows will alter a company's tax liabilities. For example, increased profits earned as a result of undertaking a capital project will increase the company's liability to corporation tax. The tax on the profits is in itself a cash outflow as it must be

paid to the Inland Revenue—it cannot be retained to add to the wealth of the shareholders. It is therefore **only the incremental, *after-tax* cash flows associated with the decision at hand which should be considered.**

Taxation and investment appraisal

As taxation effects will significantly impact on an investment's cash flows, and therefore its ultimate attractiveness, they must be taken into account in the appraisal. We will not, at this point, complicate an understanding of the basic concepts of investment appraisal by dealing with the treatment of taxation here (we will return to taxation aspects later in this chapter). For now it is sufficient to be aware of the following points:

1 generally the relevant tax payments will be reflected in the cash outflows in the year *following* the year in which the liability arises, in other words there is, for all practical purposes, a one year ***time lag*** between earning the profits and payment of the tax;
2 any relevant tax losses in one year will normally be shown as a cash receipt in the next year.

DCF—information required

To build a DCF model and perform our project evaluation we will need to collect all the relevant information in an accurate and systematic way. The information required to develop a discounted cash flow model can be itemised as follows:

1 the estimated **initial *cash* expenditure** or outlay on the project;
2 the estimated **operating cash expenditure** for each year of the project's life;
3 the estimated **operating cash receipts** each year;
4 **annual operating cash flow**=(3)−(2);
5 the estimated **termination cash flows** if any, at the end of the project's life;
6 the **estimated economic life** of the project; and
7 the **rate of return** required on the investment.

You will notice from the above that project cash flows can be summarised into three broad categories, **(1) initial cash investment, (2) annual operating cash flows, and (3) terminal cash flows,** that is, items (1), (4) and (5) above. Terminal cash flows occur when the project is terminated or decommissioned at the end of its useful economic life. These three stages are also referred to as the *initial, intermediate* and *terminal* stages, with their cash flows similarly classified.

The annual operating cash flow, item (4) above, is the relevant or incremental annual cash flow resulting from undertaking the project, and clearly this should be a positive figure!

The required rate of return, or cost of capital as it is often referred to, item (7) above, is the minimum rate of return the project must earn in order to justify the investment of funds and to maintain, or preferably enhance, shareholder wealth.

The collection of this cash flow information, particularly for large-scale, complex

projects, is likely to be difficult and tedious. For example, in large-scale, multimillion pound projects, the initial investment could be spread over several years (e.g. factory construction, installation of heavy, complex plant and machinery, systems testing, staff
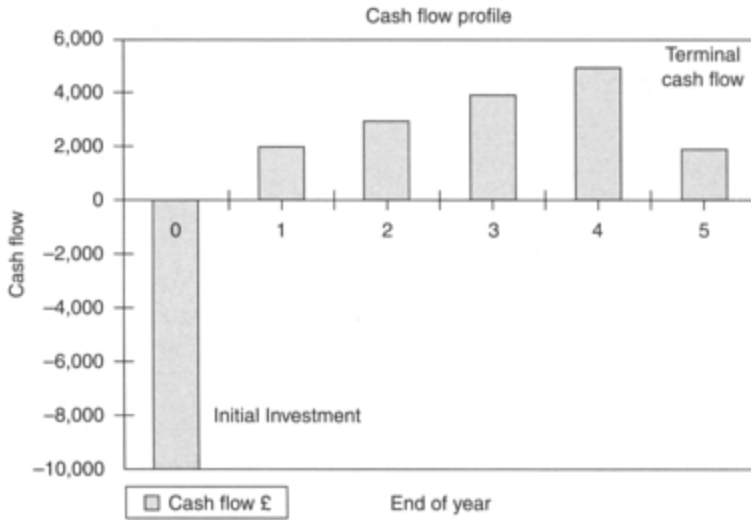
Figure 10.1 Project cash flow profile

training etc.) and similarly with decommissioning costs when the project terminates. Despite the difficulties it is essential that the information is collected in a systematic and accurate way to enable a valid project appraisal to be carried out.

The use of low cost computer software packages will greatly facilitate the construction and manipulation of the DCF model, once all the basic data has been collected and entered. A typical cash flow profile or pattern for an investment project could be represented as in Figure 10.1.

Figure 10.1 shows the cash flow profile for a typical investment project. The initial investment cash outflow of £10,000 is denoted as occurring at time 0, the present time, and this is followed by a series of increasing positive operating cash flows from year 1 to year 4, with a positive terminal cash flow occurring at the end of year 5.

> ### *Example 5 —DCF method*
> Illusions Ltd is a small firm specialising in the creation of special effects for the film and television industry. Its management is considering an investment proposal to upgrade existing services in order to meet contractual obligations and improve competitiveness.
>
> New equipment will cost £150,000; installation costs are estimated at £10,000. Building alterations and modifications are estimated to cost £90,000. It is anticipated that £20,000 will be received from the

disposal of old equipment and £5,000 will need to be invested in additional working capital (in the form of additional stock holdings and debtors, etc.) over the life of the project.

Additional annual running costs (wages, consumables, maintenance and power) are estimated at £55,000, including depreciation of £15,000. Overall the scheme will generate increased income of £80,000 per year. The project's life is expected to be 10 years and the required rate of return on the project is 10 per cent. Residual values will be zero. As the firm's financial manager you are required to:

1 calculate the initial investment; and
2 calculate the relevant annual cash flows and the net operating cash flows.

Ignore taxation.
1 Initial Investment

	£
New equipment	150,000
+Installation costs	10,000
+Building extension	90,000
+Additional working capital	5,000
	255,000
−Sale proceeds from old equipment	20,000
=Initial investment	235,000

The additional investment in working capital will be required for the life of the project. It is the amount of additional money that is needed for example, to finance increased stock levels to support the expansion in services. It is treated as a 'one-off' initial cash outlay, but is usuallyassumed to be recovered when the project terminates. Conversely any reduction in working capital which accompanied an investment project would be shown as a cash inflow.
2 Incremental Cash Flows

	£
Increased annual revenue	80,000
−Increased annual running costs	55,000
=Operating profit (after depreciation)	25,000
+Depreciation	15,000
=Net operating cash flows	40,000

All the expected benefits from a capital expenditure proposal must be converted into actual cash flows. Cash inflows are monies that Illusions Ltd can actually spend, they are not income statement 'operating profits', which are not necessarily available to the company to pay its bills. Remember that depreciation, while an operating expense, is not a cash flow item, therefore it must be added

> back to the operating profit figure to obtain the relevant cash flow figure.

The discount rate

Assuming all the DCF information as previously set out in items (1) to (4) above can be obtained, the question arises as to what discount rate (variously referred to as the required rate of return, opportunity cost, or cost of capital) to use.

In the commercial world the discount rate is **the required rate of return;** it refers to the minimum return that must be earned on an investment project to maintain the market value of the firm. In Chapter 7 we learned how the Capital Asset Pricing Model (CAPM) can be used to determine required rates of return. We will also further examine the derivation of discount rates, that is, the cost of capital for a project, in Chapter 12.

Net present value (NPV)

Investment decision-making requires an evaluation of the relevant costs and benefits of a project that *do not occur at the same time.* For example, the bulk of the capital outlays on the project may be paid in the first year and the benefits may be spread out over a number of years into the future.

As we learned in Chapter 5, the time value of money concept overcomes the difficulty of trying to reconcile costs and benefits occurring over differing time periods by making all money amounts comparable; it converts them to a common present value or base so that all present money costs are comparable with all future money benefits. The **net present value (NPV)** enables us to make this comparison for a project. Recall from Chapter 5 that the net present value (NPV) *is the difference between the present value of future cash inflows and the present value of the initial outlay, discounted at the firm's cost of capital.*

Clearly, for a project to be viable, the present value of the cash inflows should at least equal, or preferably exceed, the present value of the cash outflows. In applying the NPV technique the decision rule is:

If the NPV is equal to or greater than zero, the project is considered acceptable; if the NPV is negative, the project should be rejected.

This accept/reject criterion can be summarised as:

NPV $\geq$ 0 Accept
NPV $<$ 0 Reject

NPV formula

The net present value (NPV) is thus found by subtracting the initial outlay (I_0) from the total present value of the cash inflows (CF_t) discounted at the appropriate discount rate (r). Therefore *NPV=total present value of cash inflows−initial investment.* This can be summarised in the formula:

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{NCF_t}{(1+r)^t}$$

where,

NPV = net present value
I_0 = initial investment/cash outlay
NCF = net cash flow at end of year t
t   = any year
r   = required rate of return/discount rate3
n   = project's expected life

The symbol Σ (Greek letter capital sigma) simply means: 'Go through the following process, let t=1 and find the PV of NCF_1; then let t=2 and find the PV of NCF_2. Continue until the PV of each individual year's cash flow has been found, then add up [Σ (sigma) =sum up] the PVs of all these individual cash flows to find the toal PV of the project'. The final step is then to subtract the initial investment, I_0, from the total PV of all the individual cash flows to find the NPV of the project.

The notation in the above formula can be refined slightly to highlight the fact that in project evaluation we are concerned with **after-tax** cash flows. This is achieved by substituting ANCF for NCF, where A simply denotes that the net cash flows are after tax.

Example 6 —NPV

We will now return to the investment decision facing Turbocharge, a sports vehicle servicing and repair company, concerning the purchase of one of two new machine tools. In this case we will appraise Machine A using the NPV technique, assuming a discount rate of 10 per cent.

NPV − Machine A

Year	Net Cash Flow (NCF) £	×Discount Rate (r) (10%)	=PV £
0	(100,000)	1.000	(100,000)
1	60,000	0.909	54,540
2	40,000	0.826	33,040
3	20,000	0.751	15,020
		NPV =	2,600

It is conventional to designate the year in which the initial outlay takes place as year 0 and to show the years in which the cash starts to flow in as from year 1 onwards. For simplicity it is also conventionally assumed that all cash flows occur at year end.

Applying the decision rule Machine A would clearly be acceptable as its NPV is positive when discounted at the company's cost of capital of 10 per cent.

EXERCISE 3 —NPV—MACHINE B

Calculate the NPV for Machine B using the same discount rate. Compare your answer with the NPV for Machine A. Which investment would you select and why? Keep your answer, you will need it later.

Annuity approach

Recall that an annuity is simply a stream of annual cash flows of a constant amount. Should the cash inflows for an investment project form an annuity, rather than a mixed stream as in the preceding examples, then calculating their present value can be simplified by using annuity tables.

Example 7 —Calculating NPV with annuity cash flows

Turbocharge is also considering the following as an investment project.

	Machine C
Net cash flow (after tax):	£
Year 1	7,000
Year 2	7,000
Year3	7,000
Year 4	7,000
Total cash flow	28,000
Initial investment (cash outlay)	25,000

Determining the project's NPV using the annuity method would be as follows, assuming the same discount rate of 10 per cent.

Machine C—NPV using annuity factor

Year £	Net Cash Flow (NCF)	×Discount Rate (r) (10%)	=PV £
0	(25,000)	1.000	(25,000)
1–4	7,000	3.170	22,190
		NPV =	(2,810)

Using the annuity approach for Machine C, we first need to find the annuity factor from the **present value annuity factor (PVIFA) tables** (Appendix A). Annuity tables are laid out in the same way as present value tables: period references on the vertical axis and

discount rates on the horizontal axis.

The estimated future cash inflows from Machine C form a four-year, £7,000 annuity. Therefore from the present value annuity tables, first look up the annuity period of 4 years and then cross-reference this with the discount rate of 10 per cent to get the annuity factor of 3.170. Next multiply the annuity sum of £7,000 by this discount factor to get the present value of the annuity cash inflow, which in this example amounts to £22,190.

As this discounted value of the cash inflows is less than the present value of the initial investment, the project has a negative NPV—according to our decision rule it should be rejected.

Often, in practice, in a cash flow model there is an annuity embedded within a mixed stream of cash flows. The following example will help illustrate how to deal with such a cash flow.

Example 8 —NPV of a mixed stream cash flow with an embedded annuity

Year	Net Cash Flow £	Revised Cash Flow £	×Discount Rate (r) = (12%)	PV £
0	(15,000)	(15,000)	1.000	(15,000)
1	2,000	2,000	0.893	1,786
2	3,000	18,185*	0.797	14,493
3	5,000*		0.712	0
4	5,000*		0.636	0
5	5,000*		0.567	0
6	5,000*		0.507	0
7	4,000		0.452	1,808
8	1,000		0.404	404
			NPV=	3,491

*(PVIFA$_{12\%,4yrs}$×3.037=15,185.)

In this example the embedded annuity runs from year 3 to 6 inclusive; a £5,000 four-year annuity discounted at 12 per cent. The present value interest factor for an annuity (PVIFA) at 12 per cent for four years from the present value annuity tables is 3.037, which when multiplied by £5,000 gives a present value of £15,185. Next this discounted value of £15,185 is combined with the non-discounted cash flow for year 2 of £3,000 and this total sum of £18,185 is then discounted at the present value factor for year 2 of 0.797 to give a combined present value of £14,493.

What does the NPV tell us?

Having previously calculated our NPVs for the two machines, what does this tell us about the two proposals?

Any project with a positive NPV earns more than the required rate of return. If you have completed the previous exercises you will have found that both machines A and B earn a rate of return greater than 10 per cent, the cost of capital. How we determine the actual rate of return will be covered in the next section on the internal rate of return (IRR).

A zero NPV project earns just sufficient returns to compensate investors: a negative NPV project does not earn an adequate return. Clearly the higher the positive NPV the more value is added to the firm and the better off (wealthier) the firm (and its shareholders) will become.

Projects with a zero NPV provide cash flows just sufficient to cover:

- repayment of the initial outlay;
- interest payments to all creditors who have lent finance for the project; and
- dividend payments (and capital gains) to shareholders.

Projects with a positive NPV provide cash flows which more than cover all of the above.

The discount rate used in investment appraisal is clearly a critical factor. If, for example, a discount rate of 15 per cent was to be used in the investment appraisal example for Turbocharge then both investments would be unacceptable, as both would show negative NPVs: for practice you should check this out for yourself.

Profitability index (PI)

The profitability index (PI) (or *benefit/cost ratio*) is the ratio of the present value of all future net cash flows (benefits) to the initial outlay (costs). While the NPV is an absolute measure of a project's acceptability, the profitability index is *a relative measure* as it relates the benefits (PV of future cash flows) to the initial investment. This can be expressed as:

$$\text{PI} = \frac{\text{PV benefits}}{\text{PV outlay}}$$

In our example for Turbocharge the profitability index for Machine A would be determined as:

Machine A

$$\text{PI} = \frac{£102,600}{£100,000}$$

$$= 1.03$$

Using the profitability index the decision rule is:

If the PI is greater than or equal to 1.0 accept the project, and reject the project if the PI is less than 1.0.

PI≥1.0 Accept
PI<1.0 Reject

EXERCISE 4 —PROFITABILITY INDEX—MACHINE B

Calculate the profitability index for Machine B. Compare your findings with Machine A and with the NPV result. Based on this information which investment would you select? Why? Keep your answer, you will need it later.

A word of warning, however, when using the PI. In evaluating independent projects the PI will give the same accept/reject decision as the NPV and the internal rate of return IRR (see Example 9). But we must be careful in applying the PI to **mutually exclusive projects**—for reasons very similar to those we will discuss in relation to applying the IRR to mutually exclusive projects. Example 9 illustrates this point.

Example 9 —Profitability index

Suppose we were evaluating the following two investments:

	Project 1	Project 2
PV of cash flows	£20,000	£1,500,000
Investment	£10,000	£1,000,000
Thus PI=	2.0	1.5

Strictly adhering to the PI criterion in this case would be very misleading, it would indicate the acceptance of Project 1. In contrast Project 2 has the greater outlay and is clearly the superior investment according to the NPV—it yields greater overall value of £500,000 compared to £10,000 for Project 1. The PI, like the internal rate of return (IRR) (see below), does not give any indication of the *size and scale* of investments. In respect of mutually exclusive projects the PI criteria would not provide a ranking system which the firm would wish to follow.

The internal rate of return (IRR)

The internal rate of return (IRR) or yield can be defined as: **the discount rate which equates the present value of the expected initial cash investment, with the present value of the expected cash inflows.**

In other words the IRR is the discount rate which when applied to an investment's cash flows gives a net present value of zero. The IRR is in effect an investment project's *expected rate of return, E(r),* and it may of course be greater than, equal to, or less than a

project's required rate of return, R(r). The IRR formula is: where,

$$I_0 = \sum_{t=1}^{n} \frac{NCF_t}{(1 + IRR)^t} \qquad \text{or alternatively} \quad B = -I_0 + \sum_{t=1}^{n} \frac{NCF_t}{(1 + IRR)^t}$$

where,

I_0 = initial investment/cash outlay
NCF   = net cash flow at end of year t
t   = any year
IRR   = expected rate of return/discount rate
n   = project's expected life

In applying IRR the decision rule is:

If the IRR is greater than, or equal to, the required rate of return the project is considered acceptable; if the IRR is less than the required rate of return the project is not considered acceptable.

IRR ≥ required rate of return, R(r) Accept
IRR < required rate of return, R(r) Reject
Alternatively,
E(r) ≥ R(r) Accept
E(r) < R(r) Reject

The IRR is more difficult to calculate manually than NPV, it has to be determined by iteration or trial-and-error techniques and the application of some common sense! Fortunately, financial calculators and computer software make its calculation quite easy.

Example 10 —Internal rate of return (IRR)

To illustrate the determination of the internal rate of return we will use the trial-and-error approach to calculate the IRR for Turbocharge's machine tool project.

Remember that Machine A had a positive net present value of £2,600, indicating that the rate of return the project actually earns is greater than the original discount rate of 10 per cent. If a higher rate of, say, 15 per cent is tried, the NPV would be:

IRR—Machine A

Year	Net Cash Flow (NCF) £	× Discount Rate (15%)=	PV £
0	(100,000)	1.000	(100,000)
1	60,000	0.870	52,200
2	40,000	0.756	30,240

3	20,000	0.688	13,160
		NPV=	(4,400)

This time the NPV is negative. The discount rate has been increased by 5 per cent, and the NPV has consequently been reduced to a negative figure of (£4,400). This reveals that the IRR for Machine A apparently lies between 10–15 per cent. We can obtain a more precise result by applying a statistical technique called **interpolation.**

Interpolation is a statistical technique used to find an intermediate value lying between a range of values. As the technique incorporates a linear or straight-line approximation to an exponential function, it will yield an approximate, not a precise, result and the wider the interpolation interval (that is, the range of values), the more approximate the answer will be. However, this does not present any major problem as even a range of 15 per cent between values will result in an IRR which is within 1–2 per cent of the true IRR.

We can find the intermediate value by using the formula:

$$IRR = r_1 + \frac{NPV_1}{NPV_1 + NPV_2} (r_2 - r_1)$$

where,

r_1 = lower discount rate used
r_2 = higher discount rate used
NPV_1 = the NPV of the cash flows at r_1
NPV_2 = the NPV of the cash flows at r_2%

Substituting for Machine A and ignoring the difference in signs between NPV values:

$$IRR = 10 + \frac{2,600}{2,600 + 4,400} (15 - 10)$$

$$= 10 + [(0.371)(5)]$$

$$= 10 + 1.855$$

$$= 11.86\% \quad \text{say 12\% to nearest whole per cent.}$$

Machine A yields a return of 12 per cent, which is greater than the cost of capital or required rate of return of 10 per cent, therefore it is acceptable using the IRR criterion.

EXERCISE 5 —IRR FOR MACHINE B

Calculate the IRR for Machine B before proceeding. Compare your findings with Machine A. Which investment would you choose and why? As before keep your answer for use later.

Net present value (NPV) profiles

The relationship between NPV and IRR can be demonstrated more clearly through the use of a graph, as shown in Figure 10.2. The graph shows the **net present value profiles** for the two machines. The NPV profile is obtained by simply plotting on the graph the NPV at various discount rates: NPVs are shown on the vertical axis and the discount rate (cost of capital) on the horizontal axis. The IRR is the point where the respective profile graph intersects the 0 NPV line.

An analysis of the graph shows a distinction between the NPV profiles of the two projects; it clearly indicates that for any discount rate Machine B has the greater NPV. There are no conflicts in NPV rankings (the lines do not cross at any positive NPV). The pattern is clear, Machine B consistently yields a higher NPV than Machine A at any discount rate.
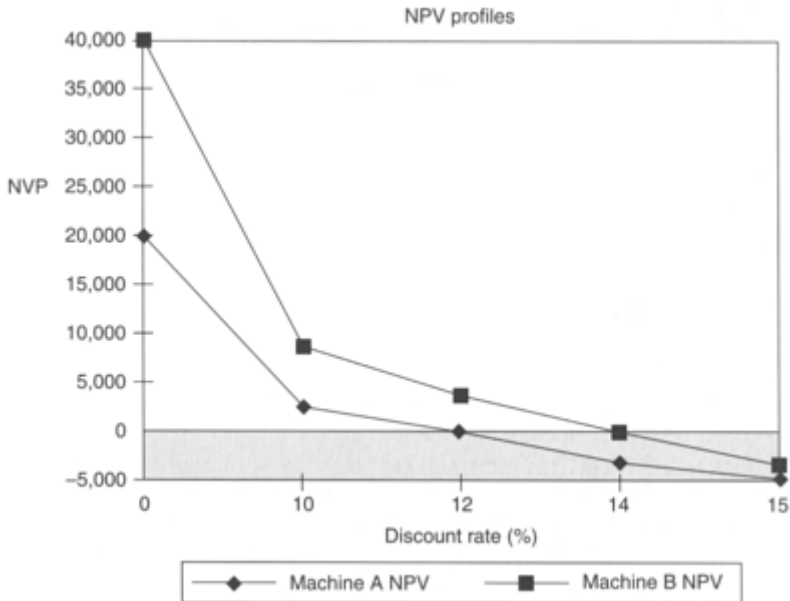
Figure 10.2 NPV profiles: machines A and B NPVs at different discount rates

Problems with IRR

The IRR has to be used with care. It does have a number of associated problems particularly when there are:

Differing cash flows

Projects may have different cash flow profiles; one project may have large cash inflows early in its life cycle while another may have large cash inflows late in its life cycle. The earlier the cash flows are received, the more attractive the project is likely to be.

Differing size/scale projects

- One project may require a considerably larger initial investment than an other. Large investment projects tend to have higher NPVs but lower IRRs. A project with a lower IRR may have a longer life and thus yield a greater *total* cash return.
- A rate of return is a ***relative*** measure—remember the profitability index (PI) as a relative measure! For example, is a 10 per cent return better than a 20 per cent return?

Project	P	Q
Outlay	£500,000	£50,000
Return	£50,000	£10,000
Return%	10%	20%

Project P has a lower rate of return than Q, but yields a greater overall cash return.

Multiple rates of return

Any project can have only one NPV and one PI but it is possible for a project, under certain conditions, to have a nil or even multiple IRRs. This occurs where a project has non-conventional cash flows. The conventional cash flow pattern is usually a large initial investment outflow followed by a series of positive annual operating inflows.

Unconventional cash flows would include periodic cash outlays, or reinvestment outflows, during the life of the project. For example, consider the following cash flow profile for Project Omega:

Project Omega
Net cash flow

Year	(NCF) £000
0	−16
1	+100
2	−100

The cash flows for this project show two reversals of signs, from − £16,000 to +£100,000 and then from +£100,000 to −£100,000. This cash flow pattern is termed unconventional when compared to the conventional pattern of an initial cash outflow (−) followed by a

stream of positive (+) cash inflows—there is typically only one sign change.

In the case of Project Omega above there will be at least two positive IRRs, that is there will be at least two discount rates which will yield an NPV=0. In this case there will be one IRR of approximately 25 per cent and a second IRR of approximately 400 per cent! In other cases of unconventional cash flows there can be as many IRRs as there are sign reversals. The mathematical explanation for this is the *Descartes' rule of signs,* which suggests that each time the cash flow signs change, there may be a new positive root to the problem. [4]

The above non-conventional cash flow pattern could, for example, resemble that of an oil or gas exploration, or a mining, project. The first outflow represents cash invested in opening the well or mine, then cash flows are generated as the natural resource is sold, and finally, when the resource is exhausted, costs of decommissioning are involved.

Alternatively an unconventional project could be a large-scale factory investment project which requires significant 'top-up' or upgrade investments during the project's lifespan.

In any event, when multiple sign reversals appear in a project's cash flow pattern, multiple IRRs are likely to emerge. In such scenarios the use of IRR as an investment criteria is futile, however, the NPV method is easily applied.

Conflicting project rankings—NPV versus IRR

In our Turbocharge investment appraisal example, both NPV and IRR criteria indicate the same investment decision. However, this may not always be the case and sometimes a choice has to be made between mutually exclusive projects which have conflicting NPV and IRR criteria. Consider the following example.

Example 11 —Conflicting NPV and IRR rankings

Ranchero Grande, a chain of Mexican themed bars and restaurants, wishes to renovate and upgrade some of its kitchen and bar facilities. It is considered that either of the following two investment projects will meet their specifications. If the required rate of return is 10 per cent, which project should management accept?

Mutually Exclusive Projects

Year	Project 1 Cash Flows (£)	Project 2 Cash Flows (£)
0	−500,000	−500,000
1	280,000	28,000
2	280,000	28,000
3	56,000	114,000
4	56,000	114,000
5	14,000	333,000
6	14,000	333,000

NPV at 10%	£82,708	£106,994
IRR	14.8%	12.7%

Discounting project cash flows at the required rate of return of 10 per cent produces positive net present values for both projects, suggesting that the expected rate of return for both is greater than the 10 per cent rate of return required by management. By interpolation we find that the internal rates of return for the projects are approximately 14.8 per cent for Project 1 and approximately 12.7 per cent for Project 2.

Both projects are clearly acceptable as both NPVs>0 and both IRRs>10 per cent, the required return. However, there is a conflict in the criteria, Project 1 which has the lower NPV also has the higher IRR, so which investment should management choose? You may wish to think about this for a moment before proceeding.

As the initial investments for both projects are identical, the conflict in this instance arises from the different timings in the project cash flows over the six-year period. Project 1 yields a higher IRR because the bulk of its cash flows occur earlier in its life and the initial investment is therefore recovered more quickly than in Project 2.

However, the root cause of the conflict is the differing inherent assumptions of NPV and IRR about the rate at which intermediate cash flows are reinvested in the business—**the reinvestment rate assumption.** It would not make good financial sense to simply leave cash flows idle, they should be reinvested in new wealth-creating projects. The problem is that the two techniques assume that such funds are invested at different rates of return.

For example, Project 1 is expected to produce a cash flow in year one of £280,000, this money could be reinvested elsewhere in the business. The NPV technique implicitly assumes that this money is reinvested for the next five years at the required rate of return of 10 per cent. In contrast, the IRR implicitly assumes that the money is invested elsewhere for the next five years at the IRR, which for Project 1 is the higher rate of return of 14.8 per cent.

As we will explain shortly, the investment decision should be guided by the NPV, therefore Project 2 should be implemented as it has the higher NPV—it is the greater value-adding or wealth-creating project.

Which is the preferable appraisal method, NPV or IRR?

Both NPV and IRR are sophisticated investment appraisal techniques which take account of the time value of money, use the cost of capital in the decision criterion and, with no

other constraints, provide the same accept-reject decisions *for independent projects.* So which should a decision-maker prefer?

Conflicts can frequently occur between the rankings of projects when using NPV and IRR. This usually is a result of differences in (1) the scale or magnitude of projects and/or (2) the timing of project cash flows. For example, two projects may require substantially different initial investments and/or the cash flows of two projects may move in opposite directions. This is the case in Example 11, where Project 1 generates most of its cash flows in the early years and Project 2 generates them in later years.

The NPV is considered a theoretically more sound technique than the IRR, although in practice many firms use the IRR in preference to NPV, principally because managers and decision-makers are more comfortable with using rates of return.

At this juncture it may be helpful to distinguish between the theoretical and the practical considerations of NPV and IRR.

Theory

NPV is considered the more theoretically sound technique and the reason for this is mainly to do with assumptions about the rate at which cash flows generated by an investment project can be reinvested—the **reinvestment rate assumption.** In other words, what does a firm do with the intermediate cash flows generated by a project? It is unlikely that they are left idle.

The NPV implies that the cash flows which a project generates are reinvested at the firm's cost of capital or required rate of return, whereas IRR implicitly assumes that the firm can reinvest at the IRR, which is frequently a higher rate than the cost of capital.[5] The more prudent and indeed realistic assumptions of the NPV are considered preferable.

Practice

Despite the theoretical superiority of NPV, in practice many managers and firms prefer to use the IRR, essentially because most people are more comfortable in practice with the concepts of rates of return. The NPV method is not really a relative measure, it yields an absolute £ amount, it does not attempt to measure benefits *relative* to the amount invested. In practice it is easier to compare the IRR with other rates of return provided elsewhere in the market by other investments.

Conclusion

When evaluating *independent projects* both the NPV and IRR methods will indicate the same accept/reject decision. However, when deciding among *mutually exclusive projects,* especially projects differing in scale, size and/or cash flow timings, the decision should be guided by the NPV technique.

The NPV technique is always considered the preferred criterion. NPV is after all a *valuation technique* and as the primary goal of financial management is maximising the value of the firm, then **NPV is the only investment appraisal technique that is** *always* **consistent with this principal goal.** Maximising shareholder value can be achieved by maximising the net present value of all the firm's investment cash flows, subject to applying an appropriate discount rate.

> **KEY LEARNING POINT**
> N**PV is the only investment appraisal technique which is *always* in harmony with the primary financial goal of shareholder wealth maximisation.**

Discounted payback

The use of payback as an investment appraisal technique can be considerably strengthened if the payback period is calculated using discounted cash flows rather than nominal cash flows. The discounted payback can be defined as: **the number of years required to recover the initial investment from the *discounted* cash flows.**

Example 12 —Discounted payback
    Set out below is the discounted payback for Machine A, assuming a discount rate of 10 per cent:
Machine A—Discounted payback

Year	Net Cash Flow £	×Discount Rate (10%)	=	PV £	Cumulative PVs (£)
0	(100,000)	1.000		(100,000)	(100,000)
1	60,000	0.909		54,540	(45,460)
2	40,000	0.826		33,040	(12,420)
3	20,000	0.751		15,020	2,600
		NPV	=	2,600	

By accumulating the discounted cash flows, we can see that the discounted payback for Machine A occurs some time during year 3; approximately when during year 3 we can determine as follows.
    The balance needed to make up the initial investment during year 3 is £12,420. We then express this as a proportion of the total cash flows for year 3, £12,420/£15,020=0.83, which suggests that payback occurs approximately 10 months into year 3. Thus discounted payback for Machine A=2.83 years—assuming all cash flows are evenly distributed throughout the year.

By using cash flows discounted at the firm's cost of capital, the discounted payback technique is a significant refinement over the regular payback method, but it remains a deficient technique. It still does not overcome the difficulties of determining an arbitrary payback cut-off point, nor does it recognise the cash flows occurring after the cut-off point. Nonetheless, if applied judiciously, it can be a useful supplementary appraisal technique.

> ### EXERCISE 6 —DISCOUNTED PAYBACK—MACHINE B
>
> Calculate the discounted payback for Machine B. As before compare your answer with that for Machine A and comment upon your findings.

> ### EXERCISE 7 —SUMMARY OF INVESTMENT APPRAISAL RESULTS FOR TURBOCHARGE
>
> Before proceeding you should now summarise all your answers for the various techniques for both investments. As the investments are mutually exclusive only one can be implemented. Take a few minutes to study your summary table. Which investment would you now recommend and why?

SUMMARY TABLE—INVESTMENT APPRAISAL TECHNIQUES

EVALUATION METHOD	DEFINITION	DECISION RULE
Payback period (PBP):		
With annuity	Initial investment / Annual cash inflows	Accept if≤ maximum PBP; Reject if>maximum PBP.
Without annuity	Accumulate annual cash inflows until they equal initial investment	
Accounting rate of return (ARR)	Average accounting profit / Average investment	Accept if≥target ARR; Reject if<target ARR.
Net present value (NPV)	Present value of cash inflows *minus* initial investment	Accept if NPV≥0; Reject if NPV<0.
Profitability index (PI)	Present value of cash inflows / Initial investment	Accept if PI≥1.0; Reject if PI<1.0.
Internal rate of return (IRR)	Discount rate which gives present value of cash inflows = initial investment i.e. where NPV=0.	Accept if IRR≥cost of capital; Reject if IRR<cost of capital.
Discounted payback period (DPBP)	Accumulate *discounted* cash flows until they equal the initial investment	Accept if≥ maximum DPBP;

Reject
if>maximum
DPBP.

TAXATION

In the United Kingdom, companies are liable to pay corporation tax on their profits, after certain adjustments. An individual company's investment programme will affect its profitability and therefore its tax liabilities.

As a company's profits grow as a result of profitable investment projects, so will its tax bill. Thus more taxable profits means more corporation tax will have to be paid to the Inland Revenue. This will have an impact on the cash flows of the company—an increase in the tax payments increases the cash flows out of the company. Conversely less tax will be paid if the company invests in loss-making projects!

A company usually has up to nine months after the financial year end in which to pay its corporation tax, although for practical convenience in cash flow appraisals a one-year time lag is conventionally assumed. The **timing effect** of tax payments on cash flows, however, is only one of the ways in which taxation can affect investment decisions.

A second key factor concerns the **capital allowances** which a company is entitled to claim when it invests in certain types of assets. Under UK tax legislation, depreciation is not allowed as an expense to be charged against profits, instead the Inland Revenue substitutes a uniform system of capital allowances. Capital allowances can be set against taxable profits thus reducing a company's tax liabilities and consequently the actual amount of tax paid to the Inland Revenue.

To summarise, in dealing with taxation, as for all other variables in an investment appraisal, we are concerned only with its incremental cash flow effects; which will usually consist of the tax charged on the additional profits and the allowances obtainable on the initial capital invested.

While the tax regimes of individual countries may vary, a common feature of many is the inclusion of some form of tax incentive or allowance to promote capital investment by companies.

Capital allowances

As we stated above, in the UK taxation system, depreciation is not allowed as a business expense to be set against taxable profits, instead a *uniform system* of capital allowances operates. Capital allowances, which only apply to certain types of capital investments, will reduce taxable profits and thus tax payments. These allowances usually take the form of a **writing-down allowance (WDA),** which is granted at varying rates on assets such as industrial buildings and plant and equipment and is calculated on a *reducing balance basis.*

Not all assets qualify for the same allowances. For example, the allowances on industrial buildings are currently 6 per cent per year over 25 years, and for plant and equipment the rate is 25 per cent—both categories are calculated on a reducing balance

basis. Different capital allowance provisions apply in relation to motor cars, hotels, enterprise zones and short-life assets such as computers. However, it is not necessary for our purposes to elaborate on these provisions.

The rates of capital allowances mentioned above have obtained for a number of years and while the actual rates may be subject to change in a future Finance Act, the basic principles of allowing tax relief on investment expenditure are still likely to apply.

The following example illustrates the calculation of writing-down allowances.

Example 13 —Writing down allowances

Four years ago Aztec Manufacturing purchased new manufacturing equipment at a total cost of £50,000. The equipment qualified for a writing down allowance (WDA) at 25 per cent, calculated on a reducing balance basis and the corporation tax rate was 33 per cent. The writing down allowances and the resulting tax savings over the four-year period would have been determined as follows:

Year £	Cost £	Writing-down allowance (WDA) £	Written-down value (WDV) £	Tax saved at 33%
1	50,000	12,500	37,500	4,125
2		9,375	28,125	3,094
3		7,031	21,094	2,320
4		5,273	15,821	1,740

The financial benefit to the company is the reduction in the annual tax bill, which is equivalent to 33 per cent of the writing-down allowance.

Balancing charges and allowances

A **balancing charge** arises when the disposal value of an asset is greater than its written-down value at the time of disposal—this in effect gives rise to a taxable profit on disposal.

Conversely a **balancing allowance** arises when the written-down value at the time of sale exceeds the disposal value—in effect a tax-allowable loss on disposal. The tax saving, or tax payment, is determined by multiplying the balancing allowance, or charge, by the tax rate.

In normal circumstances disposal value is the amount of the sale proceeds. If the asset has been lost or destroyed, disposal value is any compensation or insurance funds received.

Balancing charge

If at the end of year four the asset is disposed of for £20,000, this will give rise to a

balancing charge of £4,179 (£20,000−£15,821) and the corresponding tax payment (cash outflow), in the next accounting year, will be £1,379 (£4,179×33%).

Balancing allowance

If, however, at the end of year four the asset is disposed of for £12,000, this will give rise to a balancing allowance of £3,821 (£12,000−£15,821) and the corresponding tax saving (cash inflow), in the *next* accounting year, will be £1,261 (£3,821×33%).

INVESTMENT APPRAISAL—CHECKLIST

The following checklist is presented as a practical guide for use in tackling investment appraisal questions and assignments:

1 Use only **incremental** cash costs and cash benefits.
2 Use **after-tax cash flows,** not accounting profits.
3 Ignore **sunk costs** in cash flow calculations. Sunk costs are cash flows that have already been spent. For example, if a firm of specialist business consultants had been engaged by the firm to carry out an initial feasibility or marketing study on the proposed launch of a new product, then their consultancy fees would be a sunk cost. The money spent on the consultants' study will not be affected by the accept-reject decision on the project.
4 Ignore **depreciation** in cash flow calculations. Depreciation is not a cash flow expense.
5 Ignore **financing costs** in any cash flows as these are already incorporated within the project's discount rate. For our purposes here (although it is not always the case) the investment decision is considered separately from the financing decision. At this stage we are primarily concerned with evaluating the economic worth or value of an investment project, not assessing its means of financing.
   If, for example, an investment project were to be financed with a long-term loan, to include the interest charges as an after-tax project cash flow would be to double-count them and thus understate the NPV. The interest charges are already subsumed within the project's discount rate, which in turn already reflects the company's overall cost of capital from all sources, debt and equity.
6 Take account of any changes to **working capital** investments. Any increased investment in working capital is treated as a cash outflow, conversely any reduced investment in working capital is treated as a cash inflow.
7 Take account of any **opportunity costs.** How does the project impact on the use of existing resources? Will some other cash flows, actual or potential, be lost as a result of investing in this project?
   For example, a firm may own some land, currently unused, on which it proposes to build a new factory. The resource is currently idle, but potentially the site could be put to alternative uses (it could be sold or rented out) which would produce additional cash flows for the firm. If the factory development was rejected, these alternative cash flows could be raised, they must therefore be reflected in the

appraisal of the new factory project.

8 Look for any **synergistic, 'spin-off'** or **incidental effects**. How will the new project impact on existing operations? Will it complement or substitute, even partially, existing operations? For example, if a new product is being launched, will it reduce or increase sales of any existing products? Frequently, in practice, such effects may not be readily apparent at the outset. Again, as for opportunity costs above, we are taking a company-wide view of the potential impact of the project on total company cash flows.

9 Beware of any **reallocation of overheads from existing services,** such as the reallocation of existing management salaries or head office overheads. These costs would be incurred whether the project is implemented or not, they are simply a reapportionment of existing administration costs, they are not incremental cash flows.

EXERCISE 8 —INVESTMENT APPRAISAL— ILLUSIONS LTD

Evaluate the investment proposal for Illusions Ltd using the investment appraisal techniques we have just examined. For ease of reference the information on the Illusions proposal is reproduced below.

Illusions Ltd is a small firm specialising in the creation of special effects for the film and television industry. Management is considering an investment proposal to upgrade existing services in order to meet contractual commitments, update technology and improve overall competitiveness.

New equipment will cost £150,000; installation costs are estimated at £10,000. Building alterations and modifications are estimated to cost £90,000. It is anticipated that £20,000 will be received from the disposal of old equipment and £5,000 will need to be invested in additional working capital (in the form of increased stock holdings and debtors, etc.) over the life of the project.

Additional annual running costs (wages, consumables, maintenance and power) are estimated at £55,000, including depreciation of £15,000. Overall the scheme will generate increased income of £80,000 per year.

The project's life is expected to be 10 years and the required rate of return on the project is 10 per cent. Assume residual values for fixed assets will be zero. Management has set a maximum acceptable payback period of six years for projects of this type.

For the proposed project you are required to:

(i)   calculate the payback period (PBP);

(ii)   calculate the accounting rate of return (ARR);

(iii) calculate the net present value (NPV) and the internal rate of return (IRR);

(iv) calculate the profitability index (PI);

(v)   summarise the outcomes for each method and explain clearly your recommendation.

Ignore taxation.

NON-FINANCIAL FACTORS IN INVESTMENT APPRAISAL

It is important to remember that we have so far confined our evaluation of investment projects to the financial aspects, to the relevant costs and benefits which can be expressed in financial terms.

Non-financial factors (for example, public image, customer service, quality of design and legal factors) will invariably enter the decision-making and influence the relative priority ranking of projects particularly when choices have to be made between a range of capital projects which are competing for limited investment funds.

In almost all cases it should also be possible to produce non-financial data to help evaluate an investment proposal. It is likely that a range of **non-financial performance criteria** such as marketing, quality and productivity indicators will be included as an integral part of the overall **'business case'** for a proposed investment.

Intangible costs and benefits

Very probably an investment proposal will generate intangible costs and benefits. These are the *costs and benefits which cannot easily be quantified or translated into a financial number* for inclusion in cash flows, but which nevertheless can be extremely important in assessing the overall value of a proposal to the business. Examples of **intangible benefits** could include: enhanced public/community image and relations; reputational capital; increased quality of customer service and satisfaction; and improved staff morale and motivation.

Examples of **intangible costs** could include: learning curve effects (production disruption, machine downtime, more waste, greater likelihood of accidents and loss of quality, etc.); and other 'change effects' such as staff uncertainty about the future (which may lead to increased stress and absenteeism) brought about as a result of undertaking the investment.

There are several recognised methods of dealing with intangible factors (which would require another book of similar length to fully explain), such as **weighting** and **scoring** the identified intangible costs and benefits—all of which involve *the exercise of value and professional judgements* on the part of management.

Whichever method of evaluating intangible factors is used, the aim should be to

present 'the full picture' for the investment in a clear and explicit way. This will facilitate objective decision-making and lead to the selection of projects which will maximise the value of the firm.

LIMITATIONS OF INVESTMENT APPRAISAL

Having examined the main techniques that are available to evaluate investment proposals, it is important to remember that these techniques are only analytical *aids* or **tools** to facilitate financial decision-making—they do not automate the decision-making process.

Ultimately it remains with managers, that is people, to make the final accept or reject decision on an investment proposal, based on the outcome of the appraisal process. In other words, while investment appraisal techniques are essential for effective decision-making, they do not remove the need for sound managerial judgement and the intelligent application of business and professional experience. The purpose of these techniques is to help managers make better investment decisions, that is, decisions which will increase shareholder wealth.

Because investment decisions are future-oriented, and the future is highly uncertain, managers of necessity will be required to make a range of assessments, judgements and predictions concerning future business conditions. These will include, for example, assessments and predictions about the likely effect of future competitive, market, and general economic conditions.

As such assessments and judgements will form the basis for much of the data which is used in an investment appraisal, the data will, by its nature, be uncertain, subject to error and in some cases may not even be available.

Thus in reality, future-based estimates of key investment variables such as cash flows and their timings, the discount rate, the project's lifespan, residual values and so forth, may turn out to be greater, equal to, or less than predicted—they will clearly be subject to a **margin of error.**

To illustrate the practical difficulties in investment decision-making, consider the scenario of a leisure services company wishing to invest in building a new hotel. The cash inflow figures are likely to be derived from estimates of, for example:

- room occupancy levels;
- room accommodation rates; and
- per capita spend on hotel facilities such as restaurants and bars.

Clearly any of these estimates may be inaccurate. In addition, there may be inaccuracies in the estimates of other key variables, such as the project's lifespan or the discount rate used. The actual lifespan of the project could be greater or less than the time horizon over which the project is appraised. Regarding the discount rate, if this is determined using the capital asset pricing model (CAPM), then there is scope for error as this model itself has its own inherent limitations, as we discovered in Chapter 7.

In the next chapter we shall explore this unpredictable and risky aspect of investment decision-making further, by refining our approach to incorporate conditions of risk and uncertainty.

INVESTMENT APPRAISAL IN PRACTICE

This section presents the results of empirical research into the investment appraisal methods actually used by business firms and distinguishes between the practices adopted by large and small firms. We also review the approach taken to investment appraisal by Japanese firms.

Large firm practices

Research by Pike (1988 and 1996) into the investment appraisal methods used in practice by 100 large UK firms indicates that over the years 1975 to 1992 there has been a marked increase in the adoption of IRR and NPV techniques.

According to Pike, approximately 32 per cent of the firms surveyed in 1975 actually used NPV analysis and 44 per cent used IRR. By 1992 this had increased to 74 per cent using NPV and 81 per cent using IRR.

While DCF methods have grown significantly in their practical application over the period 1975 to 1992, they are by no means universally applied. Of the companies that do use DCF techniques, the internal rate of return is clearly still favoured over the net present value.

Pike's research also indicates that companies do not rely on a single technique, most use more than one. According to Pike (1996), almost two-thirds of the firms surveyed used three or more appraisal techniques.

One of the more striking features of the research is the widespread popularity of payback in practice, despite its lack of sophistication. In the sample of companies surveyed, 88 per cent regularly use payback as an investment criterion, with 62 per cent indicating that they always used it. Similarly ARR, despite its shortcomings, is also a technique favoured by managers in practice. Around 50 per cent of the firms in the sample use it.

A survey by Drury *et al.* (1993) of 300 UK manufacturing companies with annual sales in excess of £20 million produced broadly similar results. Payback and IRR remain the appraisal methods most frequently used in practice. According to Drury *et al.* 86 per cent of companies surveyed use payback, 73 per cent use discounted payback, 78 per cent use ARR, 80 per cent IRR and 72 per cent NPV.

The findings of UK research into investment appraisal practices are in general terms similar to research conducted in the United States, although there is still some lag in the UK in terms of the use of the more sophisticated methods. Table 10.1 illustrates the findings of a study of the Fortune 500 industrial companies in the United States by Bierman in 1993.

Bierman's study found an almost universal application of DCF techniques, with IRR again being favoured over the NPV. Payback also remains a very popular method in practice among US companies, although none of the companies surveyed used it as a primary technique.

Table 10.1 Investment appraisal methods used in the Fortune 500 industrial firms

Method	1993 (%)
Payback	84
DCF methods (IRR or NPV)	100
IRR	99
NPV	85

Source: H.Bierman, 'Capital Budgeting in 1993: a Survey', *Financial Management,* Autumn 1993.

Small firm practices

A far as smaller companies are concerned, in both the UK and the US, they are less likely to utilise the more sophisticated DCF techniques, see for example Mills (1988). In the US, a study of small business firms by Walker *et al.* in 1993, found that only 21 per cent of the firms surveyed used DCF methods (compared with 100 per cent of the large firms in Bierman's study).

They also found that the smaller the firm, the less likely is DCF to be used. The main reasons given for this were: (1) small firms tend to be preoccupied with liquidity, which is best indicated by the payback period; (2) a lack of familiarity with DCF methods; and (3) a belief that for small projects DCF is too cumbersome.

However, the use of the more sophisticated DCF techniques is likely to grow extensively among small firms because of developments in computing technology and for reasons of competitiveness. Continuing advances in computer technology will make it easier and less expensive for small firms to adopt the more sophisticated DCF techniques and as some small firms see their competitors utilise such techniques they will be prompted to use them too.

Japanese practices

Much has been written over the past number of years about the Japanese style of management, about the techniques and practices which Japanese firms follow, how these have contributed to Japan's economic success and how western companies can learn from them.

Most western companies have, for example, achieved greater operational efficiency and profitability by adopting just-in-time (JIT) inventory management, total quality management (TQM) and continuous improvement programmes (CIPs). All of these management systems originated with Japanese firms, particularly Toyota which is said to have created these techniques in its legendary Toyota Production System (TPS)—which has been described as: 'the machine that changed the world'.

When it comes to investment appraisal, there are several distinguishing features of the Japanese approach. One of the first observations is that **Japanese firms are more strategic in their outlook** and are **more willing to undertake long-term investments**

than are their West European or US counterparts—which still seem more preoccupied with achieving financial results in the short term.

Japanese firms, for example, have been much quicker in the past to adopt new technologies such as advanced manufacturing technology (AMT), even though in the appraisal process it is not possible to translate into financial numbers many of the benefits of investments of this type; benefits such as the creation of entry barriers for competitors, quality improvements, greater flexibility, less lead time and less downtime in the manufacturing processes.

The Japanese approach seems to focus more on the *'softer'* , unquantifiable side of investment decisions, whereas western companies are, in general, more focused on the *'harder',* quantifiable, accounting numbers side.

Another key feature of the Japanese approach, is their **consensus style of management.** Managers at all levels participate in the decision-making process, leading to a thorough scrutiny of the project and rigorous assessment of its strategic potential—a holistic approach.

In summary there is a greater willingness on the part of Japanese firms to implement projects which they consider to be of strategic importance, even though the financial gains are not so readily measurable or apparent.

INTERNATIONAL INVESTMENT APPRAISAL

FORD IS JUST NUTS ABOUT INVESTMENT!

In March 1995 the Ford motor company announced that it was planning to invest $2.5bn in its car manufacturing operations in Brazil. This was mainly related to the launching of its Fiesta and Ka hatchbacks. Since 1995 Ford has invested a further $500m on a new engine factory and plant modernisation programmes in Brazil.

In October 1997 the company announced that it was increasing its investment in Brazil even further, by committing $800m to manufacturing operations in southern Brazil to produce a new range of cars for the global car market.

In return for this level of investment the state government has agreed to provide land, roads and other essential services. In addition the state government has arranged $700m in loans with Brazil's national development bank and agreed to other concessions to Ford in relation to value added tax exemptions. For its part Ford said it has agreed to give Brazil priority in its investment plans over the next five years.

The above investment programme by the Ford motor company, is just one example of the many investment decisions made by **multinational corporations (MNCs)**—firms that operate in more than one country—that are taken every day. It reflects the growing

globalisation of business and the substantial sums of money which can be involved in **foreign direct investment (FDI)** decisions.

Foreign direct investment (FDI) is the transfer of capital, skills and assets to a foreign country, for example, through the establishment of a foreign subsidiary. Foreign direct investment may be undertaken as an alternative to, or in conjunction with, strategies to expand international business and markets through exporting, joint venturing, or licensing arrangements.

Why undertake foreign direct investment?

The world is increasingly viewed as a single marketplace necessitating business firms to think 'globally' and to define their marketing and investment strategies in global terms. High-Tec Sports Plc is an example of a multinational corporation which designs, manufactures, markets, and distributes sports and leisurewear worldwide. The company derives approximately 29 per cent of its sales from North America, 37 per cent from the UK and Ireland, 15 per cent from Continental Europe and 19 per cent from the rest of the world.

For any company, undertaking a direct foreign investment project is clearly a strategic decision and it may be taken for a number of motives (Eiteman and Stonehill 1989).

Strategic motives

To **secure new markets** when perhaps the domestic market is saturated (e.g. the aggressive overseas expansion by the Japanese car manufacturers) or to **secure supplies of raw materials** as in the case of the major oil companies. Another strategic motive is to **circumvent political and regulatory hurdles** as in the case of Hi-Tec Plc avoiding EU quota regulations on footwear imports from China by sourcing production in other countries such as Indonesia and the Philippines. Similarly Japanese car manufacturers have built manufacturing plants in the UK and the US to circumvent EU and US import quotas.

Economic motives

To achieve economies of scale through expanding sales volumes or to achieve lower operating costs by transferring production to low-cost countries. One of Hi-Tec's motives for sourcing from Vietnam was to achieve significant unit cost savings from production.

By having operations and markets in more than one country, companies can also counteract adverse economic cycles in any one country thus reducing both total and **systematic risk.** Diversification will reduce total risk. Systematic risk is related to market factors and the sensitivity of the firm's returns to changes in market factors. The fact that a company operates in a broader, international market rather than a single domestic market, may reduce the sensitivity of its returns to changes in market factors.

Behavioural motives

To keep up with the competition which may be operating successfully in a foreign country, or as a defensive measure to avoid losing markets.

International investment appraisal principles

Although the same investment appraisal principles will apply in international investment as in a domestic context, there are additional considerations which need to be evaluated in relation to foreign investment. In addition to the 'normal' risk factors for a domestic investment, multinational corporations (MNCs) will have to evaluate exchange rate risk and political risk.

Exchange rate risk

As cash flows will occur in a foreign currency they will be subject to exchange rate fluctuations, which can be dramatic and rapid. As we noted in Chapter 2, it will be the responsibility of the treasury function to implement strategies for efficient exchange rate risk management

Political risk

This refers to the actions which might be taken by a foreign government, such as direct interference in the project itself, outlawing repatriation of profits, imposition of additional tax burdens, or even seizure of the firm's assets.

Both of these risks require careful consideration and planning to minimize their effects. Exchange rate risk can be minimised in the short term by the judicious use of hedging (i.e. risk protection) instruments and strategies such as forward and futures contracts and options. In the longer term, exchange rate risk can be minimised by perhaps raising the capital for the investment in the local capital market, if this is feasible. Political risk can be lessened through strategic alliances, and/or collaborative arrangements with reputable and soundly based local firms, which have good political connections.

RECAP

Investment Appraisal Decisions: These are **strategic decisions** affecting the future of the firm. It is important that they are undertaken as **part of a systematic strategic planning process.** They involve spending money now in anticipation of gaining greater future, but uncertain, benefits. Effective investment appraisal decisions also require the knowledge and application of recognised evaluation techniques.

Investment Appraisal Techniques: The key methods of evaluating investment appraisal decisions were discussed. These were:

(1) **Payback,** which is a popular but unsophisticated technique. It measures how long it takes to recover the initial project outlays, in cash terms: if the payback period (PBP) is less than a preset maximum, the project is considered acceptable.

(2) **Accounting rate of return (ARR),** measures the return on a project in 'profit', not cash, terms, and ignores the time value of money. A project is considered acceptable if its ARR is greater than or equal to a predetermined

target.

(3) Discounted cash flow (DCF) techniques, which are the more *sophisticated* cash flow-based techniques and take into account the time value of money. The main DCF techniques are **net present value (NPV)** and the **internal rate of return (IRR) or yield.** To find the NPV a pre-determined discount rate is applied to the expected future project cash flows; if the NPV is greater than or equal to zero, the project is acceptable. The IRR is the discount rate which produces an NPV of zero. The project is considered acceptable if the IRR is greater than or equal to the cost of capital. The NPV technique is, theoretically, a sounder technique than IRR, although IRR is much favoured in practice.

Non-Financial and Intangible Factors: The increasing significance of non-financial and intangible factors in investment decision-making has been recognised. In appraising projects, important non-financial factors and performance measures must be taken into account. Consideration must also be given to the costs and benefits which are intangible or difficult to quantify. Effective investment appraisal requires managers to integrate these factors into any appraisal so that a more complete assessment of the **overall value** of the project or group of projects to the firm can be formed.

It is the nature of today's dynamic and competitive business environment, that the factors which will contribute most to sustainable competitive advantage are the intangibles—reputation, image, information, brand names, quality and so forth.

Investment Appraisal in Practice: This chapter also presented the results of empirical research into the investment appraisal methods actually used by business firms, distinguishing between the practices adopted by large and small firms. We also reviewed the approach taken to investment appraisal by Japanese firms.

APPENDIX I INVESTMENT APPRAISAL IN THE PUBLIC SECTOR

Private sector firms evaluate projects in terms of their contribution to the firm's goal of maximising the wealth of its shareholders; they do not include an evaluation of any **'externalities'.** Externalities are costs, or benefits, of a project which are borne by members of society or the local community but do not form part of the private firm's cost/benefit evaluation; externalities are also called **third-party effects.**

The point about externalities is that they affect other parties in a way that does not give them any legally recognised rights of compensation or redress; otherwise the firm would have to recognise these in its evaluation. For example, an expansion by a paint factory or paper mill may cause more air and water pollution, in the form of effluent discharged into the local river system and more smog, all having an adverse effect on the local tourism industry. The firm will not factor these effects into its cash flow calculations.

In contrast public sector projects, by their very nature, are concerned with externalities; they are evaluated in terms of their **net contribution or benefit to society** or the community as a whole.

Principles and practices

Despite their differing goals, in broad terms, the main principles and practices of investment appraisal in the public sector or in a not-for-profit organisation (NPO) such as a charity, are very similar to those followed in the private sector; there are, however, a few notable distinctions.

Over the past two decades the thrust of government policy, not only in the UK but in other countries too, has been to impose greater commercial disciplines and practices on public sector organisations, in an effort to obtain greater efficiency and effectiveness in the use of public resources. As a consequence, public sector organisations have had to increasingly adopt the management practices and techniques of the private sector and in general conduct their affairs in a more businesslike manner.

In particular, government policy in the UK has required public sector organisations, such as the National Health Service to subject capital expenditure decisions to a rigorous investment or economic appraisal process. Public sector bodies should normally appraise projects in terms of their net present value (NPV), which, similar to a private company, should be positive at the cost of capital. Usually 6 per cent is the discount rate used in the public sector and is known as the **test discount rate (TDR).** Payback and internal rate of return (IRR) are also used. However, the application of IRR is often limited due to the existence of the test discount rate.

The techniques for dealing with **risk and uncertainty** in public sector projects are also similar to those in the private sector e.g. sensitivity analysis and scenario analysis.

We shall deal with the treatment of risk and uncertainty in investment appraisal in the next chapter.

Main forms of public sector appraisal

It is sometimes confusing that what is called investment appraisal in the private sector is also frequently referred to as economic appraisal or option appraisal in the public sector. Whatever the terminology used, the common concern is with making better decisions about the best way to utilise scarce resources. The main types of appraisal in the public sector are:

Cost-benefit analysis (CBA)

'Cost-benefit analysis is a technique for aiding the choice between competing projects in the public sector…it defines "costs" and "benefits" very broadly and uses or adapts traditional investment appraisal techniques to its needs' (Dixon 1994). This type of analysis is **the most comprehensive form of appraisal.** It is much wider in scope than cost effectiveness analysis (CEA) or financial/commercial investment appraisal, which are described below, due to the very broad definition of costs and benefits.

Cost-benefit analysis (CBA) attempts to quantify in money terms as many of the costs and benefits as possible, including those for which there is no measure of market value available.

Typical CBA applications would include road building programmes, inner city regeneration and urban development schemes. The objective of CBA in such cases would be to encompass as many of the costs and benefits as possible (including intangibles) and assess the overall **net cost or benefit to society.** For example, CBA for a major road development scheme would include an evaluation the following cost and benefits:

CBA—Road Development Scheme
Costs	*Benefits*
Land acquisition costs	Improved road safety
Construction costs	Less inner city/town congestion, noise and pollution
Environmental costs	Better quality of life for local residents
	Less travelling/commuting time

Cost-effectiveness analysis (CEA)

This is much narrower in scope and application than CBA. It is concerned with evaluating and comparing only the costs of alternative ways of producing the same or a similar result or of achieving the same objective. The aim is to find the **least cost solution to meeting a given objective;** or, given a fixed budget to achieve a specific objective, what is the best way to spend the budget. Cost-effectiveness analysis is what the American military term 'getting the biggest bang for the buck' in terms of government spending on defence.

By stark contrast, in health care, for example, CEA could be used to examine the various alternatives available and determine the least cost alternative of treating a specific illness or disease; various surgical, drug and other therapy options would be examined.

In another case, the objective of a health prevention programme might be to reduce the incidence of coronary heart disease, or some other preventable disease, by a target amount, in a given region of the country, over a defined timeframe, from within a limited budget. CEA could be employed to help determine the most cost-effective way of spending the limited health prevention budget.

In CEA all costs should be included, but, as for CBA, the measurement of some costs may be extremely difficult, if not impossible. For example, in choosing which therapy is to be given to particular patients, the costs of stress or anxiety on patients and their relatives of the differing options needs to be considered, but it cannot be quantified.

CEA is only applicable where the alternatives under consideration produce the same effects or outcomes e.g. alleviate pain or cure a disease. It cannot therefore be used to compare alternatives that produce different outcomes, or that have multiple effects.

Financial or commercial appraisal

This applies to **public sector trading activities** which sell goods or services on a commercial basis to private markets. The benefits are measurable in financial terms such as sales receipts or income from fees and charges; examples include the former nationalised industries and utilities, most of which are now privatised.

Non-marketed outputs

Public sector appraisals encounter similar problems with regard to the evaluation of non-financial and intangible factors. In economic terms these factors are referred to as **non-marketed outputs.** These are *outputs which are not bought or sold in the marketplace* and are a common feature of central government programmes such as health, education, law and order, defence and roads. The outputs of these programmes, which prove very difficult to measure in financial terms, may nevertheless be capable of some other quantitative measure such as service volume, service quality or service accessibility.

S**hadow prices** may be used where market prices are not available. A shadow price is the price derived (from another suitable source) for the economic value of a resource where the market price, or value, is unavailable or inappropriate. They are in effect *substitute prices.*

An example would be the valuation of savings in travel time used in appraising road and other transport projects. The Department of Transport has a well established methodology for valuing 'employer's' time and 'own' time (or working and non-working time) in relation to road and transport projects. The value of employer's time is derived from the cost of labour to the employer; this is calculated as gross wages plus employer's contributions for insurances and pensions plus any other labour costs.

Then there will be other intangible costs and benefits, which will prove very difficult to quantify in any terms, but are nevertheless extremely important in assessing the overall value of a proposal. Examples of intangible benefits which would typically be involved in health service investments would include: increased life expectancy (not just the number of lives saved); increased quality of life; improved staff morale and motivation; improved patient satisfaction; and better access to health care facilities for patients and the public in general.

In public sector policy areas such as health care, specific measures have been and continue to be developed for some of these benefits and perhaps the best known in health care is the **QUALY (quality adjusted life-year).** This is based on a weighting system which combines life expectancy with different health states; it is a composite, weighted index of a variety of health effects. The Department of Health takes cost per QUALY assessments into account in decisions relating to, for example, illness prevention programmes.

Another example of a weighting and scoring approach to dealing with intangibles is the Noise and Number Index (NNI). This combines the average loudness of aircraft and their actual number, resulting in an overall indicator of disturbance effects on people exposed to aircraft noise.

Cost of capital

One of the key distinctions in public sector appraisals, compared with the private sector, concerns the cost of capital. For the public sector, the cost of capital is specified in the form of the test discount rate (TDR), which is the rate prescribed by HM Treasury. For most public sector appraisal applications this rate is 6 per cent (for railway and publicly

financed road investments the rate is 8 per cent) and is expressed in real terms, that is it ignores the effects of inflation. It therefore needs to be applied to costs and benefits which are measured in real (not nominal) terms.

   Part of the rationale for the test discount rate is that money spent by government has an opportunity cost, once money is spent on one programme it cannot be spent on another. Most government expenditure programmes must therefore be justified in terms of this opportunity cost.

Political intervention

A further key distinction in public sector appraisal is the much greater scope for direct political intervention or manipulation of investment projects, in order to achieve political rather than economic objectives.

REVIEW QUESTIONS

Concept review questions

1 (a) Spending money now which will result in benefits within one year represents a
   _____ expenditure.
   (b) Spending money now which will result in benefits beyond one year represents a
   _____ expenditure. Complete the missing words.
2 Indicate which of the following are capital or revenue expenditures:

   (a) A payment of £30,000 to purchase a fast food franchise;
   (b) A new delivery vehicle at a cost of £20,000;
   (c) New tyres for existing vehicles;
   (d) Complete re-decoration of the finance office;
   (e) The quarterly heating oil bill;
   (f) A new piece of medical diagnostic equipment costing £10,000.

3 (a) Briefly state the reasons for investment decisions, (b) What is meant by
   'intangible investments'? (c) Distinguish between mandatory and discretionary
   investments, (d) Summarise the characteristics of investment decisions.
4 Explain the principal stages involved in the investment appraisal process.
5 'When evaluating investment projects the net present value (NPV) and internal rate
   of return (IRR) always suggest the same accept/reject decision.' What, if anything,
   is wrong with this statement?

Practice questions

6 **Investment Appraisal Techniques—Various.** The management of Comfy Hotels
   Ltd is attempting to evaluate the feasibility of investing £125,000 in upgrading and
   extending its bar, kitchen and dining room facilities. The scheme is assumed to have
   a ten-year life, a scrap or terminal value of nil and is expected to increase annual net

profits by £15,000, after charging annual depreciation of £12,500. For a project of this type, management usually prefers a payback period of less than 6 years. Using a cost of capital of 12 per cent, where appropriate, and ignoring taxation, you are required to determine:

(a) Payback period (PPB);
(b) Average accounting rate of return (AARR);
(c) Net present value (NPV);
(d) Internal rate of return (IRR);
(e) The financial acceptability of the project, based upon the above data.

7 **Investment Appraisal Techniques—Mutually Exclusive Options.** Meadowvale Hospital is attempting to choose the better of two mutually exclusive options to expand theatre operating capacity. The data for each option is as follows:

	Option 1 £	Option 2 £
Initial investment	80,000	100,000
Increased annual running costs	40,000 pa	30,000 pa

If each option is assumed to last ten years, and the discount rate is 6 per cent, which option should be chosen? What other, non-financial, factors might influence the final decision?

Test questions

8 **Investment Appraisal Techniques—Various.** Sunnyvale Enterprises plc is involved in the production and distribution of milk products, natural and processed cheeses and dairy spreads. The company wishes to expand and develop its manufacturing processes and technology and its product range. Management estimates that the total capital investment in the project will be £1.7 million, which would be partly offset by the disposal of some existing facilities. The old facilities can be disposed of for an estimated £580,000.

As a result of the new investment, reduced operating costs, combined with increased sales revenue, are expected to increase net cash inflows by £190,000 in each year of the project, which is assumed to have an economic life of 10 years. Management would prefer the project to have a payback period of less than six years. An additional £30,000 will need to be invested in working capital (increased stock holdings, etc.). Ignore terminal or scrap values at the end of the project and any taxation effects. The company's cost of capital is 10 per cent. Determine:

(a) The initial investment in the project.
(b) The payback period.
(c) The net present value (NPV) and the profitability index (PI).
(d) The internal rate of return (IRR) of the proposed investment.
(e) If the project should be implemented. Give reasons for your recommendation,

including a consideration of any non-financial or intangible factors which you think may be relevant.

9 **Investment Appraisal Techniques—Mutually Exclusive Options.** Clinical Diagnostics, a medical services company, wishes to invest in new medical diagnostic technology. Management is considering the following two systems which it is considered will meet the company's requirements.

	System 1 £m	System 2 £m
Initial outlay	1.60	1.00
Net Cash Flows		
Year 1	0.30	0.30
2	0.40	0.30
3	0.50	0.30
4	0.60	0.30
5	0.70	0.30

As the company's financial manager you have been asked to:

(a) Determine the payback period, the net present value and the internal rate of return for each system.
(b) Present a summary of your findings for presentation to management.
(c) Indicate which system you would recommend, giving your reasons.
(d) Discuss, briefly, any non-financial factors which the management of Clinical Diagnostics should consider in assessing this investment decision.

The company's cost of capital is estimated at 13 per cent and both systems are considered to be of equal risk.

10 **Payback.** Identify the major limitations of the payback method of project appraisal *and* suggest reasons why it is widely used by companies.

11 **Investment Appraisal—General.** You are the chief accountant of Deighton plc, which manufactures a wide range of building and plumbing fittings. It has recently taken over a smaller unquoted competitor, Linton Ltd. Deighton is currently checking through various documents at Linton's head office, including a number of investment appraisals. One of these, a recently rejected application involving an outlay on equipment of £900,000, is reproduced below. It was rejected because it failed to offer Linton's target return on investment of 25 per cent (average profit-to-initial investment outlay). Closer inspection reveals several errors in the appraisal.

Evaluation of profitability of proposed project NT 17 (all values in current year prices)

Item (£000)	0	1	2	3	4
Sales		1,400	1,600	1,800	1,000

Materials		(400)	(450)	(500)	(250)
Direct labour		(400)	(450)	(500)	(250)
Overheads		(100)	(100)	(100)	(100)
Interest		(120)	(120)	(120)	(120)
Depreciation		(225)	(225)	(225)	(225)
Profit pre-tax		155	255	355	55
Tax at 33%		(51)	(84)	(117)	(18)
Post-tax profit		104	171	238	37

Outlay

Stock	(100)
Equipment	(900)
Market research	(200)
	(1,200)

$$\text{Rate of return} = \frac{\text{Average profit}}{\text{Investment}} = \frac{£138}{£1,200} = 11.5\%$$

You discover the following further details:

1 Linton's policy was to finance both working capital and fixed investment by a bank overdraft. A 12 per cent interest rate applied at the time of the evaluation.

2 A 25 per cent writing down allowance (WDA) on a reducing balance basis is offered for new investment. Linton's profits are sufficient to utilise fully this allowance throughout the project.

3 Corporate tax is paid a year in arrears.

4 Of the overhead charge, about half reflects absorption of existing overhead costs.

5 The market research was actually undertaken to investigate two proposals, the other project also having been rejected. The total bill for all this research has already been paid.

6 Deighton itself requires a nominal return on new projects of 20 per cent after taxes, is currently ungeared and has no plans to use any debt finance in the future.

Required:

Write a report to the finance director in which you:

(a) Identify the mistakes made in Linton's evaluation.

(b) Restate the investment appraisal in terms of the post-tax net present value to Deighton, recommending whether the project should be undertaken or not.

Practical project

   Survey the financial media (press, television etc.) for several current examples of investment decisions already undertaken, or to be undertaken, by companies in areas relevant to your studies.

   From your survey determine:

1 What reasons have been given for the investments?
2 What are the stated benefits?

See if you can also find an example of an investment decision that has gone wrong, and if you can determine the reasons for its failure.

NOTES

1 Source: financial media, March 1997.
2 BP Annual Report 1996.
3 Also referred to as the firm's cost of capital.
4 Mathematically the equation to find the IRR for a project with unconventional cash flows is given by:

$$\sum_{t=0}^{n} \frac{NCF_t}{(1 + IRR)^t} = 0$$

which is a polynomial of degree n, thus it will have n different roots.
5 These assumptions are to do with discounting mathematics.

FURTHER READING

General

An excellent and very readable introduction to investment appraisal is provided by:
• *Investment Appraisal* . Dixon, R., CIMA, 1994.
  A more rigorous and complete treatment of investment appraisal techniques can be found in:
• *Investment Appraisal and Financial Decisions* . Lumby, S., 5th edition, Chapman & Hall, 1994.
• *Capital Investment and Financial Decisions* . Levy, H. and Sarnat, M., 5th edition, Prentice-Hall, 1994.

Investment practices and processes

A excellent discussion of the practical application of investment appraisal practices and processes can be found in Chapter 7 of:
• *Corporate Finance and Investment, Decisions and Strategies* . Pike, R. and Neale, B., 2nd edition, Prentice-Hall, 1996.
  For insights into the operation of cost-benefit analysis (CBA) see:
Cost-Benefit Analysis . Edited by Layard, R. and Glaister, S., 2nd edition, Cambridge University Press, 1994.

Business strategy and investment decisions

For a discussion of the relationships between business strategy and investment decisions see:
• 'Corporate Strategy and the Capital Budgeting Decision.' Shapiro, A.C., *Midland Corporate Finance Journal ,* Spring 1985, as reproduced in *Strategic Issues In Finance ,* Ward, K., Butterworth-Heinemann, 1994.
• *Strategic Financial Decisions .* Allen, A., CIMA, 1994.

International investment appraisal

Excellent treatment of investment decision-making in an international business context is provided in:
• *Financial Management for International Business .* Demirag, I. and Goddard, S., McGraw-Hill, 1994.
• *Multinational Finance .* Buckley, A., 3rd edition, Prentice-Hall, 1996.
• *International Financial Management .* Holland, J., Blackwell Business, 1993.

REFERENCES

Bierman, H. 'Capital Budgeting in 1993: A Survey.' *Financial Management ,* Autumn 1993.

Department of Transport. *Values for Journey Time Saving and Accident Prevention .* HMSO, March 1987.

Dixon, R. *Investment Appraisal .* CIMA 1994.

Drury, C., Braund, S. and Tayles, M. *A Survey of Management Accounting Practices in UK Manufacturing Companies .* ACCA Research Paper 32, Chartered Association of Certified Accountants 1993.

Eiteman, D.K. and Stonehill, A.I. *Multinational Business Finance .* Addison-Wesley, 1989.

Mills, R. 'Capital Budgeting—the State of the Art.' *Long Range Planning ,* Vol. 21, No. 4, 1988.

Pike, R.H. 'An Empirical Study of the Adoption of Sophisticated Capital Budgeting Practices and Decision-making Effectiveness.' *Accounting and Business Research ,* Autumn 1988.

Pike, R.H. 'A Longitudinal Survey on Capital Budgeting Practices.' *Journal of Business Financing and Accounting ,* Spring 1996.

Walker, J., Burns, R. and Denson, C. 'Why Small Manufacturing Firms Shun DCF.' *Journal of Small Business ,* 1993, pp. 233–49.

11
INVESTMENT APPRAISAL

Risk analysis

This chapter refines our approach to investment appraisal by examining the impact of risk on the investment decision-making process. The following topics are covered:

the impact of risk on the investment decision-making process;
an examination of the main risk analysis techniques; and
approaches to reducing project risk.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the impact of risk on investment decisions;
2 explain and apply the main methods of risk evaluation in investment decisions;
3 appreciate the limitations of risk evaluation methods; and
4 specify approaches to risk reduction.

OVERVIEW

The future just ain't what it used to be.

Up until now in our study of investment appraisal we have treated a project's expected future cash flows as if they had been known with certainty, clearly in real life this is not the case. In making investment decisions we are dealing with—and actually shaping—the firm's future, but the future is not certain and investment decisions, whether personal or corporate, are invariably undertaken with imperfect knowledge about the future. The future may turn out to be better or worse than expected.

For the corporate firm, the objective of an investment decision is to allocate resources only to those projects which will preferably increase, or at least maintain, the firm's value and the wealth of its shareholders. Clearly it would not make good financial sense to invest in projects which would reduce corporate value!

The problem for managers is that at the outset it is often difficult to determine which of

the firm's potential investment projects will enhance corporate value and which will diminish it.

Consequently when making investment decisions investors and managers have no idea which projects will succeed and which will fail, which will be peaches and which will be lemons! Such decisions inevitably involve an element of **risk,** the key investment characteristic with which we are concerned in this chapter.

So how can a firm's managers take account of risk in the investment appraisal process? Can a project's risk be measured? How can managers judge if one project is more risky than another? How can they determine the probability of achieving the outcomes or returns they are seeking? In this chapter we will be reviewing a range of risk analysis techniques which will help provide answers to these questions.

It is, however, important to bear in mind that risk analysis is not an exact science; there is no perfect answer to dealing with risk in investment decision-making. The techniques which are presented in this chapter will certainly help managers and investors analyse and evaluate risk, but they are *aids* to decision-making. They do not eliminate the need for the exercise of judgement on the part of the decision-maker(s), and the more complex the investment decision, the more significant will be the role of managerial judgement.

Before proceeding it will be helpful to clarify some terminology. Although the terms *risk* and *uncertainty* are in practice frequently used interchangeably, there is a subtle distinction between them.

RISK AND UNCERTAINTY

Risk

Generally speaking, risk can be defined as: ***the chance that the actual outcome will differ from the expected outcome.*** Risk is frequently measured in statistical terms by the standard deviation, denoted by σ (the Greek letter small sigma), which is a measure of dispersion or spread around an *expected or mean value,* assuming a normal distribution of returns. The greater the degree of dispersion σ around the mean, the greater the degree of risk.

In attempting to quantify risk we are concerned with measuring dispersion, good and bad, on either side of an expected value, as the greater the overall *variability,* the greater the risk and the greater the perceived risk, the greater the return investors will require. Remember from Chapter 1 that risk and return are positively correlated: if managers and investors wish to gain greater returns they will have to accept greater risk.

Specifically in investment appraisal we are concerned with evaluating the riskiness of a project's future cash flows. In other words we wish to evaluate the chance that actual cash flows will differ from expected cash flows, that the NPV will be negative or the IRR will be less than the cost of capital, that is, that the project will prove unacceptable because of ***the potential variability of future cash flows.***

In the context of risk assessment the decision-maker does not know exactly what the outcomes will be but it is possible to assign **probability weightings** to the various, potential outcomes.

For example, a large retail chain wishing to open additional domestic outlets is likely to have made this type of investment decision many times before. There is substantial past experience to be drawn on, and the appraisal processes and procedures will be fairly well defined. However, the project will not be risk-free, but because of past experience and developed skills the risks can be more easily identified and their respective probabilities more easily evaluated. Thus **probability theory** underlies many of the approaches to risk analysis.

Types of risk

There are three different types of project risk to be considered:

Stand-alone risk

This is the risk of the project itself as measured in isolation from any effect it may have on the firm's overall *corporate risk.* Stand-alone risk ignores the possibility of risk diversification when the project is combined with the firm's other projects.

Corporate, or within-firm, risk

This is the *total or overall risk of the firm* when it is viewed as a collection or portfolio of investment projects. Portfolio theory and risk diversification were discussed in Chapter 6.

An individual project's corporate risk is a measure of the project's contribution to the *total* riskiness or variability of all the firm's cash flows. A new project may add to or reduce the firm's corporate risk, that is, it may increase or decrease the firm's total cash flow variability.

Market, or systematic, risk

This defines the view taken of a project's risk by well-diversified shareholders and investors. Well-diversified shareholders will accept that the project is just a single asset within the firm's overall portfolio of assets and that their own shareholding in the firm is only one part of their own well-diversified investment portfolio. As we know from our study of risk and return, market risk is essentially the stock market's assessment of a firm's risk, its beta, and this will affect its share price. Shareholders who are not well diversified are likely to be more concerned with corporate risk than with market risk. Similarly, if the firm is a small business the owner-managers will be more concerned with corporate risk.

In practice both corporate and market risk are extremely difficult to quantify. It is a comparatively easier task to quantify a project's stand-alone risk, and use this as a surrogate measure for corporate and market risk. If, for example, an individual project's stand-alone risk is perceived to be higher than the firm's 'normal' or average risk project, this is likely to raise the level of corporate risk and consequently market risk. The three types of risk are in fact correlated.

Because of the practical difficulties of measuring corporate and market risk, and the correlation between the three different types of risk, we will accept stand-alone risk as a suitable substitute for corporate and market risk.

Uncertainty

Uncertainty relates to the situation where a range of differing outcomes is possible, but it is not feasible to assign probabilities to this range of outcomes. An uncertain situation is likely to be one where the proposal is **unique** or **unprecedented;** it is a situation which has not been faced or experienced before, such as the high degree of uncertainty faced when diversifying into a completely new area of business—travelling in uncharted waters! For example, if our retail chain management were to consider a project to open outlets in a foreign country for the first time, this type of project would have a much greater degree of uncertainty, there would be many more 'unknowns' than simply expanding in the home market.

A risk situation, in contrast, may have been repeated before and previous experience can be drawn on to assess probabilities—travelling in charted waters! Dealing with uncertainty is clearly more problematic for decision-makers than dealing with risk.

However, as Levy and Sarnat (1994) have pointed out: 'the introduction of subjective probability has greatly diminished the significance of the distinction between risk and uncertainty. By assigning *subjective* probabilities to decision problems, an inherent *uncertain* situation can be transformed into a *risky* choice.'

DEALING WITH RISK

In dealing with risky decisions, three stages can be identified (MacCrimmon and Wehrung 1986):

1 *Recognition of the risky situation.*
2 *Evaluation of the risky situation.* Are the risks considered acceptable? Is it worth staying in, or entering this situation? Would it be better to opt out, or stay out?
3 *Adjusting the risks.* Managers who have a positive attitude to risk, that is they are risk-seekers, will try to shape the situation to their advantage by stalling for time and more information and by seeking control.

In this section we will move on to examine a number of approaches to dealing with risk in investment appraisal. Specifically they are:

1 **sensitivity analysis;**
2 **scenario analysis;**
3 **simulation analysis; and**
4 **risk-adjusted discount rate (RADR).**

It should be appreciated that here we will be using these techniques essentially to analyse a project's *stand-alone risk.*

It is also worth emphasising from the outset that, while we are applying various techniques in an attempt to evaluate a project's stand-alone risk, in practice much of the data used in risk analysis will be based on and influenced by the **subjective judgements** of people (managers and other professionals), rather than on objective statistical data and

observations.

Remember the adage in decision-making with regard to the quality of the information used: *garbage in, garbage out (GIGO).* It is as relevant to investment decision-making as it is to any other form of decision-making.

In addition, the techniques which are actually selected to analyse project risk will depend on the *size and scale of the project,* the *specialist technical skills and knowledge* available to the decision-makers, and on the perceived *cost-benefit* assessment of employing a technique.

Risk and the variability of cash flows

As was mentioned above, the relevant cash flows for a capital project will have been derived from estimates and judgements about the behaviour of a range of **critical project variables** such as: income and sales levels; material, labour and overhead costs; tax rates; and activity levels.

It seems logical therefore to ask, to what degree are the cash flows associated with these variables likely to vary? Actual project cash flows may turn out to be higher or lower than planned, they can be subject to considerable variability. Risk results from the way in which all these variables interact.

Even if cash flows were known with substantial accuracy, their **timings** may alter. Estimated incomes, for example, in the form of grants or debtor receipts, may be received later than anticipated giving rise to liquidity problems. The variability of individual cash flows must therefore be scrutinised in order to analyse project risk. As we shall soon see, in many instances this will be achieved by attaching probability weightings to the various cash flows.

We will now examine our first technique for handling project risk.

Sensitivity analysis

Once a base case, or best estimate, appraisal for an investment project has been completed, **sensitivity analysis** can be used to test how changes in selected cost and/or revenue items will alter the base case cash flow estimates. Specifically sensitivity analysis involves:

1 testing how the overall expected outcome of the project (measured in terms of its NPV, or possibly IRR in some cases) is likely to alter in response to changes in any of the input variables (e.g. the initial outlay, selling prices, sales volumes, project lifespan, asset residual values and so forth); and

2 identifying the key or **critical variables** in the base case appraisal. These are the input variables which, even if they change by a small amount, will have a magnified effect on the project's expected outcome (NPV, or possibly IRR).

For example, management may wish to consider the effect on the base case NPV of a 5 per cent increase or decrease in the expected sales volume of a new product. Sensitivity analysis invariably involves asking 'what if?' type questions. Questions such as, what if our sales price is 10 per cent less than expected? What if our raw material costs are 10 per

cent higher than expected? For this reason, sensitivity analysis is frequently referred to as **'What if?' analysis.**

The objective of sensitivity analysis is to ***determine how sensitive the NPV is to changes in any of the key variables and to identify which variable has the most significant impact on NPV.***

If a small change in a key variable, such as sales volume, say less than ±5 per cent, produces a substantial change in the NPV, perhaps even turning it negative, then this would probably be deemed a very risky project. Conversely, if with a large change in a key variable, such as sales volume or sales price, say ±10, or even 15, per cent, the NPV remains positive, then the project *may* be viewed as low risk.

In sensitivity analysis all other variables, except the one under testing, are held constant. So it can be quite a tedious procedure, testing the effects of multiple changes in one variable at a time while holding all the others constant. Fortunately sensitivity analysis lends itself very easily to computer spreadsheet analysis, and most proprietary computer spreadsheet packages come with sophisticated 'what if' analysis already built-in to the package.

Example 1 —Sensitivity Analysis

Aphrodite Cosmetics has devised the following sensitivity analysis for its proposed new product range. The critical items in evaluating the proposal have been identified as: sales price, sales volume, and the expected life of the project, which in this case is given as 10 years.

CRITICAL VARIABLE:	Base Case NPV £000s	Adjusted NPV £000s	Increase (Decrease) £000s	%
(i) Sales Price:	120	180	60	50
10% Increase	120	0	(120)	(100)
10% Decrease				
(ii) Sales	120	162	42	35
Volume:	120	52	(68)	(56)
10% Increase				
10% Decrease				
(iii) Estimated	120	140	20	17
Life:	120	100	(20)	(17)
10% Increase				
10% Decrease				

This particular project is most sensitive to changes in sales prices. A 10 per cent increase in price produces a 50 per cent increase in NPV, and a 10 per cent decrease in price produces a 40 per cent reduction in the NPV. In other words if forecast selling prices were to fall by 10 per cent the project is likely to fail.

The project is also, not surprisingly, very sensitive to changes in sales volume, a 10 per cent reduction in volume results in a 56 per

cent reduction in NPV. The project is least sensitive to changes in its estimated lifespan, with a 10 per cent increase or decrease in estimated life yielding a 17 per cent increase/decrease in NPV.

Management would now need to review these critical variables to assess the probability of these changes occurring. Should Aphrodite decide to proceed with the project, management would need to pay particular attention to controlling prices and volumes.

Alternatively, the sensitivity of the NPV to any variable can be determined by calculating the degree or margin by which the individual variable would have to change to produce a zero NPV. For example, if we are told that the net operating cash flows (NCF) for Aphrodite's project form a 10-year annuity of £214,724 per year, the initial investment (I_0) is £1 million, and that the company's cost of capital is 14 per cent, then we can test the sensitivity of selected project variables as follows.

Initial investment

We wish to determine the degree by which the initial investment would have to change, in this case increase, to produce a zero NPV. This can be derived as follows:

$$(NCF \times PVIFA_{14\%,10}) - I_0 = NPV$$
substituting:
$$(£214,724 \times 5.216) - £1,000,000 = £120,000$$

and we need to find the value of I_0 which yields an NPV of zero:

$$(£214,724 \times 5.216) - I_0 = 0$$

which rearranging gives:

$$I_0 = (£214,724 \times 5.216) - 0 = £1,120,000$$

Thus the initial investment would have to increase by £120,000, or by a margin of 12 per cent, to result in a zero NPV. Alternatively we can say that the *margin of safety* for the initial investment—that is, the margin by which the current level of investment must increase to reach the break-even NPV point—is 12 per cent.

Cost of capital

In this case we wish to determine the cost of capital which will produce an NPV equal to zero, in other words we need to find the project's internal rate of return (IRR):

$$(£214,724 \times PVIFA) - £1,000,000 = 0$$

which rearranging gives:

PVIFA=£1,000,000/£214,724=4.657

From the present value annuity tables we find that the discount rate which has a present value factor of 4.657, where n equals 10 years, is, for all practical purposes, 17 per cent. The cost of capital for the project would have to increase by three percentage points, or by a margin of 21.4 per cent, before the NPV becomes zero.

Operating cash flows

In this project the operating cash flows form an annuity pattern, and we wish to determine by what amount they would have to reduce to yield a break-even NPV. Thus:

$(NCF \times 5.216) - £1,000,000 = 0$
rearranging:
$NCF = £1,000,000/5.216 = £191,718$

Thus the annual operating cash flows would have to reduce by £23,006, or 10.7 per cent, for the outcome to be a zero NPV.

Project life

Here we wish to find the project life, n, which would produce a zero NPV. Thus:

$£1,000,000 = £214,724(1+0.15)^n$
$£1,000,000/£214,724 = (1+0.15)^n$
$4.657 = (1+0.15)^n$

The next step is to look up the PVIFA tables, at the 15 per cent discount rate, to find the value of n closest to 4.657. This value lies between 4.487 for 8 years and 4.772 for 9 years. By interpolation the project life is found as:

$8+(4.657-4.487)/(4.772-4.487)$
≈ 8.6 years

Therefore the break-even life span for the project is approximately 8.6 years. The project's expected economic life could fall by 1.4 years, or 14 per cent, before the NPV reduces to zero.

We can summarise these results as follows:

Variable	Value	*Change*%
1 Initial investment	+£120,000	+12.0
2 Cost of capital	+3%	+21.4
3 Operating cash flows	−£23,006	−10.7
4 Project life	−1.4 years	−14.0

The NPV of this project would appear to be most sensitive to changes in its operating cash flows, and least sensitive to changes in its cost of capital.

The sensitivity of operating cash flows could be tested further by analysing the effects of changes in the variables from which they are derived, for example variables such as selling prices, sales volumes, and variable cost elements.

Limitations of sensitivity analysis

An important limitation of sensitivity analysis is that it **treats variables as if they are independent** and does not consider the interrelationships that might exist between key variables. In its most simple form it allows for a change in only one variable at a time, while all others are held constant. It is important therefore that the interdependency between certain variables is recognised when using this approach.

In the above example, both sales price and sales volume are key variables, but it is unlikely that in a real-world situation there is no connection between the two. An increase in sales volume may only be achieved by lowering selling prices.

Sensitivity analysis **does not formally attempt to quantify risk.** There is, for example, no assessment of the probability of changes in any of the variables occurring. However, on the other hand, simply because probability weightings are not required, sensitivity analysis is very useful in trying to develop a feel for an individual project's riskiness.

Finally, sensitivity analysis **does not provide any clear-cut decision rule** for management—managers do not know if their decisions should be altered as a result of the sensitivity of any variable. Based on the outcomes of the analysis they still have to exercise managerial judgement in arriving at a final accept/reject decision.

Despite these limitations, in practice sensitivity analysis is a very popular risk analysis technique. In fact, there is evidence to suggest that it the most favoured technique (see 'Risk Analysis in Practice' later in this chapter).

EXERCISE 1 —SENSITIVITY ANALYSIS

MJM Enterprises, a health food manufacturing company, is considering an investment project to introduce a new range of products. You have been provided with the following information:

	£m
Initial investment	4.68
Annual sales revenue	3.95
Annual operating costs	2.59

The project has an estimated economic life of 5 years. Assuming a cost of capital of 10 per cent you are required to:

1. Calculate the base case NPV for the project.
2. Test the project's sensitivity to key variable changes as follows:

   (a) ±5% change in annual sales revenue;
   (b) ±5% change in annual operating costs.

3. To which variable, sales or costs, do you consider the NPV to be more sensitive? Comment on your findings.

Scenario analysis

Scenario analysis extends sensitivity analysis by creating a range of different business case scenarios: its focus is much broader than simply evaluating individual variables one at a time. Typically three broad scenarios will be produced; *a best case scenario,* **a** *middle (or most likely) case scenario,* and a *worst case scenario* —the **BMW approach.** In each case, an estimate is made of the project's most likely outcome (in terms of its NPV or possibly IRR), given each scenario's particular set of assumptions and variables.

For example, under the best case scenario, managers will be required to make optimistic or favourable assumptions about business conditions (e.g. economic, marketing and competitive conditions) and about the key variables. Typically higher estimates will be made for selling prices and sales volumes, and lower estimates for unit costs, initial outlay and so forth. For the worst case scenario more pessimistic assumptions and estimates will be made.

Scenarios can be *'hard',* in the sense that they rely solely on hard, quantitative information, such as financial numbers and economic statistics. Alternatively they can be *'soft'* , meaning that they are derived from qualitative, descriptive information. Clearly they can, and should, comprise a combination of both.

While scenario analysis is subjective, it nonetheless allows managers to develop an appreciation and awareness of the degree of variability (risk) of project outcomes or returns. The difference between the NPVs for optimistic and pessimistic conditions will give the **range,** which is also a useful risk measure.

Creating a range of scenarios will allow the financial manager to explore the effects of alternative investment and financing options on the organisation's planned financial performance, its financial condition, and the goal of maximising shareholder value.

Example 2 —Scenario Analysis

Continuing with Aphrodite Cosmetics, assume that management have created a set of three scenarios, optimistic, most likely, and pessimistic for the project, and the resulting NPV under each scenario is as follows:

Scenario	Expected Outcome (NPV)
Optimistic	£180,000
Most likely	£120,000
Pessimistic	(£10,000)
Range	*£190,000*

Subtracting the pessimistic NPV (−£10,000) from the optimistic NPV (+£180,000) gives the range of NPVs for the differing

scenarios, which in this case equals £190,000.

The range is also a statistical measure of dispersion (risk), although it is less sophisticated than the standard deviation, σ. Essentially the wider the range, the greater the degree of variability, and thus the greater the level of risk involved in the project. By creating several scenarios and estimating the variation between them, management can use the results to develop a clearer insight into the project's degree of riskiness.

It would be unusual for management to consider a single capital expenditure proposal in isolation, normally choices will have to be made between several or many proposals. The application of sensitivity and scenario analysis techniques will assist in the selection process by indicating the comparative riskiness of the various proposals. The ultimate decision will be influenced by **management's attitude to risk;** whether the management tends to be risk-seeking, risk-indifferent, or risk-averse.

Computerised spreadsheet packages have greatly enhanced the ease and popularity of using sensitivity and scenario analysis in evaluating capital investment decisions. Like sensitivity analysis, there is research evidence to suggest that scenario analysis (in some form) is a very commonly used risk analysis technique (Pike 1988, 1996).

Scenario analysis using probability estimates

A refinement to the above is to create a scenario analysis, only this time assigning explicit probability estimates to predicted outcomes. It is likely that other key variables, such as sales estimates, will have already been determined using some kind of probability assessment, but here the focus of our attention is on expected outcomes (NPV or IRR). For instance, a simple probability distribution of the project outcomes could resemble that shown in Example 3.

Example 3 —Scenario analysis using probability estimates

For Aphrodite Cosmetics, management have now attached a simple probability distribution to the three scenarios. Given the respective probability of each scenario, the **expected net present value** (ENPV) for the project overall is determined as follows:

Scenario	Outcome (NPV)	Probability (P)	NPV×p
Optimistic	£180,000	0.30	54,000
Most likely	£120,000	0.60	72,000
Pessimistic	(£10,000)	0.10	(1,000)
	Expected Net Present Value (ENPV) =		*£125,000*

The expected net present value (ENPV) is calculated by multiplying the NPV for each scenario by its assigned probability. Thus the ENPV for the optimistic or best case scenario=£180,000×

0.30=£54,000. The expected net present value for the project overall is estimated as:

ENPV=£54,000+£72,000+(£1,000)=£125,000

Of course the question arises as to how the probability estimates are determined. You will appreciate that they tend to be based on subjective assessments by managers.

EXERCISE 2 —SCENARIO ANALYSIS

The management of Greenfield Equestrian Centre and Stud Farm is considering the following investment project to develop the business. The forecast NPVs and their assigned probabilities are as follows:

Optimistic £75,000 (0.4), middle £50,000 (0.4), pessimistic £10,000 (0.2)

Calculate the range and the ENPV. Comment on your findings.

Simulation analysis

This is really a more complex and elaborate version of scenario analysis. It is a statistically based approach which makes use of *random numbers* and *preassigned probabilities* to simulate a project's outcome or return. The technique requires a sophisticated computing package to operate effectively. The technique differs from sensitivity analysis in that instead of estimating a specific value for a key variable, a distribution of possible values for each variable is used.

Typically the simulation model building process begins with the computer calculating a random value simultaneously for *each* variable identified for the model, not just for a single variable as in the case of sensitivity analysis. The variables are likely to include: market size, market growth rate, sales price, sales volume, variable unit costs, residual asset values, project lifespan, and so on. From this set of random values a new series of cash flows is created and a new NPV is calculated.

Figure 11.1 NPV probability distribution Net present value (NPV)
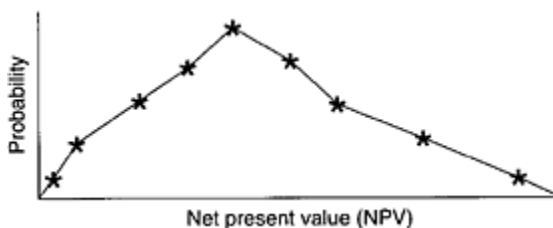
This process is repeated numerous times, perhaps as many as 1,000 times (or even more for very large projects), allowing the decision-maker to develop *a probability distribution* of project NPVs. From the distribution model, a mean (expected) NPV will be calculated and its associated standard deviation will be used to gauge the project's level of risk.

The fact that a distribution of possible outcomes is provided enables the decision-maker to view *a continuum of possible outcomes* rather than a single estimate, as illustrated in Figure 11.1.

Example 4 —Simulation Analysis

Assume that the management of Aphrodite Cosmetics has assigned a probability distribution and a corresponding table of random numbers to the sales price for its new product range as set out below.

In our example the table of random numbers ranges from 1 to 100 and they are allocated to the variable values on the basis of the relevant probability distributions. The identical procedure will be followed for all other variables identified for the model, but for illustration purposes we will confine our example to the two key variables of *sales price* and *sales volume.*

Sales price (£)	Probability	Random Number
5	0.10	1–10
6	0.15	11–25
7	0.25	26–50
8	0.35	51–85
9	0.10	86–95
10	0.05	96–100

Similarly, a probability distribution and corresponding random number set for *sales volume* has been developed as follows:

Sales volume (units) 000s	Probability	Random Number
100	0.05	1–5
200	0.10	6–15

300	0.20	16–35
400	0.30	36–65
500	0.20	66–85
600	0.10	86–95
700	0.05	96–100

On the first run of the model, the computer will generate a random number for sales price and similarly a random number for sales volume. The respective random numbers will determine the values to be used. For example, supposing the random numbers were generated as follows:

Variable	Random Number	Corresponding Value

Sales price	16	£6
Sales volume	77	500,000

Therefore the first total sales value for the model will be £3,000,000 (6×£500,000). This is now the value which will be combined with all other variable values to produce the first project NPV for the model. The process will be repeated many times; the end product being a probability distribution of NPV outcomes for the project.

From the distribution a mean (expected) NPV and its associated standard deviation can be calculated to evaluate the project's level of risk. It will then remain for Aphrodite's management to come to an accept/reject decision on the project after assessing all the information provided.

Simulation analysis—advantages and disadvantages

Advantages

One clear advantage of simulation analysis (such as **Monte Carlo simulation** which was developed from mathematical work on casino gambling) is that it facilitates, albeit with the aid of sophisticated computer packages, the analysis and appraisal of highly complex, multivariate investment proposals. It also has the advantage of being able to cope with both independence and dependence amongst variables.

The process of simulation analysis forces decision-makers to examine the relationships between variables. Overall the process of building a simulation model can be a valuable learning exercise, allowing managers to develop a deeper understanding of a project and the nature of variables at play.

Disadvantages

However, simulation is not always appropriate or feasible for risk evaluation. The model requires *accurate probability assessments* of the key variables: these are subjective and difficult to estimate in practice.

It is also difficult for model builders to define exactly the nature of the relationships (correlation) between dependent variables. For example, it may be known that there is a correlation between sales price and volume sold, but specifying with mathematical accuracy the nature of the relationship for model purposes can be problematic.

Constructing simulated financial models can be time-consuming, costly, and requires specialist skills. It is therefore only likely to be used to analyse very important, complex, and large-scale investment projects. Because of these factors, simulation analysis is not so widely used in practice as sensitivity and scenario analyses.

Simulation analysis, like sensitivity and scenario analysis, focuses on a project's *stand-alone risk*. The techniques ignore the impact of diversification, that is, how a project's stand-alone risk, as derived from the model, will correlate with that of other projects within the firm and affect the firm's overall corporate risk.

Risk-adjusted discount rate (RADR)

This approach to project risk analysis differs from the previous approaches in that, instead of adjusting a project's cash flows for risk, here a project's discount rate is modified to incorporate a **risk premium.** The risk premium is defined as the difference between the risk-free rate and the project's required rate of return.

The firm's normal or *average risk premium* (k_a), will be reflected in its normal or average discount rate (r_a), which is used to discount 'normal' or average risk projects. The average risk premium is therefore the difference between the risk-free rate (r_f) and the firm's normal or average cost of capital (r_a). In equation form this would be:

$$k_a = r_a - r_f$$

The risk premium chosen for a particular project may be higher or lower than the firm's average level of risk, if it is considered that the individual project's risk is significantly different from the firm's average level of risk. The risk-adjusted discounted rate (RADR) is thus *the rate of return a project is required to earn in the situation under analysis, given its risk characteristics.* The higher the perceived risk of a project, the higher will be the RADR, and clearly using higher discount rates will yield lower NPVs.

This method has the advantage and attraction of being a *very practical approach* to risk adjustment and is widely adopted in practice. However, the problem is in evaluating the amount of the risk premium to be added to the 'normal' discount rate: this is of necessity a subjective and arbitrary process.

With the RADR approach, the use of a single constant discount rate over the life of a project implies that risk is an increasing function over time. This is because the risk premium is compounded in the *denominator* of the NPV formula; remember $(1+r)^1$, where in this case r includes the risk premium (it is in fact the RADR itself) and t equals any year:

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$$

In applying RADR the effect of this adjustment is to essentially penalise long-term projects. As t increases, the denominator in the equation increases exponentially, thus the further into the future the cash flows are expected to occur the more severely they are discounted. This will tend to make shorter-term projects *appear* the more attractive alternative, especially when they are competing directly with longer-term projects.

This approach would not be appropriate therefore in cases where later year returns are not considered more risky than early year returns. In business start-ups (or new product launches), for example, the high risk period is usually in the early years, particularly the first two years. Once the business becomes established for a number of years, cash flows are likely to become more predictable and therefore less risky.

When the RADR is used in practice, it is common for projects to be classified or categorised according to their perceived level of risk. The simplest classification would

be to place what are considered high risk-projects in one class which has a predetermined RADR, medium-risk projects in another with a lower RADR, and finally what are deemed low-risk projects in a third. Alternatively, management might use a classification along the lines shown in Table 11.1. While clearly of practical value, it is necessary to appreciate that classifications of this type tend to be subjective and arbitrary. In summary, the **key advantages** of RADR lie in its practicality and its lack of complexity when compared with other approaches.

Table 11.1 Project risk and RADR classifications

Project risk Class/category	RADR (%)
1 *Lowest risk,* e.g. routine replacement projects	10
2 *Average risk,* e.g. projects maintaining current operations	14
3 *Above average risk,* e.g. projects expanding current operations	18
4 *High risk,* e.g. projects involving diversification	22

The **key disadvantages** of RADR relate to the subjective nature of the risk premium adjustment and the fact that the RADR incorporates both risk and time adjustments in a single discount factor. Because of this latter characteristic, RADR is considered a theoretically inferior technique to other techniques (see for example certainty equivalents in the appendix to this chapter). Despite their shortcomings RADRs are frequently used in practice.

RISK ANALYSIS IN PRACTICE

A survey by Drury *et al.* (1993) of 300 UK manufacturing companies with annual sales in excess of £20 million per year, found sensitivity analysis to be clearly the most widely used risk analysis technique, particularly among the larger firms. Sensitivity analysis was used by over 80 per cent of the larger firms and by around 30 per cent of smaller firms.

Discounted payback was also very popular as a risk analysis technique (much more so than RADR) with both large and small firms. RADR seemed to be used mainly by the larger firms—31 per cent said they used it whereas only 9 per cent of the smaller companies claimed to have used it. A significant proportion of the firms also used some form of scenario analysis.

As for the more sophisticated techniques, Drury *et al.*'s survey found that 49 per cent of companies never used statistical probability analysis for decision-making. Monte Carlo simulation and the capital asset pricing model (CAPM) were particularly unpopular—over 95 per cent of the companies stated they never used them—primarily due to a lack of understanding.

However, as with the use of the more sophisticated DCF investment appraisal techniques of NPV and IRR, sophisticated risk analysis techniques are likely to become more common, again because of developments in computing technology and for reasons of competitiveness. Continuing advances in computer technology will make it easier and less expensive for firms to adopt the more sophisticated analytical techniques and as

some firms see their competitors utilise such techniques they will be prompted to use them too.

Since 1993, when the results of Drury *et al.*'s survey were published, there have been significant improvements and developments in even the standard computer software packages such as Lotus and Excel. These proprietary packages now offer users the facility of more sophisticated, and cheaper, statistical analysis tools.

In addition, the increasing sophistication of investors is requiring firms to adopt more sophisticated approaches to risk analysis. Lenders, for example, will require to see the results of risk analysis studies before making any decisions on advancing funds.

REDUCING RISK

There are a number of practical ways of reducing project risk. The following summary of actions and techniques which can be used to reduce project risk is simply indicative, it is not intended to be comprehensive:

1 Carry out ***proper research*** (marketing, technical, competitive, etc.) before undertaking projects. Despite its apparent fundamental importance, this is an area which commonly leads to the failure of projects, or results in otherwise profitable projects being discarded. For example, initial research can sometimes be hurried, carried out under pressure and performed without the necessary professional and technical skills and financial resources.

2 Seek ***expert advice*** and help. This is related to 1 above and includes securing the appropriate technical and financial expertise. Expert help might be sought to test out assumptions and forecasts, perhaps through developing computer-based project or business models.

3 Set up ***pilot projects.*** This is particularly important for large-scale projects which involve new systems, processes and technologies.

4 Employ effective ***project management systems and techniques.*** These would include techniques such as *critical path analysis (CPA),* devised by the DuPont company, *and project evaluation and review technique (PERT),* developed by the RAND Corporation in California. Most project management systems today are computer-based.

5 Secure ***long-term contracts*** for sales and purchases. If possible, negotiate long-term contracts with customers and suppliers.

6 Avoid ***over-dependence*** on a few customers or suppliers. While negotiating long-term contracts with customers and suppliers increases future certainty of sales or supplies (e.g. essential raw materials), care needs to be taken to avoid over-reliance on one or two key suppliers or customers.

7 Carry out ***regular audits.*** This would include not only regular *financial audits* to ensure proper financial controls, procedures, and budgets are being followed, but also regular *management audits.* For example, audits specifically designed to test out if the project is living up to managers' original expectations and forecasts.

8 ***Insure*** as comprehensively as possible. Obvious examples include taking out appropriate and cost-effective insurance to cover normal business risks such as

accidents, damage, fire, theft, third-party claims and so forth. Any unusual or unique project risks should be identified, and ways of sharing these with insurance underwriters explored. Clearly insurance premiums will have to be paid and these will have to be weighed up against the risks.

9 Carry out *post-project implementation audits.* An often neglected stage, but one from which invaluable lessons may be learned about undertaking and managing future investment projects.

RECAP

Risk: Risk can be defined as: *the chance that the actual outcome will differ from the expected outcome* or in investment decisions *the potential variability of future cash flows.* It is frequently measured in statistical terms by the standard deviation, σ. Three types of risk were identified: stand-alone risk, corporate risk and market risk.

Risk analysis techniques: Handling risk and uncertainty is both important and difficult in capital investment decisions. Despite the difficulties, managers must make a determined effort to effectively seek out the potential risks associated with their projects and ensure that appropriate methods are used to analyse risk. The key methods of evaluating risk in investment decisions were explained. These were:

1 **Sensitivity analysis,** where one input variable at a time is changed, is a very popular approach to analysing project risk.
2 **Scenario analysis**—the *best, middle,* and *worst* (BMW) approach—is broader than sensitivity analysis and involves examining a range of possible outcomes under differing sets of assumptions about future business conditions. Neither sensitivity analysis or scenario analysis formally attempt to quantify risk.
3 **Simulation analysis** is a sophisticated, statistical, usually computer-based approach, which can analyse the effects on outcomes of changing multiple variables simultaneously.
4 **Risk-adjusted discount rate (RADR)** involves a direct adjustment to the discount rate to compensate for risk. The higher a project's perceived level of risk, the higher will be the risk premium added.

Risk reduction: A number of ways of reducing risk were presented and the benefits of *post-implementation audits* were emphasised.

APPENDIX I CERTAINTY EQUIVALENTS (CES)

In this approach to risk analysis the expected base case cash inflows, which we refer to as the risky cash inflows, are reduced by a proportion or factor which reflects the decision-maker's attitude to risk. The reduced cash inflows represent the amount the decision-maker would be prepared to accept *for certain* in place of the original risky cash inflows.

Thus the decision-maker would be indifferent between the certain amounts and the original risky amounts.

The underlying principle of certainty equivalents is the decision-maker's **utility function,** that is, the approach depends on the decision-maker's risk preferences. You may remember from your studies of economics that utility is the level of satisfaction an individual derives from consumption of a commodity.

The factor by which the base case cash inflows are reduced is called the **certainty equivalent coefficient** and is denoted by the symbol, α_t: it simply represents the ratio of the certain cash flow to the risky base case cash flow as follows:

$$\alpha_t = \frac{\text{Certain cash inflow}_t}{\text{Base case cash inflow}_t}$$

where $_t$ denotes the year

Thus to find the value of the certainty equivalent cash flow, it is simply a matter of multiplying the base case cash inflow for year $_t$ by the factor for that year, α_t. Certainty equivalent coefficients, α_t, will range between 0, for exceptional risk, and 1 for certainty. Example 5 illustrates how a certainty equivalent coefficient is determined.

Example 5 —Certainty Equivalents

Suppose that you had the option of investing £1,000 in a project which promised to generate a return of either £1,500 or £2,000 one year from now and that there is a 50/50 chance of either outcome occurring. The expected value (EV) of the investment is £1,750, (£1,500×0.5+ £2,000×0.5). This £1,750 expected value is the risky cash flow.

Alternatively you could invest the £1,000 in a risk-free security which will guarantee a return of £1,200 in one year's time. If you considered these two sums, the £1,200 certain cash inflow and the £1,750 expected risky cash inflow as equivalents, that is you were indifferent between them, then the £1,200 would be your certainty equivalent for the risky cash flow and your certainty equivalent coefficient, αt, would be:

$$\alpha_t = \frac{£1,200}{£1,750} = 0.69$$

The next step is then to discount the certainty equivalent cash flows by the **risk-free rate of return,** denoted R_f—*not* the firm's cost of capital. This risk-free rate, R_f, is the rate of return that could be earned on a risk-free investment, such as a government bond.

The reason we use a risk-free rate as the discount factor is that the original risky cash inflows have already been adjusted by the certainty equivalent coefficient to take account of risk; to then discount them at a risk-inclusive rate would be double-counting risk.

The certainty equivalent approach can be summarised by a slight modification to our original NPV cash flow equation, thus:

$$NPV = -I_0 + \sum_{t=1}^{n} \frac{\alpha_t CF_t}{(1+r_f)^t}$$

where NPV = base case or expected NPV
   n = the project's expected lifespan
   α_t = the certainty coefficient in period (year)$_t$
   CF_t = the cash flow in period (year)$_t$
   I_0 = the project's initial outlay
   r_f = the risk-free discount rate

The certainty equivalent approach adjusts the *numerator* in the above NPV equation, $\alpha_t CF_t$ (recall that the RADR technique adjusted the denominator) which represents the certain cash inflow which management would be prepared to accept in place of the project's original risky cash inflow for each year of the project.
 Example 6 illustrates the application of the certainty equivalent technique.

***Example 6** —Certainty Equivalents—Aphrodite Cosmetics*
 The base case data for Aphrodite Cosmetics' new product range is as set out below.

Year	Net Cash Flow (NCF) £	×	Discount Rate (r) (10%)	=	PV £
0	(500,000)		1.000		(500,000)
1	100,000		0.909		90,900
2	120,000		0.826		99,120
3	130,000		0.761		97,630
4	140,000		0.683		95,620
5	150,000		0.621		93,150
6	150,000		0.565		84,750
7	115,000		0.513		58,995
			Base case NPV=		120,165

 In using certainty equivalents the first step is to convert the base case cash inflows into certainty equivalent cash flows to reflect management's assessment of their risk. This is achieved by multiplying each year's base case cash inflow by its respective certainty equivalent coefficient α_t, as determined by the firm's management.

The next step is then to discount the certainty equivalent cash flows by multiplying them by the relevant *risk-free rate*. In our example, management have ascertained the current risk-free rate of return (R_f) to be 6 per cent. Converting the cash flows gives:

Year	Base Case Cash Flow £	×Certainty Equivalent Coefficient αt	=Certainty Equivalent Cash Flow £	×Risk-free Discount Rate (R_f) (6%)	=PV £
0	(500,000)	1.00	(500,000)	1.000	(500,000)
1	100,000	0.90	90,000	0.943	84,870
2	120,000	0.90	108,000	0.890	96,120
3	130,000	0.80	104,000	0.840	87,360
4	140,000	0.80	112,000	0.792	88,704
5	150,000	0.70	105,000	0.747	78,435
6	150,000	0.60	90,000	0.705	63,450
7	115,000	0.50	57,500	0.665	38,238

NPV=37,177

In this case the initial outlay is known with certainty so the relevant certainty equivalent coefficient is 1.0. The cash inflows for year 1 are deemed risky so a certainty equivalent coefficient of 0.9 has been applied and similarly for year 2. Subsequent cash flows, from year 3 onwards, are deemed riskier still and this is reflected in their declining certainty equivalent coefficients.

Applying the certainty equivalent technique reduces the original base case NPV of £120,000 down to £37,177. The NPV remains positive and the project would be deemed acceptable by the decision-maker because he/she will have incorporated his/her own risk preferences into the model.

You will probably have appreciated by now that one of the key difficulties with the CE approach is that estimating the certainty equivalent coefficient, α_t, is a highly subjective process. Despite this difficulty the certainty equivalent approach is considered conceptually sound, essentially because:

1 Decision-makers actually incorporate *their* own risk preferences or attitudes into the cash flow analysis, they have after all determined the CE coefficients. Thus the technique provides a clear-cut decision rule for those particular decision-makers: if the revised NPV is positive it is acceptable to those decision-makers and if the NPV is negative it is not acceptable to those decision-makers.
2 It is possible with the certainty equivalent technique to modify each individual period's cash flow to reflect its respective specific risk.

In summary, the **key advantage** of certainty equivalents concerns the way in which risk and time can be separately accounted for in a cash flow analysis. First, individual period

cash flows are modified to reflect the decision-maker's attitude to risk, and second the risk-adjusted cash flows are discounted at the risk-free rate.

For these reasons certainty equivalents are, from a theoretical point of view, the preferred approach to risk analysis when compared with the risk-adjusted discount rate (RADR) approach—since they can reflect the unique risk profile of a project.

The **key disadvantage** of the CE technique relates to the subjective nature of adjusting for the certainty equivalent coefficients.

Both the certainty equivalents and the RADR, if correctly applied, should, in theory, yield the same results. However, because the CE approach relies on the need to understand the decision-maker's utility function, it is a very difficult technique to accurately utilise in practice.

REVIEW QUESTIONS

Concept review questions

1 Distinguish between *risk* and *uncertainty* in the context of investment appraisal.
2 Define the following terms:

   (a) Stand-alone risk.
   (b) Corporate risk.
   (c) Market risk.

3 Summarise the respective limitations of the following risk analysis techniques:

   (a) Sensitivity analysis.
   (b) Simulation.

4 Compare and contrast the certainty equivalent and risk-adjusted discount rate (RADR) approaches to project risk analysis.

Practice question

5 **Sensitivity Analysis.** Illusions Ltd is a small firm specialising in the creation of special effects for the film and television industry. Management is considering an investment proposal to upgrade existing services in order to meet contractual obligations and improve competitiveness. New equipment will cost £150,000; installation costs are estimated at £10,000. Building alterations and modifications are estimated to cost £90,000. It is anticipated that £20,000 will be received from the disposal of old equipment and £5,000 will need to be invested in additional working capital in the form of increased stock holdings over the life of the project. Additional annual running costs (staffing, consumables, maintenance, and power) are estimated at £55,000, including depreciation of £15,000.
Overall, the scheme will generate increased income of £80,000 per year. The project's life is expected to be 10 years and the required rate of return on the project

is 10 per cent. Residual values will be zero. Management has set a maximum acceptable payback period of six years for projects of this type.

For ease of reference the relevant base case data is reproduced below:

1. Relevant Annual Cash Flows

	£
Increased annual revenue	80,000
– Increased annual running costs	55,000
= Operating surplus (profit) after depreciation	25,000
+ Depreciation	15,000
= Operating cash inflows	40,000

2. Net Present Value

Year	Net Cash Flow £	× Discount Rate (10%)	= PV £
0	(235,000)	1.000	(235,000)
1–10	40,000	6.145	245,800
10	5,000	0.386	1,930
		NPV =	12,730

Evaluate the effect on the project's base case NPV of each of the following:

(a) ±10% change in income;
(b) ±20% change in operating costs;
(c) ±20% change in the project's estimated lifespan;
(d) based on your findings, what is your advice to management about the project's acceptability?

Test questions

6 **Scenario Analysis.** The Leaning Tower of Pizza restaurant is attempting to decide which of two new mutually exclusive environmental control systems, A or B, it should install. Each system will produce benefits (e.g. improved productivity and efficiency) over a 10-year period and have an initial cost of £90,000 each. The manager has asked you to assist in the evaluation and has provided the following cash flow and probability estimates:

Initial investment	System A	System B
	£90,000	£90,000
Estimated outcome	*Annual cash inflows (£'s)*	
Optimistic	18,000	21,000
Most likely	15,000	16,000
Pessimistic	12,000	9,000

Estimated outcome	Probability estimates	
Optimistic	0.30	0.20
Most likely	0.40	0.60
Pessimistic	0.30	0.20

The finance manager has now asked you to:

(a) calculate the range of annual cash inflows for each system;
(b) calculate the expected NPV for each system using a 10% discount rate;
(c) calculate the range of NPVs for each system and use these to compare the risk of each system;
(d) recommend which system should be purchased and give your reasons.

7 **Certainty Equivalents.** The management of Illusions Ltd has developed the following range of certainty equivalent factors for the project's cash flows:

Year t	Net Cash Flow £	Certainty equivalent coefficient (α_t)
0	(235,000)	1.0
1	40,000	1.0
2	40,000	0.9
3	40,000	0.9
4	40,000	0.8
5	40,000	0.8
6	40,000	0.7
7	40,000	0.6
8	40,000	0.5
9	40,000	0.4
10	40,000	0.4
11	5,000	0.3

Given that the firm's cost of capital is 10 per cent and the risk-free rate has been determined at 6 per cent you are required to:

(a) calculate the certainty equivalent NPV;
(b) advise management on the project's acceptability.

8 **RADR and Risk Classes.** Andover Industrial Products is considering in which of the following three, mutually exclusive, projects it should invest. All projects have equal lives but differ in risk. Project 1 is a straightforward replacement project and is viewed as low risk. Project 2 involves an expansion of existing operations and is considered to be of average risk. Project 3 is a plan to expand into a new business area and is viewed as high risk.
The expected project cash flows are presented below:

	Project 1 £	Project 2 £	Project 3 £
Initial outlay	200,000	300,000	400,000
Cash inflows			
Year			
1	70,000	90,000	115,000
2	60,000	65,000	115,000
3	50,000	75,000	115,000
4	50,000	75,000	115,000
5	30,000	100,000	115,000

The required rates of return for each risk class are as follows:

Risk class	Required rate of return
Low risk projects	8%
Average risk projects	10%
High risk projects	15%

(a) calculate the risk-adjusted NPV for each project;

(b) based on your findings in (a), which project, if any, should be accepted.

9 **Sensitivity Analysis.** Scenic Systems designs and manufactures specialist bathroom fittings. The company's management is considering a proposal to manufacture and market a new shower systems product. The project would require an investment in premises, plant and equipment of £1.5 million.

The marketing manager estimates sales of the new unit at 70,000 per year at a selling price of £26.00 per unit. Relevant cash operating costs are estimated at 75 per cent of sales value. Assuming a cost of capital of 14 per cent and an economic project life of 8 years, you are required to:

(a) Calculate the project's NPV.

(b) Test the sensitivity of the project's NPV to changes in:

(i)   selling price;
(ii)   cost of capital;
(iii) initial investment;
(iv)   project life.

(c) Summarise and comment on your findings.

FURTHER READING

General

Excellent discussions of risk analysis in investment decision-making are included in the following texts:
• *Investment Appraisal* . Dixon, R., CIMA, 1994.
• *Investment Appraisal and Financial Decisions* . Lumby, S., 5th edition, Chapman & Hall, 1994.
• *Capital Investment and Financial Decisions* . Levy, H. and Sarnat, M. 5th edition, Prentice-Hall, 1994.

Practical applications of risk analysis techniques

For a review of the practical application of risk analysis techniques see:
• 'An Empirical Study of the Adoption of Sophisticated Capital Budgeting Practices and Decision-Making Effectiveness.' Pike, R.H., *Accounting and Business Research* , Autumn 1988.
• 'A Longitudinal Survey on Capital Budgeting Practices.' Pike, R.H., *Journal of Business Finance and Accounting* , Spring 1996.

REFERENCES

Drury, C., Braund, S. and Tayles, M. *A Survey of Management Accounting Practices in UK Manufacturing Companies* . ACCA Research Paper 32, Chartered Association of Certified Accountants, 1993.

Levy, H. and Sarnat, M. *Capital Investment and Financial Decisions* . 5th edition, Prentice-Hall, 1994.

MacCrimmon, K.R. and Wehrung, D.A. *Taking Risks: The Management of Uncertainty* . The Free Press, 1986, as referred to by Schlosser, M. in *Corporate Finance: A Model-building Approach* . Prentice-Hall, 1989.

Pike, R.H. 'An Empirical Study of the Adoption of Sophisticated Capital Budgeting Practices and Decision-making Effectiveness.' *Accounting and Business Research* , Autumn 1988.
Pike, R.H. 'A Longitudinal Survey on Capital Budgeting Practices.' *Journal of Business Finance and Accounting* , Spring 1996.

12
THE COST OF CAPITAL

> This chapter explains the determination of a company's cost of capital. The following aspects are covered:
>
> the nature of the cost of capital;
> the cost of the various sources of long-term capital;
> the weighted average cost of capital (WACC);
> risk-adjusted cost of capital.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the meaning of the term cost of capital;
2 explain the factors which influence a firm's cost of capital;
3 determine the cost of debt capital;
4 determine the cost of equity capital;
5 understand and apply the concept of the weighted average cost of capital (WACC);
6 recognise the limitations of the weighted average cost of capital (WACC);
7 appreciate other methods of calculating a risk-adjusted cost of capital.

OVERVIEW

In the preceding chapters we have discussed the importance of the firm's investment decisions. As we know, it is the firm's investment decisions which, more than any other type of decision, will affect its value. It is therefore important that, before being implemented, investment decisions are properly appraised. The cost of capital is a critical variable in the investment appraisal process.

The cost of capital is the discount rate which is applied to a potential investment's expected cash flows; it is a discount rate which allows for the time value of money and project risk.

To be considered acceptable, investment projects must expect to earn a rate of return at least equal to the firm's cost of capital.

If a project yields a positive net present value (NPV) when discounted at the firm's cost of capital it is considered a worthwhile investment: it is expected to increase the value of the firm and the wealth of its shareholders. In other words, projects with positive

NPVs earn a rate of return greater than the cost of capital.

Evidently if the cost of capital number is wrong, then the results of the appraisal will be wrong and perhaps value-diminishing projects will be undertaken. It is clearly important that before being used to evaluate investment projects the cost of capital figure is determined with care.

THE COST OF CAPITAL

The cost of capital is an important figure, as it serves to connect the firm's long-term financing decisions directly to its long-term investment decisions, and thus to the wealth of its shareholders. The firm's financing decisions will affect its cost of capital, which in turn will affect its investment decisions. If, for example, a firm finances an investment by raising long-term debt, the cost of the debt will impact on its overall cost of capital. Calculating the cost of individual sources of capital also enables a financial manager to compare their relative costs, for example the cost of debt versus equity.

A company's cost of capital is also of interest to other parties, such as shareholders, investors, and if the company operates in a regulated industry (e.g. a public utility) to the industry regulators and consumers. Shareholders and investors will wish to compare the returns a company is earning with its cost of capital. Similarly a regulator will be interested that a company is not earning excessive returns above its cost of capital, and perhaps exploiting consumers by virtue of its monopoly position.

The cost of capital figure, which is used as the firm's discount rate, is usually quoted as a single (normally percentage) figure, yet a firm usually derives its capital from a variety of sources. A firm's capital structure will usually comprise a mixture of debt and equity finance which have been acquired at different times in the firm's history, and each source of finance will have its relevant cost. Combining the respective costs of these sources of finance, at any point in time, will produce an overall composite cost of capital figure for the firm.

We should be clear at this stage, that in determining the cost of capital we are primarily focusing on the cost of the firm's long-term capital, such as long-term debt, ordinary and preference share capital, and retained earnings. This is the capital which the firm employs to finance its long-term investments, generally investments in its fixed assets. In later chapters on working capital management we will examine the financing of the firm's short-term (current) assets.

Clearly to stay in business and maintain its value a firm must earn a rate of return which at least matches, but preferably exceeds, its cost of capital. If the rate of return earned equals the cost of capital, then, in theory (assuming the firm's risk characteristics remain unchanged) the value of the firm will be maintained.

Conversely, if the rate of return earned is greater than the cost of capital then in theory (again assuming the firm's risk characteristics remain unchanged) the value of the firm will be increased. A firm which earns a rate of return which is less than its cost of capital will erode its market value and find it difficult to attract investors.

Thus we can define the cost of capital as ***the minimum rate of return a firm is required to earn on its investments in order to satisfy investors and to maintain its***

market value, in other words it is *the investor's required rate of return.*

The key question is: how is this rate of return determined? The essential purpose of this chapter is to answer this question.

How the cost of capital is determined

We can begin by briefly reviewing the sources of financing for the firm's long-term investment decisions. The firm's capital structure may be viewed as a pool of resources from which its investment projects are financed. Sometimes projects may be financed specifically from debt, such as long-term loans or debentures, or alternatively they may be financed by equity, perhaps in the form of a rights issue. On other occasions the exact source will be indeterminate as projects will be financed from the firm's overall pool of capital resources.

The cost of capital is traditionally viewed in terms of a **weighted average cost of capital (WACC),** which is a simple weighted average of the cost of the individual capital components (equity, including retained earnings, preference shares, and debt).

Before discussing the weighted average cost of capital we will need to examine how the cost of each individual source of capital is determined, but first we will briefly review some of the key factors which influence a firm's cost of capital.

Factors which influence a firm's cost of capital

A firm's cost of capital is influenced by a number of factors, some of which a firm's management is able to control (e.g. capital structure, investment and dividend policy) and some which it is not (e.g. interest rates, taxation rates and regulations). The main factors are as follows:

Investors' required returns

When conditions in the capital markets that affect investor returns change, for example the level of interest rates, then the firm's cost of capital will change. If the returns required by investors increase (decrease), the firm's cost of capital will similarly increase (decrease).

Risk

In considering the effect of changes in risk on the firm's cost of capital we should distinguish between the firm's *business risk and financial risk.* Remember that business risk arises from the nature of the firm's business environment and the particular characteristics of the type of business or industry in which it operates. For example, the competitive structure of the industry, its sensitivity to changes in macroeconomic variables such as interest rates and inflation, and the stability of industrial relations all combine to determine a firm's business risk.

The level of business risk in some industries, for example catering and construction, is higher than in others and is a variable which lies largely outside management's control.

Financial risk in contrast represents the risk which arises from a firm's level of gearing or leverage and is a variable which is directly under management's control. Basically the more debt a firm introduces into its capital structure, the greater the level of financial risk (the risk of the firm not being able to meet its financial obligations) and the greater the return the equity shareholders will require to compensate for the additional financial risk.

Should a new investment project significantly alter a firm's risk profile, that is, its *systematic risk*, then it will also alter the firm's cost of capital. This may be because the new investment is much more risky than usual. For example, it may be in a different line of business from the firm's normal activities, thus changing the character of the firm's business risk.

As implied by the capital asset pricing model, an increase in the firm's systematic risk (as measured by its beta) will increase required returns. Remember that the two main components of a firm's equity beta P are its level of business risk and financial risk.

Capital structure

By changing its capital structure a firm *may* change its cost of capital. The capital structure and cost of capital relationship are more fully explored in Chapter 13. For example, when a firm decides to invest in a capital project any new funds raised may alter the firm's existing capital structure, that is its mix of equity and debt financing, and therefore its average cost of capital. A significant increase in a firm's gearing, by raising additional debt finance, may cause equity shareholders to demand increased returns because of the increased exposure to financial risk.

It is not uncommon for a firm, or its financial manager, to operate with some form of *optimal* or *target capital structure* in mind. You will recall from Chapter 1, where we initially discussed financial objective-setting, that maintaining an appropriate capital structure is one of a firm's key financial objectives. What is an appropriate capital structure for a firm is a variable which will be decided by the firm's management.

Dividend policy

Should a firm change its dividend policy, either by paying out significantly increased or reduced cash dividends to its shareholders, then this *may* be interpreted by the financial markets and investors as a *signal* of favourable or adverse changes in the firm's future prospects. This in turn could impact on the firm's market value, and thus on the returns required by investors.

The relationship, if any, between a firm's dividend policy and its market value is a controversial area in financial management and is explored in more depth in Chapter 14.

Taxation

Changes in taxation may also affect the firm's overall cost of capital. For example, if the rate of corporation tax is increased the cost of debt capital will be reduced and vice versa. This is because the interest payable by the firm on debt capital is allowable as a tax deductible expense. We shall examine this taxation aspect of debt financing in more

detail shortly.

As our intention in this chapter is to examine the essential constructs or components of a firm's cost of capital, we will for the most part avoid the complexity, and often the controversy, surrounding some of the above issues. Consequently we will assume that any investment project undertaken by the firm does not significantly change its risk, capital structure or dividend policies, as a change in any one of these variables may alter the firm's cost of capital.

In determining the cost of various sources of long-term financing you will no doubt notice that we are in fact utilising our valuation models as explained in Chapter 8, but from a different perspective. We will begin by examining the cost of debt capital.

THE COST OF DEBT CAPITAL

There are many forms of debt capital which a company may have in its capital structure. For example, debt capital may be redeemable or irredeemable in terms of its lifespan, and it may be fixed rate or floating rate in terms of interest payments.

Debt capital may be also be convertible or non-convertible. With convertible debt, the debt holder has the option to convert the debt into equity at some time in the future, under pre-arranged terms and conditions although in this section an examination of convertible debt is beyond our scope.

The cost of redeemable debt capital

The cost of long-term debt capital is the *after-tax cost* of raising debt capital in the markets today, not the historic cost of the debt capital in a firm's balance sheet. The after-tax cost is important, as in maximising a firm's value we are interested in the after-tax cash flows which it generates. It is the after-tax cash flows which add value to the firm.

This same principle applies to the determination of the cost of all other sources of long-term capital, for example retained earnings. The reason being that the cost of capital is an **opportunity cost.** It is the rate of return investors could earn from alternative investments of equal risk. Thus the cost of capital is the minimum return investors require *today* from investing in the firm. If a firm is appraising an investment project then it has to use a cost of capital based on the future rate of return required by investors, not the historic rate of return, as this is really irrelevant for making future-oriented investment decisions.

It is said that calculating a firm's cost of capital is like trying to hit a moving target, the cost of capital is dynamic and changing. For example, the firm's cost of capital will be affected by factors outside its control, such as changes in interest rates.

The cost of capital is also calculated at a specific point in time and will change over time. When making an investment decision we can view the firm's cost of capital as the *expected* average cost of capital funds in the future.

Returning specifically to the cost of debt we can calculate the after-tax cost of debt as follows:

$$\text{After-tax cost of debt} = k_d(1-T)$$

Where the before-tax cost of debt is k_d and T is the marginal rate of tax. The before-tax cost of debt, k_d, is adjusted to reflect the tax relief available on debt interest. As debt interest is a tax deductible expense, the cost of debt capital to the firm will be reduced by the amount of tax relief currently available.

For example, if the tax rate is 30 per cent and a firm is paying investors 10 per cent annual interest on £100 par value bonds, then the annual cash flow to investors will be £10 on each bond. However, the firm will save £3.00 (£10×0.30) each year in tax payments.

Over a number of years this tax saving, also known as the **tax shield,** can be substantial, as we will soon see. This assumes of course that the firm has sufficient taxable profits to be able to take full advantage of the tax relief.

In determining the cost of redeemable debt capital we will use the *yield to maturity (YTM)* as a proxy for the before-tax cost of debt, k_d, thus:

$$\text{Before-tax cost of debt, } k_d = \text{YTM}$$

The yield to maturity is the rate of return that the financial markets indicate investors currently require from equivalent investments, that is, investments equal in term to maturity and risk.

To avoid unnecessary complications in the calculations which follow we have generally ignored flotation or issue costs. These are the costs (investment banking and underwriting fees, broking commissions and so forth) a company incurs when it floats or issues capital in the financial markets.

Example 1 —Cost of redeemable debt

WeatherAll Engineering, a mechanical and electrical engineering company, has in issue £100 par value bonds with a coupon rate of 12 per cent paid annually. The bonds, which are currently trading at £93, are redeemable at par in 20 years time. Find the cost of the bond assuming a taxation rate of 30 per cent.

The before-tax cost of the bond can be calculated by finding its *internal rate of return (IRR).* This is the discount rate which equates the bond's cash inflows with its cash outflows, that is, the net present value is zero. The nominal cash flows to an investor who purchased the bond now at £93 would be as follows:

Year	Cash flow (£)
0	(93)
1–20	12
20	100

The investor would have a cash outlay now of £93, followed by cash inflows of £12 per year interest for 20 years, plus the par value of the bond on redemption 20 years from now. We therefore want a discount rate which, when applied to the future cash flows, over the 20-year term to

maturity of the bond, gives a present value of £93. Thus the before-tax cost of the bond, k_d, is determined as:

$$£93 = \frac{£12}{(1 + k_d)^1} + \frac{£12}{(1 + k_d)^2} + \dots + \frac{£12}{(1 + k_d)^{20}} + \frac{£100}{(1 + k_d)^{20}}$$

Recall from Chapter 8 on value, that if we discount the bond's future cash flows at its coupon rate this will give the bond's par value. To find a value less than par, in this case the bond's market value of £93, we need to use a discount rate higher than the coupon rate.

Trying 15 per cent, we can calculate the present value of the cash flows using the present value interest factor (PVIF) as follows:

$$= £12(PVIFA_{16\%,20}) + £100(PVIF_{15\%,20})$$
$$= £12 \times 6.259 + £100 \times 0.061$$
$$= £75.11 + £6.10$$
$$= £81.21$$

As the present value is less than the current market value of £93, the discount rate of 15 per cent is clearly too high. We also know that a discount rate of 12 per cent (the bond's coupon rate) is too low as it will yield a present value of £100, the bond's par value. Thus the before-tax cost of the bond lies somewhere between 12 per cent and 15 per cent. We can determine a close approximation of the actual cost by interpolating as follows:

$$IRR = r_1 + \frac{NPV_1 (r_2 - r_1)}{NPV_1 + NPV_2}$$

where,

r_1 = lower discount rate used

r_2 = higher discount rate used

NPV_1 = the NPV of the cash flows at r

NPV_2 = the NPV of the cash flows at r_2%

The net present values are calculated as follows:

At the lower discount rate of 12 per cent

We know that if the bond's future cash flows are discounted at its coupon rate of 12 per cent their present value will be equal to the bond's par value of £100. For an investor to purchase the bond now, the present

value of the outlay would be £93. Thus the NPV at 12 per cent can be determined as:

Year	Cash flow (£)	Discount rate 12%	Present value (£)
0	(93)	1.000	(93.00)
1–20	12	7.469	89.63
20	100	0.104	10.40
		NPV=	7.03 (say £7)

The 12 per cent discount rate is clearly too low, as the present value of the cash inflows to the investor are greater than the initial cash outflow.

At the higher discount rate of 15 per cent

If the discount rate was 15 per cent, the investor would receive a present value inflow of £81.21 compared to the present value of the purchase price of £93. Thus the NPV at 15 per cent can be determined as:

Year	Cash flow (£)	Discount rate 15%	Present value (£)
0	(93)	1.000	(93.00)
1–20	12	6.259	75.11
20	100	0.061	6.10
		NPV =	(11.79)

This discount rate is clearly too high. The present value of the cash inflows to the investor are less than the initial cash outflow.

Substituting the net present values for the bond:

$$
\begin{aligned}
k_d &= 12 + \frac{7.00}{7.00 + 11.79}(15 - 12) \\
&= 12 + [(0.373)(3)] \\
&= 12 + 1.12 \\
&= 13.12\% \\
&\approx 13\%
\end{aligned}
$$

The gross cost of the bond to the company is 13 per cent, approximately: it is the investor's required rate of return. This can be verified as follows:

$$
\begin{aligned}
&= £12(PVIFA_{13\%,20}) + £100(PVIF_{13\%,20}) \\
&= £12 \times 7.025 + £100 \times 0.087 \\
&= £84.30 + £8.70 \\
&= £93.00
\end{aligned}
$$

Thus if the company wished to raise new debt capital, of the same risk, investors would now require a return of 13 per cent.

To determine which discount rate to try next, in interpolating, a rough guide is to calculate the annual capital gain and (in this case) add it to the coupon rate of the bond. The capital gain for the investor for a 20-year

period is £7, or £0.35 per year, which is less than 1 per cent on an annual basis, in relation to the bond's current market value of £93. This would suggest trying a discount rate of 13 per cent in this example.

Should the bond be trading at a premium, then the procedure would be reversed. With a marginal tax rate of 30 per cent, the after-tax cost of the debt, $k_d(1-T)$, would be:

$$k_d(1-T)=13(1-0.30)$$
$$=9.1\%$$

The tedium of interpolating can be avoided by using the Hawanini and Vora (1982) yield approximation formula, introduced in Chapter 8, as follows:

$$k_d = \frac{I + [(P - NPD)/n]}{P + 0.6(NPD - P)}$$

where,

I =annual interest or coupon rate
P =par value of bond at maturity
NPD=net proceeds from sale, or market value of debt instrument
n number of periods (years) to maturity

Applying it to our present example the cost of debt, k_d, would be calculated as:

$$k_d = \frac{12 + [(100 - 93)/20]}{100 + 0.6(93 - 100)}$$
$$= 12.35/95.8$$
$$= 12.89\%$$

And the after-tax cost of debt, $k_d(1-T)$, is given as:

$$k_d(1-T)=12.89(1-0.3)$$
$$=9.02\%$$

Which is very close to the value obtained by interpolation.

The tax deductibility of debt interest

The tax deductibility of debt interest is one of the attractions of using debt finance and is

a factor which tends to make long-term debt capital the low cost form of long-term financing.

The benefit to WeatherAll of the tax shield in the previous example, can be valued as:

Annual interest=£100×12%=£12
Annual tax shield=£12×0.30=£3.60

The present value of the tax shield over the 20-year term of the bond is:

$£3.60×PVIFA_{12\%,20}=£3.60×7.469=£26.89$

If the company had 1 million £100 par value bonds in issue, the tax shield in total would be worth £26.89 million. This assumes that WeatherAll is earning sufficient taxable profits to be able to benefit from the tax shield. Also, in practice, the time lag in the actual payment of corporation tax to the Inland Revenue would reduce the present value of the tax shield. A company generally has up to nine months after the end of its accounting period to pay its corporation tax liability.

EXERCISE 1 —COST OF DEBENTURES

Sunny Sky Ventures plc has in issue £100 par value debentures with a coupon rate of 10 per cent paid annually. The debentures, which are currently trading at £109, are redeemable at par in 10 years time. Find the cost of the debentures assuming a taxation rate of 30 per cent. For practice use both interpolation and the approximation method.

The cost of irredeemable debt and preference share capital

The procedure for determining the cost of irredeemable debt and preference share capital is very similar because they essentially (ignoring taxation) have the same characteristics. For example, they both pay a fixed rate of return, fixed *interest* in the case of debt, and a fixed rate of *dividend* in the case of preference shares.

Preference share capital

Preference shares may be *redeemable* or *irredeemable,* but most commonly they are irredeemable. The cost of irredeemable preference share capital, k_p, is very similar to that for consols or perpetual bonds, it is calculated as a perpetuity, thus:

$$k_p = \frac{D_p}{P_0}$$

where,

k_p = cost of preference share capital

D_p = fixed dividend payment

P_0 = the current market value of the preference shares

As preference (and equity) share dividends are paid out of the firm's after-tax profits no tax adjustment is necessary.

Example 2 —Cost of preference share capital

WeatherAll Engineering, a mechanical and electrical engineering company, has in issue 5 million £1.00 par value irredeemable 6 per cent preference shares. Find the cost of the shares if their current market value is £0.96.

The annual dividend is paid on the nominal value of the preference shares and is computed as £0.06 (£1.00×6%), therefore the cost of the preference share capital is determined as follows:

$$k_p = \frac{£0.06}{£0.96} = 6.25\%$$

Irredeemable debt

Irredeemable debt, such as irredeemable bonds, is also treated as a perpetuity paying a constant regular cash flow in the form of periodic interest payments. As the debt is never redeemed no terminal cash flow is involved. Thus the cost of an irredeemable or perpetual bond is given by:

$$k_d = \frac{I}{BV_0} \times (1-T)$$

where,

k_d = cost of irredeemable bond

I = annual interest or coupon payment

BV_0 = current market value of the bond

T = relevant tax rate

___

Example 3 —*Cost of an irredeemable bond*

WeatherAll Engineering has in issue 8 per cent irredeemable bonds with a par value of £100. If the market value of a bond is currently £90 and the rate of corporation tax is 30 per cent, the after-tax cost of the bond would be calculated as:

$$k_d = \frac{£8}{£90} \times (1 - 0.30)$$

$$= 0.0622 = 6.22\%$$

The cost is significantly reduced due to the tax relief on the debt interest.

___

EXERCISE 2 —**COST OF IRREDEEMABLE DEBENTURES**

Sunny Sky Ventures plc has in issue £100 par value irredeemable debentures with a coupon rate of 7 per cent paid annually. Find the cost of the debentures assuming a current market value of £96 and a taxation rate of 30 per cent.

___

Floating rate debt

Floating rate debt instruments, such as a floating rate bond, pay a variable rate of interest. The rate of interest varies periodically in line with changes in general market interest rates.

In calculating the cost of floating rate debt, the company may use as a proxy the cost of a similar fixed rate debt instrument. The proxy or substitute fixed interest debt should be similar to the floating rate debt in terms of risk and maturity.

Other sources of debt

In today's financial markets there are a myriad of debt instruments available to a company, particularly large companies. For example, there are different types of debt convertibles and a host of debt derivatives such as swaps and options. Where such instruments exist in a company's capital structure they will inevitably pose considerable difficulties in trying to determine their cost.

Questions also frequently arise in relation to leasing and other forms of debt financing such as bank overdrafts. Should these be included as part of the capital structure and in determining a company's overall cost of capital?

Leasing, as we will see in later chapters, is a means of financing medium to long-term corporate assets, for example plant, equipment and vehicles. As it is essentially a form of

longer-term debt financing, leasing should be included in cost of capital (and in gearing) estimates.

Bank overdrafts are technically a form of short-term debt financing and as such should be excluded from cost of capital estimates. However, as was discussed in Chapter 9, many small and medium-sized companies rely on bank overdrafts as virtually a permanent source of financing. If bank overdrafts can be identified as such, they should arguably be included in the determination of the company's cost of capital.

THE COST OF EQUITY CAPITAL

We now come to the most problematic part of calculating a firm's cost of capital, the cost of equity. The cost of equity can be defined as, *the rate of return required on the firm's shares by investors in the financial markets.* However, one immediate difficulty with this is that we have no direct way of discovering the return that the firm's equity investors actually require on their investment, we therefore have to find some method of estimating it.

In this respect we can refer to previous chapters on equity valuation and risk and return and adapt two techniques which can be used to estimate the firm's cost of equity capital. The first is the *constant dividend (or Gordon) growth model* and the second is the *capital asset pricing model (CAPM).*

The constant dividend growth model

The constant dividend, or Gordon, growth model was used in Chapter 8 as a method of valuing equity shares. Here we will adapt the model to estimate the cost of the firm's equity capital.

Recall that the constant dividend growth model assumes that dividends will grow at a constant rate each year, it is in fact a growing perpetuity, and that the formula was determined in Chapter 8 as follows:

$$SV_0 = \frac{D_0(1 + g)}{(r - g)} = \frac{D_1}{(r - g)}$$

where,

SV_0 = value of the share at time zero
$D1$ = expected dividend per share (DPS) one year from now
r = investor's required annual rate of return on the share
g = constant growth rate

The investor's required rate of return is denoted by r, and D_1 represents the cash dividend payment expected—which is equal to the current (or last paid) dividend D_0 multiplied by the growth rate g. Note that, as with the growing perpetuity model, the constant growth

dividend valuation model is only valid if the growth rate, g, is less than r, the investor's required rate of return.

However, in the interests of consistency, in this case we will substitute the notation k_e for r to denote the cost of equity. Thus solving the above equation for k_e yields:

$$k_e = \frac{D_1}{SV_0} + g$$

By using this approach the cost of equity, k_e, can be determined by dividing the expected dividend per share (DPS) one year from now, D_1, by the current market price of the share, SV_0, and adding the growth rate, g. Note that we do not have to make any tax adjustments as the firm's dividends will be paid out of after-tax distributable profits.

Example 4 —Cost of equity with constant dividend growth

The directors of Sunny Sky Ventures plc estimate the dividend for next year at £0.21 per share and expect future dividends to grow at a constant 5 per cent per year. Assuming the current market price of the share is £3.00, the firm's cost of equity would be calculated as:

$$k_e = \frac{£0.21}{£3.00} + 0.05 = 0.07 + 0.05 = 12\%$$

The firm's cost of equity capital is therefore 12 per cent. This is also the rate of return existing shareholders currently require from the firm's equity shares.

Should any of the key variables change, for instance the expected growth rate, g, then clearly this will affect the return required by shareholders, and the firm's cost of equity capital. For example, the cost of equity is sensitive to changes in the growth rate, g. A change of 1 per cent in the growth rate would also change the cost of equity by about 1 per cent.

EXERCISE 3 —COST OF EQUITY

The directors of WeatherAll Engineering estimate the dividend for next year at £0.46 per share and expect future dividends to grow at a constant 3 per cent per year. Assuming the current market price of the share is £3.68, calculate the firm's cost of equity.

The advantages and disadvantages of using the constant dividend growth model to determine the cost of equity can be summarised as follows.

Advantages and disadvantages

A key advantage of using the model lies in its relative simplicity and ease of application. As we shall soon discover, compared with the CAPM approach (discussed below), the constant dividend growth model is a relatively straightforward and practical approach. However, there are some significant limitations relevant to the model.

First, as we discovered in using it to value equity in Chapter 8, the model can only be used with companies which actually pay dividends—not all companies do. Second, it assumes a firm's share value is simply a function of its dividend policy: share value is likely to be influenced by other factors.

Third, there are real difficulties in assuming a constant dividend growth rate indefinitely, although the model can be modified to incorporate variable growth rates. For example, in relation to rapidly growing (or declining) companies assuming a constant growth rate is likely to be inappropriate. Moreover the growth rate is likely to be determined with reference to past data and trends, this may not be appropriate in determining future growth rates, particularly in a rapidly changing business environment.

In addition, if a company is not listed on a stock market there will be difficulties in obtaining a current market price for its shares.

The final point concerns risk. Unlike the CAPM approach to calculating the cost of equity (described below), the constant growth model takes no explicit account of risk. Although it does incorporate a share price variable (if available) which does imply something about the share's expected risk-return characteristics.

The capital asset pricing model (CAPM)

Recall from Chapter 7 that the capital asset pricing model (CAPM) demonstrates how *systematic (non-diversifiable) ris*k and return can be linked together and specifies the nature of the risk-return relationship for any security or asset.

Using the capital asset pricing model (CAPM) this relationship is expressed more formally as:

$$E(r) = R_f + \beta_i(ERm - R_f)$$

where,

$E(r_i)$ = required return on share i

R_f = risk-free rate of return

β_i = beta coefficient for share i

ER_m = expected market return, that is the return expected on the
    market portfolio of shares

***Example 5** —Cost of equity using CAPM*
   The financial manager of Sunny Sky Ventures plc wishes to use the capital asset pricing model to determine the firm's cost of equity capital. From contacts at the firm's investment bank the financial manager has learned that the risk free rate, R_f, is currently 6 per cent, the market return, ER_m, is 11 per cent, and the firm's beta, β, is 1.2. Using this information the financial manager would calculate the cost of equity, k_e, as:

$$k_e = 6\% + 1.2(11\% - 6\%) = 12\%$$

Using the CAPM the firm's cost of equity capital, in this case, is the same as using the constant dividend growth model. However, in reality, estimates of the cost of equity obtained using both methods are likely to differ, due to practical difficulties in measuring the key variables (e.g. betas, growth rates, and market return) required for the models. Depending on the outcomes using both methods, a pragmatic solution may be to use a simple or weighted average of the two methods. Weightings may, for example, be related to management's confidence levels concerning the data used in the models.

EXERCISE 4 —COST OF EQUITY USING THE CAPM
   WeatherAll Engineering currently has an equity beta, β, of 1.1. Assuming a risk-free rate, R_f, of 7 per cent and a market return, ER_m, of 15 per cent, calculate the cost of equity using the CAPM.

The advantages and disadvantages of using the CAPM to determine the cost of equity are as follows.

Advantages and disadvantages

The CAPM has two key advantages. First, it explicitly reflects the firm's risk as measured by beta in the model. Second, CAPM can be used in circumstances where dividend information is either not available or not appropriate.

   However, as was highlighted in Chapter 7, the CAPM does have its own shortcomings. There are, for example, practical problems in determining beta, the risk-free rate, and the market return. Remember also that CAPM is a future-oriented model, yet it essentially relies on historic data to predict future returns. Betas, for instance, are calculated using historic data; consequently they may or may not be appropriate predictors of the variability or risk of future returns.

   In summary, neither the constant dividend growth model or the CAPM are

deterministic models, the cost of capital suggested by these models can only be viewed as an approximation.

What about retained earnings?

Retained earnings are the proportion of the firm's after-tax distributable profits which have not been paid out to shareholders in the form of dividends. They have been reserved within the firm to finance future investment plans.

Shareholders will expect the firm's managers to earn a satisfactory rate of return on retained earnings in order to at least maintain the market value of the firm's equity, otherwise they should be paid out as dividends so that the shareholders can invest these funds for themselves. Retained earnings therefore incur an **opportunity cost.** It is the return foregone by shareholders of not being able to invest these funds in alternative investments.

Retained earnings are part of shareholders' funds or equity, they belong to the shareholders and will appear in the equity part of a firm's balance sheet under capital and reserves. An increase in retained earnings will increase shareholder equity, and in this respect retained earnings are similar to fully paid up ordinary share capital.

We can treat the cost of retained earnings as therefore equal to the rate of return required by investors on the firm's ordinary share capital. For our practical purposes, we will regard the cost of retained earnings, k_{re}, as equal to the cost ordinary equity, k_e, thus:

$$k_{re} = k_e$$

However, in practice retaining earnings is usually a cheaper source of equity financing than making a new issue of ordinary shares. A new issue would probably have to be made at a discount to the firm's current share price to attract investors (raising the required return on the new issue). Any new issue would also incur flotation costs (e.g. advertising, brokerage and underwriting fees) of about 3–4 per cent of the total funds raised, reducing the proceeds from the sale.

THE WEIGHTED AVERAGE COST OF CAPITAL (WACC)

Having reviewed how to determine the cost of the main individual sources of capital, the next step is to combine these individual costs to establish the firm's overall cost of capital.

The firm's overall cost of capital is traditionally viewed in terms of a **weighted average cost of capital (WACC),** which we will denote as k_a. It is a simple weighted average of the cost of the individual capital components (equity, retained earnings, preference shares, and after-tax debt) as follows:

$$k_a = w_c k_d(1-T) + w_p k_p + w_e k_e$$

where,

w_d=weight (proportion) of debt in capital structure

k_d =before-tax cost of debt

T =marginal tax rate

w_p=weight (proportion) of preference shares in capital structure

k_p =cost of preference share capital

w_e=weight (proportion) of equity in capital structure

k_e =cost of equity capital

All sources will be included, irrespective of whether an individual source is currently being used to finance a new investment project or not.

In Chapter 1 it was stated that the market value of the firm can be defined in terms of the following equation:

$$MV=MV_E+MV_D$$

Where MV is the total market value of the firm, MV_E is the market value of equity and MV_D is the market value of debt.

Thus if the market value of a firm's equity, that is, the total number of shares in issue multiplied by the share price, was determined at £75 million and the market value of its debt was determined as £25 million, then its total market value would be £100 million.

The respective weightings or proportions of debt and equity in the capital structure would be:

Equity	=	£75m/£100m	=	0.75
Debt	=	£25m/£100m	=	0.25
				1.00

There are several important points which should be noted from the above:

1 The use of *market values* for debt and equity. This is highly preferable to using balance sheet or book values, as these values may bear no relation to current market values. Where market values are not available, for example in the case of a private company, then a suitable proxy measure may have to be found, or book values used as a last resort.

2 The weightings are shown in decimal (rather than percentage) format and they must sum to 1.0.

The cost of capital which is used to appraise an investment project should therefore be based on the concept of an overall or weighted average cost of capital for the firm: it should not be based on the cost of the individual source(s) of finance used to fund an investment project. To appreciate why an overall cost is used as the investment criterion, rather than an individual financing source, consider the scenario in Example 6.

Example 6 ***—The cost of capital and project financing***

Balero Construction is presented with an investment project which is expected to yield an internal rate of return (IRR) of 9 per cent. The initial investment is £1 million and the project has a 15 year lifespan.

The cheapest form of financing currently available to the company is long-term debt, on which the rate of interest is 8 per cent. The investment is attractive and would be undertaken as the IRR of the project exceeds the cost of the financing.

Suppose that shortly afterwards Balero's management is presented with another investment project which is expected to yield an internal rate of return (IRR) of 12 per cent. The initial investment is also £1 million and the project also has an expected life of 15 years. On this occasion the cheapest financing the company can get is by raising equity, on which the required rate of return is 13 per cent. This second investment would not seem attractive and would be rejected as the IRR of the project is below the cost of the financing. Is this an example of good financial decision-making? Would these investment decisions be wealth maximising for the shareholders of the company?

Essentially management's decisions led them to select an investment with an expected return of 9 per cent in preference to an investment with an expected return of 12 per cent—this type of decision-making cannot be in the best interests of the shareholders.

If Balero, like most companies, finances its operations through a mix of financing sources, part debt and part equity, then it is the overall cost of this financing mix which should be used to appraise investment decisions. Assuming Balero wished to operate with a capital structure of 50 per cent debt and 50 per cent equity, the weighted average cost of capital (WACC) for the company (ignoring taxation) would be:

Source	Weighting	Cost (%)	Weighted cost (%)
Debt	0.50	8.0	4.0
Equity	0.50	13.0	6.5
			10.5

Applying this weighted average cost of capital reverses the original decisions. The first project, with an expected IRR of 9 per cent would be rejected, and the second with an expected return of 12 per cent would be accepted. Clearly this approach is more consistent with the goal of shareholder wealth maximisation.

Basing investment decisions on the cost of individual sources of capital is not a sound investment strategy. This strategy would also imply, unrealistically, that it is always possible to relate individual sources of finance to individual projects. As companies often finance

their investments from a pool or mixture of financing, it is frequently not possible, or desirable, to relate individual investments to a particular source of finance.

As we shall soon discuss, the overall cost of capital should also be suitably adjusted to reflect a project's *systematic risk,* if this is judged to be sufficiently different from the risk of firm's existing operations.

Example 7 illustrates more fully the determination of the weighted average cost of capital.

Example 7 —Calculating the WACC

The financial manager of Sunny Sky Ventures plc now wishes to determine the company's weighted average cost of capital (WACC) and has collected the following information. The company currently has 5 million shares in issue, no new issues have been made and the current market price is quoted at £3.00. The company also has 50,000 £100 par value bonds issued in the market and which are currently trading at £98, with a current yield of 10 per cent. The cost of equity remains as previously calculated at 12 per cent and corporation tax is 30 per cent.

The first step is to calculate the respective *market values* of debt and equity capital and then the respective weightings or proportions of each in the capital structure, thus:

Source	Market value	Weight
Equity (5m×£3.00)	£15.0m	0.75
Debt (50,000×£98)	£4.9m	0.25
	£19.9m	1.00

The next step is to calculate the weighted average cost of capital (WACC) using the above weightings:

$$k_a=w_d k_d(1-T)+w_e k_e$$
$$=[0.25(10\%)\times(1-0.3)]+0.75(12\%)$$
$$=1.75\%+9\%$$
$$=10.75\%$$

Thus Sunny Sky Ventures has an overall cost of capital of 10.75%— at this moment in time. It reflects today's cost of financing the company, not the historic cost of the various sources of capital at the time they were raised by the company.

This is the rate of return the company should earn on existing operations. Any new investment projects—which are not considered to alter the firm's *existing level of risk (business or financial)*— must

also earn an after-tax return of at least 10.75% to maintain the market value of the company. For example, this would be the rate of return required from a relatively straightforward investment project such as the extension of existing production facilities.

It is important to remember in investment appraisal that we are interested in the *after-tax cash flows* which a project is expected to generate, therefore these should be discounted at the appropriate *after-tax cost of capital.*

Target capital structure

In Example 7 Sunny Sky Ventures had a capital structure of 75 per cent equity capital and 25 per cent debt capital. This may simply reflect the effects of a sequence of historic financing decisions. Alternatively it may actually represent management's considered view of what is the **target or 'optimal' capital structure**—measured on a market value basis—for the company.

In practice the managers of many companies operate, explicitly or intuitively, within the realms of what *they consider* to be a target or optimal capital structure for their company. That is, a capital structure which they consider will minimise their company's cost of capital and maximise its market value. For example, J.Sainsbury plc, a leading retail company, operates with a target maximum for financial gearing of 50 per cent, where gearing is defined as the ratio of net debt to equity shareholders' funds.

A firm's cost of capital is the figure which is used to discount its investment cash flows. Recall the relationship between cash flow values and discount rates, the lower the discount rate, the higher the cash flow values and vice versa. This implies that if managers are able to select a capital structure which minimises a firm's cost of capital then this is also the capital structure which will maximise the firm's value.

Although finance will probably be raised from different sources over time, depending on circumstances—for example when interest rates are low, more debt finance may be raised—in the long run the capital structure of many firms will tend to gravitate towards some preferred 'norm' or target level. This notion of an optimal or target capital structure will be explored more fully in the next chapter.

The WACC and risk

The point was made above that the WACC is only appropriate as an investment discount rate when the investment project under consideration has a similar risk profile as the company's existing operations. For the WACC to be appropriate the project must not alter the company's existing level of business or financial risk.

On occasions this will be acceptable. For example, a food manufacturing company building additional production capacity to meet market demands for its existing products, or a food retailer opening another chain store. These investments represent extensions of existing operations: they are not departures from the current line of business. There is no real change in the company's business risk.

In addition, the WACC assumes that the financing of the investment will have no significant impact on the company's financial risk—essentially it will not change the company's capital structure. The project will be financed in the same proportions of debt and equity as the company's existing capital structure. The WACC in fact assumes that the company is operating at its optimum long-term capital structure and that any further financing will maintain the existing structure.

On other occasions, when the firm is presented with investment opportunities which differ in risk characteristics from its present range of activities, the WACC will not be suitable. For example, should a food retailing chain decide to venture into the hotel or leisure sectors, then this would clearly represent a significant departure from the firm's established and familiar line of business. The level of business risk associated with such an investment is likely to differ from the firm's normal level of business risk. Clearly any change in the company's risk will impact on the investor's required rate of return.

Example 8 illustrates that, in evaluating capital investment projects which differ in risk characteristics (i.e. possess different degrees of systematic risk) from current activities, the WACC is not the appropriate investment criteria. In such circumstances it is an investment project's *systematic risk* which is relevant, and the cost of capital for the project may be estimated using the CAPM.

Example 8 —The WACC and risk

Play Safe Toys plc, a long-established manufacturer of children's soft toys, is an all equity financed company and has a profitable trading history. The company's management has been presented with the opportunity to acquire a small computer games manufacturing company as part of a growth by diversification strategy. The computer games company currently has a beta of 1.5 and an expected return of 18 per cent.

Play Safe's financial manager has estimated that the company's cost of equity is currently 14 per cent and its beta is 1.0. The risk-free rate is 6 per cent and the market risk premium is 9 per cent.

At first glance this investment might seem attractive as its expected return of 18 per cent is significantly higher than Play Safe's WACC of 14 per cent. In this scenario the cost of equity and the WACC are identical, as the company is all equity financed. If the WACC is used as the selection criteria, or investment hurdle rate, then this investment project would be accepted. But this would be to simply focus on return and ignore its level of risk. The investment's expected return of 18 per cent cannot be considered in isolation from its level of risk, in this case represented by its beta of 1.5.

If the investment has an expected return of 18 per cent and a beta of 1.5, and given the other data on market risk and the risk-free rate, we can use the CAPM to determine if this investment is indeed attractive by calculating its *required rate of return.*

Applying the CAPM to calculate the required rate of return:

Required rate of return, $R(r) = R_f + \beta(ER_m - R_f)$
$= 6\% + 1.5(9\%)$
$= 19.5\%$

It is now evident that this investment is not as attractive as it may have first appeared. The expected return is 18 per cent, whereas the return required from an investment with this level of *systematic risk* is 19.5 per cent. If Play Safe's management were to proceed with this investment, it would increase the company's existing level of risk without an adequate compensating increase in its return.

To increase the company's risk without a matching increase in its return would not be in the best interests of the company's shareholders. Remember that the lower the return an investment offers, compared to similar investments of equal risk, the lower its value—assuming all other factors remain unchanged. If the company can find an alternative investment with a beta of 1.5 and an expected return of 19.5 per cent, then clearly this alternative investment should be considered.

In summary the key assumption of the WACC is that the investment under consideration replicates the firm's existing operations: it will not alter the firm's existing business risk or its financial risk.

Providing that any changes to a company's capital structure evolve gradually over time, or that any significant deviations from the optimal structure are quickly corrected, the WACC is likely to be sufficiently reliable as an investment discount rate.

Other methods of determining a project's cost of capital

In Example 8 the expected return and beta for the new investment were given, so determining a cost of capital or risk-adjusted discount rate (RADR) for the investment project was relatively straightforward. In practice these variables may not be so easily obtained, particularly for a completely new or novel type of investment by the firm, so arriving at an appropriate risk-adjusted discount rate (RADR) or cost of capital may prove more problematic.

In this section we will review two approaches which may be used to determine a suitable risk-adjusted cost of capital for a new and distinct type of investment by the firm. Both these approaches may also be adapted by a private company to determine an appropriate risk-adjusted discount rate for use in evaluating its investment projects. A private company does not have shares listed on a stock exchange, therefore using a WACC based on market values is not feasible.

The pure play approach

When a firm's management is faced with a completely new and different category of investment project, one commonly used approach to determining an appropriate cost of capital for the project is to scan the business environment looking for a company, preferably listed, with similar operating and risk characteristics to the investment under consideration. This is often referred to as a **pure play approach.**

Strictly speaking a 'pure play' is a listed company that operates exclusively in a business area identical to the proposed investment project. Ideally the pure play should also have the same debt/equity ratio in its financing. It is then the pure play's beta which would be used as a substitute or proxy for the new investment's beta.

For example, if a hotel operator was considering an investment to diversify its operations by opening a chain of exclusive health and fitness clubs, then management would examine the operations of other health and fitness companies that are quoted on the stock exchange. They would look at betas, market required returns, debt ratings, capital structures and so forth. The objective would be to determine a suitable match with the planned investment, or develop a profile for a 'typical' health and fitness club operator.

Again, as we discovered in financial analysis in Chapter 9, finding exact matches, or even closely comparable companies, may prove difficult. In such situations, a less sophisticated approach to the determination of an appropriate risk-adjusted discount rate may have to adopted.

A subjective approach

An alternative, but less satisfactory, approach to the pure play method is for a firm's managers to determine the risk-adjusted discount rate (RADR) of a new project subjectively. This would be achieved by managers subjectively adjusting the WACC to reflect the systematic risk of the project. For example, management may operate a system of project risk classification such as that indicated in Table 12.1, (see also Chapter 11).

Table 12.1 Project risk classification

Project risk Class/category	RADR (%)
1 *Lowest risk,* e.g. routine replacement projects	10
2 *Average risk,* e.g. projects maintaining current operations	14
3 *Above average risk,* e.g. projects expanding current operations	18
4 *High risk,* e.g. projects involving diversification	22

This approach may be used where the necessary information on investment betas and so forth is simply not available, or the benefits of obtaining it are not justified by the costs.

> **KEY LEARNING POINTS**
>
> 1 **The *cost* of capital used to evaluate an investment project should be determined with reference to the overall cost of capital for the company and the systematic risk of the investment, not the individual source(s) of finance used to fund the project.**
> 2 **In evaluating capital investment projects which differ in risk characteristics, that is, they possess different degrees of systematic risk, from current activities then the WACC is not the appropriate investment criteria. In such circumstances it is an investment project's systematic risk which is relevant, and the cost of capital for the project may be estimated using the CAPM.**
> 3 **The cost of capital for a project which differs in risk from current operations may also be determined by a subjective adjustment to the WACC which reflects the systematic risk of the project.**

RECAP

The cost of capital: The cost of capital can be defined as *the minimum rate of return a firm is required to earn on its investments to at least maintain its market value,* in other words it is *the investor's required rate of return.*

The cost of debt capital: The cost of long-term debt capital is the ***after-tax cost*** of raising debt capital in the markets today, not the historic cost of the debt capital in a firm's balance sheet. Debt capital is the only source which specifically has to be adjusted for tax effects as follows:

After-tax cost of debt$=k_d(1-T)$

Where k_d represents the before-tax cost of debt and T is the marginal tax rate.

The cost of redeemable debt: The ***yield to maturity (YTM)*** is used as a proxy to determine the before-tax cost of redeemable debt capital.

The cost of irredeemable debt: Irredeemable or perpetual debt, such as an irredeemable bond, is treated as a perpetuity paying a constant regular cash flow in the form of periodic interest payments. The cost of an irredeemable bond is given by:

$$k_d = \frac{I}{BV_0} \times (1-T)$$

The cost of preference share capital: Preference shares may be *redeemable* or

irredeemable, but most commonly they are irredeemable. The cost of irredeemable preference share capital, k_p, is very similar to that for consols or perpetual bonds, it is calculated as a perpetuity, thus:

$$k_p = \frac{D_p}{P_0}$$

The cost of equity capital: The cost of equity can be defined as, *the rate of return required on the firm's shares by investors in the financial markets.* This can be estimated using the *constant dividend (or Gordon) growth model* and the *capital asset pricing model (CAPM).*

Using the constant dividend growth model the cost of equity, k_e, is given by:

$$k_e = \frac{D_1}{SV_0} + g$$

Applying the CAPM, k_e, is given by:

$$k_e = R_f + \beta(ER_m - R_f)$$

The weighted average cost of capital—WACC: The cost of capital can be viewed in terms of a weighted average cost of capital (WACC), which is a simple weighted average of the cost of the individual capital components (equity, including retained earnings, preference shares and after-tax debt). It is given by the formula:

Where possible, target weightings based on market values for debt and equity should be adopted.

The WACC and risk: In evaluating capital investment projects which differ in risk characteristics (i.e. possess different degrees of systematic risk) from current activities, then the WACC is not the appropriate investment criteria. In such circumstances it is an investment project's systematic risk which is relevant, and the cost of capital for the project may be estimated using the CAPM.

Risk-adjusted cost of capital: Two possible methods of determining a suitable risk-adjusted cost of capital for use in evaluating a novel investment project by the firm are **a pure play approach, and a subjective approach.**

REVIEW QUESTIONS

Concept review questions

1 How would you define the term 'cost of capital'? Briefly explain its role in financial decision-making.
2 What are the main factors which will influence a company's cost of capital?
3 Why is the cost of debt capital calculated on an after-tax basis?
4 Discuss the relative advantages and disadvantages of using the constant dividend growth model and the capital asset pricing model (CAPM) to determine the cost of

equity.

5 (a) Describe the weighted average cost of capital (WACC) and how it is calculated,
(b) What are the limitations of using the WACC as a discount rate in investment appraisal?

Practice questions

6 **Cost of Redeemable Debt.** Carolynco Textile Systems has in issue 200,000 £100 par value bonds with a coupon rate of 14 per cent paid annually. The bonds have 20 years to maturity. Find the cost of the bond assuming a current market value of £96 and a taxation rate of 30 per cent.

7 **Cost of Preference Share Capital.** Jain Medical Systems has in issue 2 million £5.00 par value irredeemable 7 per cent preference shares. Find the cost of the preference shares assuming they are currently trading in the market at £5.60.

8 **Cost of Equity Share Capital.** The dividend per share (DPS) paid by the directors of Carolynco Textile Systems over the period 1994 to 1999 is presented below.

Year	Dividend per Share (DPS)
1999	£0.44
1998	£0.41
1997	£0.38
1996	£0.35
1995	£0.32
1994	£0.30

The directors expect future dividends to continue to grow at the same constant rate per year. Assuming the current market price of the share is £6.30, calculate the firm's cost of equity. Ignore taxation.

Test questions

9 **Cost of Equity Share Capital—CAPM.** Carolynco Textile Systems has an equity beta, β, of 1.21. The risk free rate, R_f, is currently 7 per cent and the market return, ER_m, is 14 per cent. Use this information to determine the company's cost of equity.

10 **WACC.** Carolynco Textile Systems has recently issued £20 million of 20-year bonds at £100 par value which are currently trading at £96 with a current yield of 14.67 per cent. The company currently has 4.5 million shares in issue, no new issues have been made and the current market price is quoted at £6.30. The cost of equity has been calculated at 15.5 per cent and corporation tax is 30 per cent. Determine the current weighted average cost of capital (WACC) for the company.

11 **Cost of Individual Sources of Capital and WACC.** Details of the capital structure of Celtic Enterprises, a specialist printing company, are as follows:

	£m
Ordinary share capital (£1 ordinary shares fully paid)	5
6% Preference shares (£1 nominal value)	2
Retained earnings	14
7% Debentures (irredeemable) £100 par	1
8% Debentures (redeemable) £100 par	2

Ordinary shares are currently trading at £2.80 and a dividend of 34 pence per share is due for payment. Dividend per share has been growing at 3 per cent per annum and the directors expect this rate of growth to continue. Preference shares have a current market value of £0.89.

The irredeemable debentures are trading at £92. The redeemable debentures are due for redemption in 4 years time and currently have a market value of £88. The rate of corporation tax is 33 per cent.

You are required to:

(a) Calculate the cost of each individual source of capital in the company's capital structure.

(b) Calculate the weighted average cost of capital (WACC).

12 **Cost of Capital—Various.** The following is an extract from the balance sheet of Leisure International plc at 30 June:

	£
Ordinary shares at 50p each	5,200
Reserves	4,850
9% preference shares at £1 each	4,500
14% debentures	5,000
Total long-term funds	19,550

The ordinary shares are quoted at 80p. Assume that the market estimate of the next ordinary dividend is 4p, growing thereafter at 12% per annum indefinitely. The preference shares, which are irredeemable, are quoted at 72p and the debentures are quoted at par. Corporation tax is 35%.

(a) You are required to use the relevant data above to estimate the company's weighted average cost of capital (WACC), i.e. the return required by the providers of the three types of capital, using the respective market values as weighting factors.

(b) You are required to explain how the Capital Asset Pricing Model would be used as an alternative method of estimating the cost of equity, indicating what information would be required and how it would be obtained.

(c) Assume that the debentures have recently been issued specifically to fund the company's expansion programme under which a number of projects are being considered. It has been suggested at a project appraisal meeting that because these projects are to be financed by the debentures, the cut-off rate for project acceptance should be the after-tax interest rate on the debentures rather than the WACC.

You are required to comment on this suggestion.

(d) Assume that instead of raising £5 million of 14% debentures, the company had raised the equivalent amount in preference shares giving the same yield as the existing preference capital.
You are required:

(i) to demonstrate that the returns offered to investors in the two securities are consistent with investor risk aversion; and
(ii) to calculate how Leisure International plc's equity earnings would have been affected if the preference shares had been issued instead of the loan capital.

Assume income tax of 25% where relevant.

CASE STUDY 4 —INVESTMENT APPRAISAL

Ocean Blue Hotel

With the assistance of a firm of management consultants the directors of Ocean Blue Hotel, a profitable company in the hotel and leisure industry, are currently considering an expansion project to build a new country club and conference centre next to the existing hotel. The new complex will provide a wide range of leisure and business facilities for members, guests and the business community.

The initial investment in land, buildings and equipment is estimated at £880,000, although grant aid of 10% of this capital cost will be received in the project's first year of operation. Annual operating costs (salaries, wages, overheads, etc.) associated with the project are estimated at £265,000 (which include depreciation of £58,000 and an allocation of the hotel's existing fixed overheads of £22,000). The cost of the consultants' report on the project was £12,000.

In the business plan the consultants' estimate of club membership is as follows:

No. of members		Probability of occurrence
Year 1	*Year 2 onwards*	
300	600	0.15
400	700	0.20
500	800	0.30
600	900	0.20
700	1,000	0.15

The consultants also estimate membership fees as follows:

Membership fee		Probability of occurrence
Year 1	*Year 2 onwards*	
£200	£300	0.15
£250	£350	0.20

£300	£400	0.30
£350	£450	0.20
£400	£500	0.15

Additional revenues from other related activities (bar and restaurant sales, conferences and functions, etc.) are estimated at £45,000 per year. The business plan also assumes a ten-year economic life for the project.

Ocean Blue's current cost of capital is 10% and the directors wish to add a risk premium of 2% for this project. The directors require a maximum acceptable payback period of six years for this project.

As a member of the management consultancy team you are required to:

1 calculate the payback period (PPB) for the project;
2 calculate the expected net present value (ENPV) for the project;
3 calculate the internal rate of return (IRR) for the project;
4 identify, and briefly explain, two techniques you would consider appropriate for the assessment of risk in this particular project;
5 what other factors (financial and non-financial) should the directors consider in evaluating this project?;
6 based on your evaluation, advise the directors on the acceptability of the project.

Ignore taxation and residual values.

FURTHER READING

Students wishing to explore the cost of capital concept further could consult:
- *Principles of Corporate Finance* . Brealey, R.A. and Myers, S.C., 5th edition, McGraw-Hill, 1996, Chapter 9.
- *Investment Appraisal and Financial Decisions* . Lumby, S., 5th edition, Chapman & Hall, 1994, Chapters 16 and 17.
- 'Capital Budgeting: A Beta Way to Do It.' Dimson, E. *Mastering Finance* , Issue 1, Financial Times, 1997.

REFERENCES

Hawanini, G. and Vora, A. 'Yield Approximations: An Historical Perspective.' *Journal of Finance* , March 1982.

part five
STRATEGIC FINANCIAL DECISION-MAKING

The Financing Decision

PART 5 CONTAINS THE FOLLOWING:

In this part we continue our exploration of the financial decision-making stage of the financial management process by examining the firm's strategic financing decisions.

Part 4 demonstrated that there is a clear and direct connection between a firm's strategic investment decisions and its value. As we will see, whether a firm's strategic financing (capital structure and dividend) decisions have any impact on its value is a highly controversial area in financial management.

For example, some theorists argue that there is no connection between capital structure decisions and value, or between dividend decisions and value. They contend that these decisions are irrelevant when it comes to determining the value of the firm. These are the issues which this part examines.

Chapter 13 examines the nature of the firm's long-term capital structure decisions and how they impact on its value.

Chapter 14 reviews the firm's dividend policy, which is an essential part of its strategic financing arrangements, and also examines its connection with a firm's value.

Part 5 concludes with a case study on strategic planning.
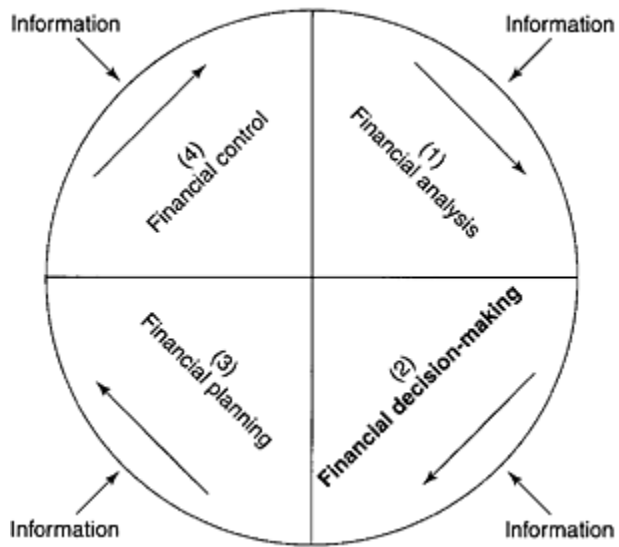
Part 5 diagram The financial management process: **financial decision-making—the financing decision**

CAPITAL STRUCTURE AND GEARING

This chapter examines the determination of a firm's capital structure and its relationship to a firm's value. The following aspects are covered:

the nature of the capital structure decision;
capital structure and the value of the firm;
gearing.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the meaning of capital structure;
2 explain the various models of capital structure;
3 use the M&M model to determine a firm's cost of capital and its market value;
4 understand the practical considerations influencing capital structure;
5 determine a firm's financial, operating and total gearing.

OVERVIEW

Financing policy at Cadbury Schweppes
    Net borrowings of the Group at year end of £649 million represent 10% of total market capitalisation. We do not believe that such low levels of debt are efficient nor in the best interests of Shareholders, as they increase the Group's weighted average cost of capital. We are continually assessing further investment opportunities to generate returns for shareholders and, in addition, evaluating other means of achieving a more efficient capital structure, including returning cash to Shareholders. [1]

Financing policy at Tesco
    The group's policy is to finance operating subsidiaries by a mix of retained profits, bank borrowings, commercial paper, long-term debt market issues and leases. Close attention is paid to planning our

> gearing levels when we review our funding and set our investment budgets. [2]

This chapter deals with a very controversial area of corporate financial management, and one which is the subject of continuing debate.

In essence, the ongoing capital structure debate revolves around two key questions: (1) does a firm's capital structure have any effect on its market value? and (2) does there exist an optimal capital structure which will minimise a firm's cost of capital and maximise its market value? In other words, the capital structure debate involves trying to discover if corporate capital structure really matters. This chapter is essentially concerned with exploring this issue.

Whether there is a direct relationship between a firm's capital structure and its value in real world (rather than in perfect) capital markets is questionable. Indeed the debate about structure and value is often referred to as the **capital structure puzzle,** a puzzle which to date remains unsolved.

We will begin our exploration of capital structure with a review of its fundamentals and then progress to review the various models of capital structure.

CAPITAL STRUCTURE FUNDAMENTALS

Capital structure refers to the combination of debt and equity capital which a firm uses to finance its *long-term* operations. Capital in this context refers to the permanent or long-term financing arrangements of the firm. *Debt capital* therefore is the firm's long-term borrowings and *equity capital* is the long-term funds provided by the shareholders, the firm's owners. Capital structure is illustrated in Figure 13.1.

Figure 13.1 Capital structure
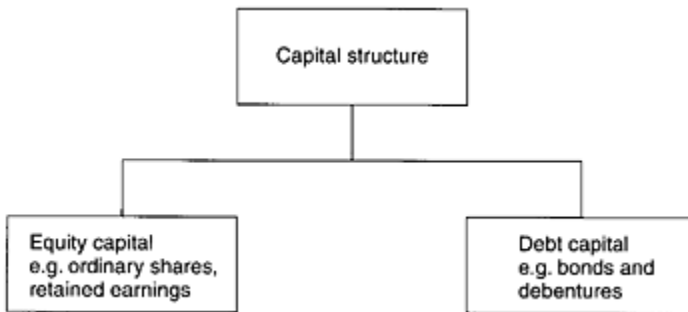
While included with shareholders' capital in a balance sheet, preference shares are classified by FRS 4 as *non-equity shares.* They are a hybrid financial instrument possessing some of the characteristics of both debt and equity. Because preference shareholders receive a fixed rate of return they are included with debt in calculating

capital gearing ratios.

A firm's **gearing** (or leverage) is the ratio of debt to equity finance in its capital structure. In financial analysis (Chapter 9) the financial ratios commonly used to evaluate a firm's capital structure and its level of indebtedness were presented. We stated that the preferred method of gearing measurement is to use market values for debt and equity if available, thus in our present context:

$$\text{Gearing} = MV_D / (MV_D + MV_E)$$

We also used the gearing ratio to assess a firm's level of **financial risk,** that is the risk of the firm not being able to pay its financial commitments. The level of financial risk is a variable that can be controlled by management, whereas the firm's **business risk** cannot be controlled by management and has to be accepted as given. The level of business risk is determined by the firm's operating environment, the structure of its industry and so forth. These are variables which are outside management's control.

We discovered in Chapter 12, for example, that a firm's capital structure today may have simply evolved from a series of past financing decisions, or it may actually represent a deliberate attempt by management to maintain what it considers to be an optimal or target capital structure for the firm.

Recall that a firm's cost of capital is the rate which is used to discount its investment cash flows, and that the relationship between cash flow values and discount rates is an inverse one: the lower the discount rate, the higher the cash flow values and vice versa.

This implies that if managers are able to determine a capital structure which minimises a firm's cost of capital then this is also the capital structure which will maximise the firm's value. We defined an optimal capital structure as one that minimises a firm's cost of capital and maximises its market value.

Firm A
High geared structure

Firm B
Low geared structure
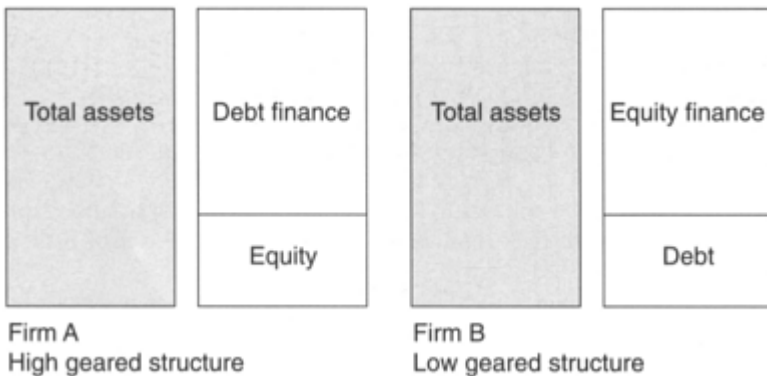
Figure 13.2 Comparative capital structures

Figure 13.2 illustrates two firms with differing capital structures. Firm A's assets are financed by a high proportion of borrowings, that is debt finance, whereas by comparison Firm B is low geared, its assets are financed largely by equity.

THE THEORY OF CAPITAL STRUCTURE

Broadly three main strands of capital structure theory have evolved since work first began on analysing modern capital structure in the early 1950s. Unfortunately these strands tend to offer conflicting views, a factor which has only added to the complexity of the capital structure puzzle. The three main theoretical approaches to capital structure which have evolved are respectively referred to as:

1 **the traditional model;**
2 **the Modigliani and Miller (M&M) model; and**
3 **the modern trade-off model.**

These models have been derived from the work of David Durand in the early 1950s, and by Franco Modigliani and Merton Miller in the late 1950s and 1960s (1958, 1963). We will begin by reviewing the traditional model of capital structure.

The traditional model

The essence of the traditional capital structure model is that the value of a company and its capital structure are related, and that an optimal capital structure exists at the point where the weighted average cost of capital (WACC) is minimised. This is illustrated in Figure 13.3 where the cost of equity is denoted k_e, and the cost of debt k_d.
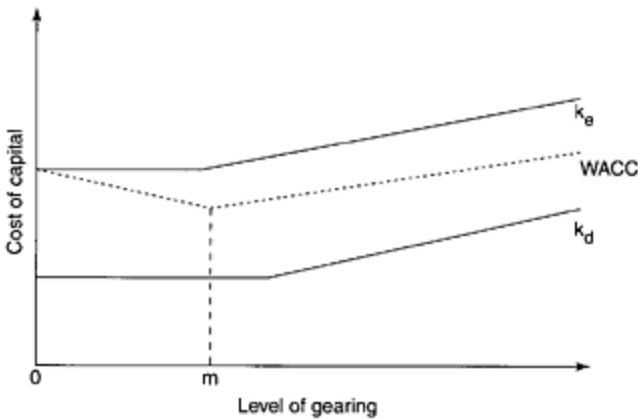
Figure 13.3 Traditional model of capital structure

Figure 13.3 illustrates that according to the traditional model an optimum level of gearing (that is, one which minimises the weighted average cost of capital (WACC) and maximises the value of the firm) can be achieved. This is shown as point m on the graph, the overall cost of capital for the firm is at its lowest and the value of the firm is at its highest.

The shape of the graph can be explained as follows. Starting from a zero gearing level, as debt is progressively introduced into the capital structure, the cost of debt, k_d, at first remains unchanged, then beyond a certain point it begins to increase. As more debt is added, the firm's financial risk increases and lenders will eventually begin to demand higher returns to compensate for the increased risk.

The cost of equity, k_e, can also be seen to increase as the level of financial gearing increases. This is because, in the traditionalists' view, as the level of gearing increases, the level of financial risk to which the equity holders are exposed also increases. Consequently they will require higher returns.

The effect on the WACC is that it falls initially when debt is first introduced. This reflects the benefits of taking on lower cost debt (as discussed in Chapter 12). Eventually the WACC curve reaches a minimum point and then begins to increase when the cost of equity and the cost of debt begin to rise.

The basic underlying **assumptions** of the traditional model are:

- all earnings are distributed as dividends;
- earnings are expected to remain constant indefinitely;
- all investors have identical expectations about future earnings;
- taxation is temporarily ignored;
- business risk remains constant;
- capital structure can be altered immediately by exchanging debt for equity or equity for debt and transactions are cost free.

The Modigliani and Miller (M&M) model

Franco Modigliani and Merton Miller (generally referred to as M&M) both Nobel Prize winners in financial economics, have had a profound influence on capital structure theory ever since their seminal paper on capital structure was published in 1958.

We will in fact be examining two M&M capital structure models. Their original 1958 model which was developed assuming a tax-free environment and their second 1963 model which modified their original model to include taxes.

M&M's model without taxes

M&M originally argued, very controversially, against the traditional model of capital structure and proposed that the value of a firm is independent of its cost of capital and its capital structure. In other words, according to M&M, a firm's capital structure is irrelevant in relation to its value. This they advanced in their famous, but contentious, 'Proposition I'.

M&M PROPOSITION I

The market value of any firm is independent of its capital structure and is given by capitalising its expected return at the rate appropriate to its risk class.
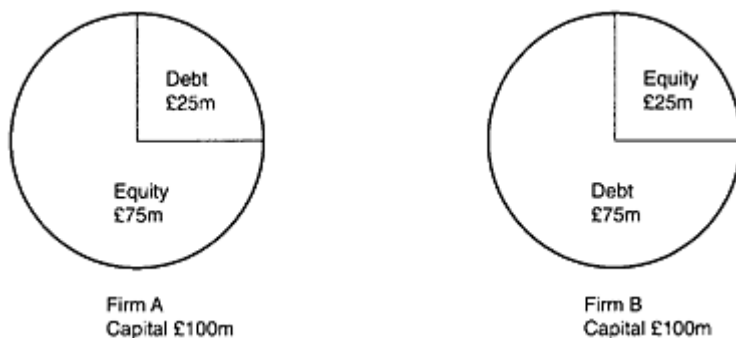
Figure 13.4 Capital structure and the value of the firm

An analogy often used to explain Proposition I is that of the 'pie' model. For instance imagine two firms, A and B in Figure 13.4, as two equally sized pies, both having the same total asset value of £100m. In addition these firms have identical operating characteristics and asset structures, the only difference between them is the manner in which they finance their assets. Firm A is 75 per cent equity, 25 per cent debt financed and Firm B is 75 per cent debt, 25 per cent equity financed.

The basic question then becomes, does the way in which these firms finance their assets affect their overall value? Or using our pie analogy, does the way the pies are sliced affect their overall size? According to M&M's Proposition I, the answer is no.

In Proposition I, M&M assert that the market value of a firm, in the absence of taxes, can be stated as:

$$V_g \ = \ V_u \ = \ \frac{EBIT}{k_a} = \frac{EBIT}{k_{eu}}$$

where,

V_g =market value of a geared company
V_u =market value of an ungeared (all equity) company
EBIT =earnings before interest and tax (net operating income)
k_a =weighted average cost of capital (WACC)
k_{eu} =cost of equity for an ungeared company

In this case we are valuing a company by taking its stream of expected future earnings before interest and tax (EBIT), also referred to as its net operating income (NOI), and using the average cost of capital, k_a, as the discount rate to 'capitalise' the expected future earnings stream. Proposition I therefore defines the value of the firm solely in terms of its EBIT and the risk (variability) of the EBIT.

The above equation implies that the cost of capital for any firm, geared or ungeared, is

equal to the cost of capital for an ungeared firm, k_{eu}, providing both are in the same risk class. If the above equation is true then k_a must equal k_{eu}, and will be related to the riskiness of the EBIT stream. Thus in the M&M model without taxes, the value of a geared firm, V_g, and an ungeared firm, V_u, are the same, that is, $V_g = V_u$.

Example 1 *—M&M proposition I (without taxes)*

McNeill Distillers is currently an all equity financed company with a cost of capital of 15 per cent and earnings before interest and taxes (EBIT) of £1m. Using M&M's Proposition I (without taxes) the market value of the company would be calculated as:

$$V = \frac{EBIT}{k_a} = \frac{EBIT}{k_{eu}}$$

$$= \frac{£1m}{0.15}$$

$$= £6.67m$$

EXERCISE 1 —M&M'S PROPOSITION I (WITHOUT TAXES)

Brewton Distillers has no debt in its capital structure. It has a cost of capital of 18 per cent and earnings before interest and taxes (EBIT) of £3m. Using M&M's Proposition I (without taxes) calculate the market value of the company.

Assumptions of the M&M model

In arguing their case on capital structure and the cost of capital M&M made a range of simplifying assumptions, similar in some respects to those of the traditional model. For example M&M assumed:

- **Perfect capital markets,** that is, there are *no taxes (corporate or personal), no transaction costs* on securities, *investors are rational, information is symmetrical—* all investors have access to the same information and share the same expectations about the firm's future as its managers, and both *individuals and firms can borrow or lend at the risk-free rate.*
- As there are no taxes, it is assumed that all earnings after interest are distributed as dividends.
- The firm's investment decision is given and generates **no income growth.** All future income streams are therefore in the form of **perpetuities.**
- Firms can only issue two classes of security, **risky equity** and **risk-free debt.**

In addition M&M made the assumption, 'which plays a strategic role in…the analysis',

that the shares of firms can be divided into certain **risk classes,** and firms within a given risk class share the same expected return and the same probability distribution of expected returns. Thus the only difference between firms included in a specified risk class is their scale of operation.

As M&M stated, the significance of this assumption is that it 'permits us to classify firms into groups within which the shares of different firms are "homogeneous", that is, perfect substitutes for each one another'. M&M suggested that these groups may be analogous to industry groupings.

Some of these assumptions are plainly unrealistic, for example the absence of taxes—a specific factor which required M&M to subsequently modify their original propositions—as we will discover later.

Arbitrage

M&M relied on the concept of **arbitrage** to prove their Proposition I. Recall from our study of asset pricing that arbitrage is the process of making a risk-free profit from trading in mispriced assets. An arbitrage opportunity occurs when an identical asset sells for two different prices usually, but not necessarily, in two different markets.

Arbitrageurs (i.e. market traders who make their money from identifying and exploiting market pricing anomalies) will buy the asset where it is underpriced and sell it where it is priced higher. As a result of arbitrage activity the price of the asset will quickly equalise.

In the context of M&M's Proposition I an arbitrage opportunity occurs when the market value of a geared firm differs from the market value of an otherwise identical but all-equity financed firm.

As M&M assumed perfect capital markets where individuals and corporations can borrow at the same rate, investors will consider personal and corporate gearing as perfect substitutes. This means for example that rational investors can use personal borrowings (referred to as creating **'homemade leverage')** to equal corporate leverage and basically construct any degree of corporate leverage they consider appropriate in their own investment portfolios.

Essentially by utilising homemade leverage rational investors are able to do for themselves what any firm can do in relation to borrowing, and *at no extra cost.* There is thus no advantage to an investor in paying more for an investment in one company compared to another simply because of differences in debt policy. As M&M concluded: 'levered companies cannot command a premium over unlevered companies because investors have the opportunity of putting the equivalent leverage into their portfolio directly by borrowing on personal account'.

The cost of capital

We will now explore M&M's Proposition I with regard to the firm's cost of capital. Recall from our analysis of the cost of capital in Chapter 12 that the weighted average cost of capital (WACC), k_a, which can also be interpreted as the required return on the firm's total assets, is given by:

$$k_a = w_d k_d (1-T) + w_e k_e$$

In the interests of simplicity, it is assumed that only debt and equity are involved in the capital structure, preference share capital, for example, is ignored.

Assuming the absence of taxes, k_a can therefore be restated as:

$$k_a = (w_d k_d) + (w_e k_e)$$

Where w_d and w_e denote the relative *market-based* weightings or proportions of debt (w_d) and equity (w_e) in the capital structure.

We can rearrange the above equation and solve for k_e, the cost of equity capital, to obtain:[3]

$$k_e = k_a + (k_a - k_d)(w_e - k_e)$$

This equation demonstrates that the cost of equity, k_e, is related to:

1 the return required on the firm's total assets, k_a;
2 the cost of debt, k_d; and
3 the ratio of debt to equity, (w_d/w_e), in the firm's capital structure.

This is the essence of M&M's second proposition, Proposition II.

> **M&M PROPOSITION II**
> The expected yield on a share of stock is equal to the appropriate capitalisation rate, k_a, for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-equity ratio times the spread between k_a and k_d.

The term $(k_a - k_d)(w_d/w_e)$ in the preceding equation represents the **financial risk premium,** that is the risk premium related to the use of debt.

Expressing M&M's Proposition II another way, a firm's cost of equity capital is a *linear function* of its capital structure. This is illustrated in Figure 13.5, where the cost of equity capital, k_e, is plotted on the vertical y-axis against the debt-equity ratio, (w_d/w_e) on the horizontal x-axis. The slope of the line k_e is given by $(k_a - k_d)$ and the intercept on the y-axis indicates an ungeared firm, that is one with a debt-equity ratio of zero and where $k_e = k_a$.

Figure 13.5 demonstrates that as the debt-equity ratio (i.e. the gearing) increases this simultaneously increases the risk of the equity capital and consequently the required return on, or cost of, equity, k_e. Notice that gearing is calculated as a straight debt to equity ratio rather the conventional debt/(debt+equity) ratio.

An important point to notice from Figure 13.5 is that the WACC or k_a remains unchanged. There is essentially a trade-off between debt and equity: the advantages of using cheaper debt (shown by the lower horizontal line k_d) are neutralised by the increasing costs of equity. This implies that using debt increases the cost of equity. We can illustrate the effects of Proposition II with an example.
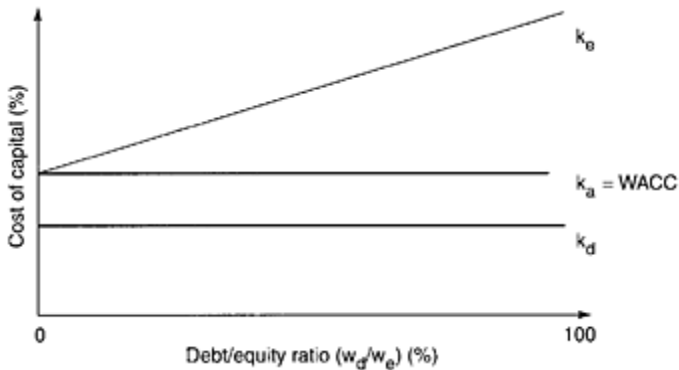
Figure 13.5 Effects of gearing: M&M model without taxes

Example 2 —*M&M proposition II (without taxes)*

McNeill Distillers is currently an all equity financed company with a cost of capital of 15 per cent. The financial manager considers that a more appropriate capital structure for the company should be 40 per cent debt, 60 per cent equity. Assuming the company can borrow at 9 per cent, then using M&M's Proposition II (without taxes) the cost of equity would be calculated as:

$$k_e = k_a + (k_a - k_d) \times (w_d/w_e)$$
$$k_e = 15\% + (15\% - 9\%) \times (0.4/0.6)$$
$$= 15\% + (6\%)(0.67)$$
$$= 19\%$$

When the company substitutes debt for 40 per cent of the existing equity in its capital structure the cost of equity rises in direct proportion to the increase in the debt-equity ratio. In this case the risk premium for using debt is 4 per cent $[(6\%)(0.67)]$.

Note that when the company is all equity financed $k_e = k_a = 15\%$. The WACC, k_a, when debt is introduced, and ignoring taxes, is calculated as:

$$k_a = w_d \times k_d + w_e \times k_e$$
$$(0.6)(0.19)$$
$$= 3.6\% + 11.4\%$$
$$= 15\%$$

Thus the WACC remains the same as before: it is unaffected by the

change in capital structure. The WACC in the geared structure is the same as the WACC in the ungeared structure.

If the market-based capital structure is changed to 40 per cent debt, 60 per cent equity, this, as we have just determined, has no effect on the average cost of capital, it remains at 15 per cent. Therefore the value of the company remains as before in Example 1:

$$V = \frac{EBIT}{k_a} = \frac{EBIT}{k_{eu}}$$

$$= \frac{£1m}{0.15}$$

$$= £6.67m$$

Thus according to M&M (in a world without taxes) the market value of a geared company, V_g, is equal to the market value of an ungeared company, V_u.

EXERCISE 2 —M&M'S PROPOSITION II (WITHOUT TAXES)

Brewton Distillers has no debt in its capital structure. It has a cost of capital of 18 per cent and earnings before interest and taxes (EBIT) of £3m.

Assuming the financial manager considers that a more appropriate capital structure for the company would be 30 per cent debt, 70 per cent equity, and that the company can borrow at 10 per cent, use M&M's Proposition II (without taxes) to calculate: (1) the cost of equity, (2) the average cost of capital, and (3) the market value of the company.

Business and financial risk

We discussed the nature of business and financial risk in the previous chapter in relation to a firm's cost of capital. Remember that **business risk** arises from the nature of the firm's business environment and the particular characteristics of the industry in which it operates and it is a variable which lies largely outside management's control. It is possible to measure a firm's business risk by the degree of variability of its earnings before interest and taxes (EBIT).

F**inancial risk** in contrast represents the risk that arises from a firm's level of gearing and is a variable which can be directly controlled by management. The more debt a firm introduces into its capital structure, the greater the level of financial risk (that is, the risk of the firm not being able to meet its financial obligations and of possibly experiencing financial distress) and the greater the return the equity shareholders require to compensate

for the additional financial risk.

This is what we have seen with M&M's Proposition II, where:

$$k_e = k_a + (k_a - k_d)(w_d / w_e)$$

The cost of equity, k_e, can be split into two segments, a business risk segment and a financial risk segment. The first segment, represented by k_a, is the overall return required on the firm's assets and is connected to the firm's level of business risk. The second segment, represented by $(k_a - k_d)(w_d / w_e)$, is the risk related to the firm's debt policy, that is it represents the firm's financial risk premium.

These two segments combined, as we have seen in our study of risk and return, represent the total **systematic risk** of a firm's equity and the greater a firm's systematic risk the greater will be the return required on its equity.

M&M's model with taxes

We will now turn to examine the M&M model in what you may consider to be a more realistic business environment, namely one where taxes exist.

In response to criticism of their original (1958) no-tax case propositions, Modigliani and Miller (1963) subsequently modified their no-tax case to include corporate taxes.

In reality there are significant tax advantages available to a company if its uses debt in its capital structure. Primarily the interest paid on debt is a tax allowable expense. We recognised this in calculating the cost of debt capital in the previous chapter, where it was stated that k_d represents the before-tax cost of debt and that the after-tax cost of debt is given by $k_d(1-T)$.

Before examining the M&M tax model, we will first of all review the effect of corporate tax on a company's earnings and cash flows.

Example 3 —The effect of corporate taxes

Consider two companies which are similar in operating characteristics and asset structures but differ in their capital structures. One company, G, relies entirely on debt in its capital structure, it is geared, and the other, company U, is all equity financed, it is ungeared. Both companies have the same annual earnings (EBIT) stream of £1m, which is assumed will continue in perpetuity.

If company G has financed its operations by issuing bonds to the value of £1m on which the interest is 10 per cent and the corporate tax rate is 30 per cent, then the respective earnings streams of the two companies would be as follows:

Company	G £m	U £m
EBIT	1.00	1.00
Interest	0.10	0

Taxable earnings	0.90	1.00
Taxation at 30%	0.27	0.30
Net Income	*0.63*	*0.70*

It is apparent that the way in which the two companies are financed is having an impact on their respective net incomes, that is, their earnings after interest and taxes (EAIT). The net income of G is lower than that of U. However, as company G is entirely debt financed, the total cash flows accruing to its owners (£0.73) are equal to the interest payments they receive (£0.10m) plus the net income of (£0.63m)— even though the net income may be retained within the company and not distributed.

Notice too that the interest paid by company G on its debt reduces its tax liability compared to U. This saving in tax of £0.03m by G as a result of using debt is generally referred to as the **interest tax shield.**

If we ignore depreciation and assume zero investment in assets (fixed and current), then the value of the cash flows to each company will be equal to their respective EBIT. However, the value of the net cash flows to each company will be different due to the interest tax shield effect as shown below:

Company	*G £m*	*U £m*
EBIT	1.00	1.00
Taxation at 30%	0.27	0.30
Net cash flow	*0.73*	*0.70*

Company G has the more valuable annual cash flows (+£0.03m) as a result of paying out less corporation tax than U. Remember than corporation tax is a cash flow out of a company. It has to be paid over to the relevant tax authority and thus reduces the cash flows a company can retain.

Considering that the cash flows are perpetuities, the present value to G of the annual tax saving can be calculated as a perpetuity, where the relevant discount rate is the interest rate on the debt:

$$PV = £0.03m/0.10 = £0.3m$$

The interest rate on the debt is used as the appropriate discount rate because it is the interest paid on the debt which produces the tax shield in the first instance and both the debt and tax shield are of equal risk.

The present value of the interest tax shield can also be derived by multiplying the value of the debt, D, by the corporate tax rate, T:

PV=DT
=£1mx0.3 =£0.3m

This is where M&M's modified Proposition I (i.e. including taxes) now enters. According to M&M, when taxes are introduced, the value of an ungeared company becomes:

$$V_u = \frac{EBIT(1-T)}{k_{eu}}$$

It is only the after-tax earnings which a company can retain and therefore it is these which the markets use to value the company. Clearly an ungeared company does not have the benefits of the interest tax shield.

The value of a geared company, V_g, in a tax environment is equal to the value of an ungeared company, V_u, plus the *present value* of the interest tax shield, pvDT:

$V_g=V_u+pvDT$

where

V_g = market value of a geared company
V_u = market value of an ungeared company
D   = market value of debt
T   = corporate tax rate

Substituting our two companies, G and U, yields:

$V_G=V_u+£0.3m$

Thus the value added to company G (£0.3m) by using debt is the market value of debt times the corporation tax rate.

Example 4 —M&M proposition I (with taxes)
Referring back to McNeill Distillers in Example 1, if corporate taxes are now introduced at the rate of 30 per cent then applying M&M's Proposition I (modified to include taxes), the value of McNeill Distillers, all equity financed, would be calculated as:

$$V = \frac{EBIT(1-T)}{k_{eu}}$$

$$= \frac{£1m(1-0.3)}{0.15}$$

$$= £4.67m$$

The company's market value is now lower due to the deduction of taxes from earnings.

If McNeill's financial manager is able to swap £2m of equity for the same market value of debt (perhaps by buying back some of the company's shares and issuing bonds instead) the company's revised value would be determined as:

$$V_g = V_u + pvDT$$
$$= £4.67m + (0.3)(£2m)$$
$$= £4.67m + £0.60m$$
$$= £5.27m$$

It can be observed that the company has increased its market value by incorporating debt in its capital structure. It could increase its value further by substituting more debt for equity. For example, if it were possible to swap £3m equity for debt, the company's value, assuming all other factors remain constant, would increase to:

$$V_g = £4.67m + (0.3)(£3m)$$
$$= £5.57m$$

In M&M's theory, the enticing conclusion is that the optimal capital structure would be 100 per cent debt!

EXERCISE 3 —MARKET VALUES

Using the previous data in Exercises 1 and 2 for Brewton Distillers and assuming a corporate tax rate of 30 per cent, calculate: (1) the market value of the all-equity company, and (2) the market value of the geared company assuming £5m of equity can be replaced by an equal market value of debt.

The effects of gearing on company value in the M&M model (with taxes) is illustrated in Figure 13.6. Figure 13.6 shows that the difference in value between a geared, V_g, and an ungeared firm, V_u, is the present value of the interest tax shield. The slope of the V_g line,

which is shown as a straight line, is the tax rate, T.
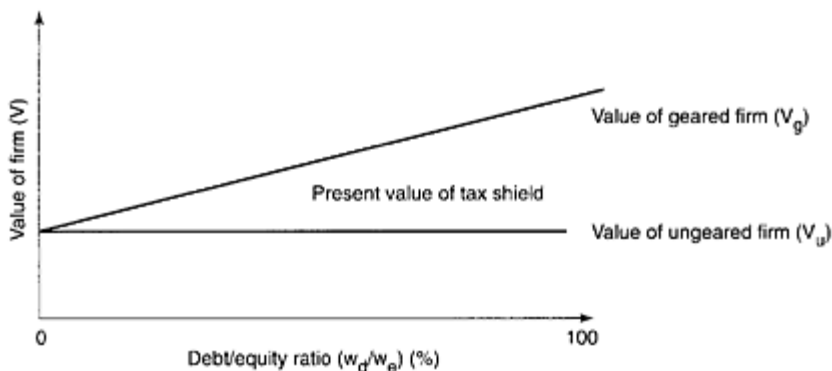
Figure 13.6 Effects of gearing on value: M&M model with taxes

As the debt-equity ratio, plotted on the horizontal axis, increases, there is a directly proportionate increase in the value of the geared firm.

The cost of equity

   Having explored the question of a company's value we can now turn our attention to the cost of equity. M&M also argued that the cost of equity for a geared company in a tax environment is given by:

$$k_{eg}=k_{eu}+(k_{eu}-k_d)(1-T)(w_d/w_e)$$

where,

k_{eg} = cost of equity for a geared company

k_{eu} = cost of equity for an ungeared company

As before, in the M&M tax-free model, the second segment of the above equation, $(k_{eu}-k_d)(1-T)(w_d/w_e)$, represents the **financial risk premium** related to the firm's debt policy, only this time it is modified by including $(1-T)$ to reflect the impact of corporate taxes.

Example 5 —M&M proposition II (with taxes)
   The market value of McNeill Distillers has been determined as £5.27m, of which £2m is the market value of the company's debt. Applying M&M's Proposition II (with taxes) and assuming an interest rate on the debt of 9 per cent, the cost of equity would be calculated as:

$$k_{eg}=k_{eu}+(k_{eu}-k_d)(1-T)(w_d/w_e)$$
$$=15\%+(15\%-9\%)(1-0.3)(0.38/0.62)$$
$$=15\%+(6\%)(0.7)(0.61)$$
$$=17.56\%$$

In this case the financial risk premium associated with using debt is 2.56 per cent.

As far as the debt-equity ratio is concerned, this has simply been calculated using the market values for debt and equity. Remember that as the value of the firm, V equals the value of its debt, D, plus the value of its equity, E, then E=V−D, which in this example=£5.27m−£2m= £3.27m.

The relative debt-equity weightings are calculated as follows:

$$w_d=£2m/£5.27m=0.38$$
$$w_e=£3.27m/£5.27m=0.62$$

EXERCISE 4 —M&M'S PROPOSITION II (WITH TAXES)

Applying M&M's Proposition II (with taxes) to Brewton Distillers, calculate the company's cost of equity.
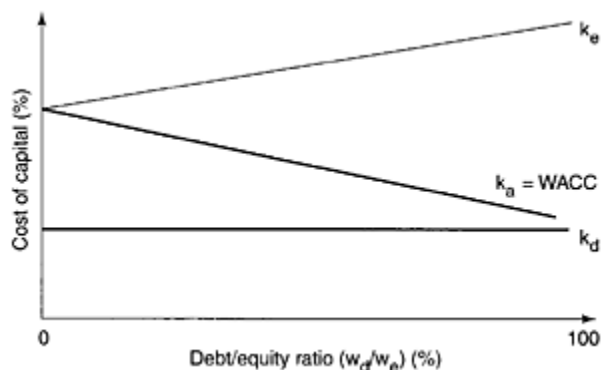
Figure 13.7 Effects of gearing on cost of capital: M&M model with taxes

The relationship between a firm's cost of capital and gearing in the M&M taxes model is illustrated in Figure 13.7. Figure 13.7 shows that as the debt-equity ratio increases, this increases the firm's financial risk and pushes up the cost of equity, k_e. However, as the

impact of corporate taxes is to subsidise the cost of debt, k_d, the weighted average cost of capital, k_a, falls.

Summary of M&M models

The basic conclusion of M&M is that in a corporate tax environment capital structure is relevant. Given that the goal of the firm is the maximisation of value then a firm can increase its market value by substituting debt for equity in its capital structure. As the ratio of debt to equity is increased, the value of the firm rises and the overall cost of capital reduces.

You may well be wondering why M&M did not use the CAPM or arbitrage pricing theory (APT). The simple answer is that the CAPM and other asset pricing models such as APT were not around in 1958. The CAPM did not come into being until 1964 and APT until 1976. For convenience the conclusions of the M&M models are summarised in Table 13.1.

Table 13.1 Summary of M&M capital structure model

| | *M&M model* | |
	Without taxes	*With taxes*
Proposition I	The value of a geared V_g, and an ungeared firm, V_u, are equal. $V_g = V_u$ Capital structure is irrelevant. Capital structure has no effect on a firm's WACC.	The value of a geared firm V_g, is equal to the value of an ungeared firm, V_u, plus the PV of the *interest tax shield (DT)*: $V_g = V_u + pvDT$
Proposition II	A firm's cost of equity, k_e, is given by: $k_e = k_a + (k_a - k_d) \times (w_d/w_e)$ k_e will increase as the debt-equity ratio (w_d/w_e) increases. Equity risk can be split into: (1) *business risk* which governs k_a, and	There are significant advantages to a firm in using debt in its capital structure k_e will increase and the WACC will decline as the debt-equity ratio (w_d/w_e) increases.

(2) *financial risk* which is
governed by (w_d/w_e).

The modern trade-off model of capital structure

In essence the M&M propositions argue that capital structure is irrelevant, however, observed practices in the real world tend to offer a different view, one where capital structure does seem to matter. See, for example, the opening vignettes on financing policy at Cadbury Schweppes and Tesco. In the continuing debate about capital structure, the modern or current mainstream view prefers to explain capital structure in terms of a trade-off between agency/bankruptcy costs and the tax shield on debt interest.

Our review of the modern model will begin by examining the impact of agency costs and then proceed to explore the role of bankruptcy and financial distress costs.

Agency costs

In Chapter 2, where the nature of the agency relationship was first discussed, **agency costs** were defined as those incurred in attempting to minimise the **agency problem.** The agency problem is the potential for conflict in objectives which exists in a principal-agent relationship. In the corporate finance world, the principals are the shareholders who own the firm and managers act as their agents.

For the shareholders of a firm where ownership is separate from managerial control, the agency problem is that managers, who are in day-to-day control of the firm, may tend to act in their own personal best interests rather than those of the shareholders, the firm's owners.

Recall that a firm's owners will incur agency costs whenever they introduce procedures and mechanisms aimed at reducing the potential for conflict between the personal objectives of managers and the objectives of the owners. Incurring agency costs has the effect of reducing shareholder value.

In the context of capital structure, when debt is introduced the agency problem is extended to the relationship between shareholders and lenders. When a lender is considering whether to advance funds to a company, the decision will be based on an assessment of the company's risk, business and financial, and of its expected future cash flows. If a loan is made, the interest rate charged and the loan terms and conditions will be influenced by these factors.

Once a loan is made, it may be open to a company's managers to take advantage of lenders, for example by using the funds for a more risky investment than that disclosed to the lenders. When a firm's managers substitute riskier investments for less risky investments to the disadvantage of lenders and creditors, this is referred to as the **asset substitution problem.**

If the riskier investments pay off, it is the shareholders who will receive the rewards not the lenders. Conversely if the riskier investments fail, both shareholders and lenders will share in the loss.

To eliminate, or at least minimise, this type of managerial behaviour, lenders will

typically insist on restrictive covenants and provisions in loan agreements to protect their own interests. These covenants or provisions may, for example, relate to limiting debt-equity ratios, dividend pay-out ratios, and other liquidity ratios. If these ratio limits are exceeded, the firm will be in breach of its covenants and may incur significant financial penalties as a result.

The costs of all the protective arrangements imposed by lenders is an agency cost, a cost which is borne by the firm's owners when the firm uses debt in its capital structure. Clearly the more debt a firm employs the greater will be the debt-related agency costs. There may come a point when the additional costs of raising more debt may exceed the benefits of the interest tax shield.

It is also argued that a firm's total agency costs may in fact be reduced as a result of using debt in its capital structure. The contention is that raising debt exposes the firm to an external scrutiny or audit, as lenders and financiers before providing funds will analyse and assess a firm's finances, risks, and management capability. These procedures reduce the owner's total costs of monitoring and controlling its managers and encourages managers to behave in a manner more consistent with shareholder wealth maximisation.

Thus in this context, where the process of raising of debt finance exposes the firm's managers to greater external scrutiny and reduces agency costs, introducing debt into the capital structure may have, at least indirectly, a beneficial effect on the firm's market value.

Bankruptcy and financial distress costs

The probability of a firm experiencing financial distress and possibly becoming bankrupt or insolvent increases in relation to the level of the firm's business and financial risk.

As we stated earlier, the level of business risk is essentially a given variable for a firm: it is outside the control of its managers. On the other hand, a firm's financial risk is a controllable variable and varies with the amount of debt in its capital structure. To compensate for an increase in financial risk, equity holders will require an increase in return and the cost of equity capital will rise.

Bankruptcy costs

The more debt a firm employs the greater its financial risk and the greater its fixed payment commitments in terms of interest and principal payments. Increasing levels of fixed payments will increase the demands on a firm's cash flows. If a firm reaches the position where its cash flows are not sufficient to cover its financial commitments then it is likely to face bankruptcy or insolvency proceedings.

A firm which is facing bankruptcy as a result of not being able to pay its financial obligations will incur, not only the *direct costs* of the associated administrative and legal procedures, but also the *indirect costs* of uncertainty and upheaval for managers, employees, suppliers and other creditors. For example, the attention of managers and employees is likely to be directed away from the day-to-day operations of the firm and towards bankruptcy proceedings and perhaps the search for alternative employment.

The direct administrative and legal costs of bankruptcy will have to be paid before any other claims are paid and this will reduce the funds available for distribution to creditors

and shareholders. In addition the costs of bankruptcy will include the possible loss of value of a firm's assets. In a liquidation process assets are unlikely to realise their full value.

Clearly these costs will only be incurred when a firm is actually in the process of bankruptcy or liquidation. For a firm that is not experiencing financial difficulties these costs are not actual but potential. At one extreme the potential for bankruptcy costs is likely to induce a firm's management to maintain a capital structure below the 100 per cent debt ratio implied by the M&M corporate tax case.

Financial distress costs

While bankruptcy or liquidation may be viewed as the extreme and terminal case of financial distress, it is feasible for a firm to struggle through a period of financial distress or hardship without actually being wound up. Other 'distress' scenarios would include a restructuring or refinancing of a firm, perhaps even government assistance, direct or indirect, if the company is a major employer.

During a period of financial distress, additional costs associated with the state of distress will be incurred. These costs can be considerable and are often difficult to quantify in money terms. For example the climate of uncertainty which a period of distress will create is likely to affect the behaviour, performance and relationships of owners, managers, employees, suppliers, customers, creditors and so forth.

Many of the consequent costs of financial distress, such as the possible unpleasant behaviour on the part of managers or owners, the likely deterioration in employee morale, and the potential loss of supplier and customer goodwill, will be difficult to translate into monetary terms.

If, for instance, suppliers (including suppliers of capital) perceive a company to be experiencing financial difficulty they are likely to intensify pressures on management to pay promptly for goods and services provided. They may also withhold future supplies unless the firm pays in advance. This will accentuate the firm's cash flow problems and reduce the prospect of the firm securing temporary or bridging finance to enable it to carry on in business.

Moreover, if the firm's customers become concerned about its ability to provide future supplies and to honour its warranties, product guarantees and servicing agreements, they may seek out alternative suppliers thus reducing the firm's future sales and cash flows.

As with bankruptcy, the risks and potential costs of financial distress will increase relative to the volume of debt in the capital structure. A firm will initially receive significant tax advantages and increase its market value by introducing debt into its capital structure. However, as the debt ratio increases, the value to the firm of the tax advantages of debt will be progressively eroded by the increasing probability of financial distress and bankruptcy costs. In practice this *tax/financial distress trade-off* will induce managers to operate with a balanced capital structure.

According to Modigliani and Miller (with taxes) the value of a geared firm is given by:

$$V_g = V_u + pvDT$$

In a more modernist view this can be modified to incorporate the value-reducing effects

of bankruptcy costs, financial distress costs and net agency costs as follows:

$$V_g = V_u + pvDT - pv(\text{bankruptcy costs}) - pv(\text{financial distress costs}) - pv(\text{net agency costs})$$

OTHER MODELS OF CAPITAL STRUCTURE

In this section we will take the opportunity to briefly discuss two other models of corporate capital structure which have emerged in recent years. The first we can broadly refer to as **information asymmetry and signalling models** and the second is the **Pecking Order Model** developed by Stewart Myers.

Information asymmetry and signalling models

Since the late 1970s various information asymmetry-signalling models of capital structure have been advanced, for example Ross (1977). Essentially these models attempt to explain capital structure in terms of the ways in which managers use issues of debt and equity to signal information about a firm's future prospects to less well informed owners and investors.

Recall from our discussion of agency costs in Chapter 2 that one of the items of agency costs is **information asymmetry.** This is in contrast to Modigliani and Miller's model which assumed that information is symmetrical, that is, that all investors have access to the same information and share the same expectations about a firm's future as its managers.

In reality managers will possess intimate inside knowledge about a firm's operations. As insiders they will have access to more information about a firm than its shareholders and they can share information with shareholders and other stakeholders, for example lenders, or withhold it if they believe that it is in their best interests to do so. This unequal access to and distribution of information between managers and owners are known as information asymmetry and it is an agency cost borne by the shareholders.

In the context of capital structure, the role of information asymmetry can best be illustrated by an example. Suppose that a biotechnology company made a secret breakthrough in genetic engineering which could be deemed to be of considerable benefit in the prevention of coronary heart disease. In this scenario only management is aware of the breakthrough and that the company's prospects are very favourable (asymmetric information).

The company needs to raise substantial funds for the manufacturing, marketing and distribution of its new product. If the financial manager considers the current capital structure as optimal how should the funds be raised, through debt or equity?

If a new equity issue is made the share price will rise when the company starts to generate the net cash flows from the investment (assumed to have a substantial positive NPV). Thus both the new and existing shareholders will have benefited from the financial windfall.

However, the existing shareholders will be less wealthy than if the funds had been

raised by an issue of debt. The creation of new shareholders has diluted the wealth of the existing shareholders. With a debt issue, existing shareholders would not have to share the new wealth. From the existing shareholders' standpoint, issuing debt to fund the development would be the preferred option.

By issuing debt the company would be **signalling** to investors and current shareholders that the future outlook for the company is bright. Issuing debt would be interpreted as a *positive signal* about the company's future.

In contrast the decision by a company (particularly a mature established company which has many financing options available to it) to issue equity would generally be interpreted by shareholders and investors as a *negative signal,* indicating that the company's future prospects are not so good and that its equity is currently overvalued.

Conversely if managers believe that their company's shares are currently undervalued in the light of good future prospects for the company, why would they issue equity at an undervalued price? Signalling theory argues that shareholders and the investing community understand these issues; that managers have more information about a firm's prospects and use financing policy to signal this information to shareholders and investors.

The key implication for capital structure management is that, if possible, firms should retain some degree of **reserve borrowing capacity** which would allow them to take full advantage of wealth enhancing investment opportunities when they arise. This means a firm maintaining less debt in its capital structure than what might be considered the optimum debt level indicated by the agency and distress costs/tax shield trade-off model.

The pecking order model of capital structure

The Pecking Order Model of corporate capital structure was proposed in 1984 by Stewart Myers. Myers essentially argues that the management of firms will follow a distinct order in their preferences for using sources of corporate finance for investment and therefore do not seek to maintain an optimal or target capital structure.

According to Myers, managers will prefer first of all to use retained earnings for financing investment rather than resort to issuing debt or equity. If retained earnings are exhausted or insufficient to fund investment projects and additional financing needs to be raised externally, then managers will prefer to use debt rather than equity. Thus, in Myers' view, a firm's capital structure at any point in time is simply a reflection of its past pecking order preferences for long-term financing.

One of the attractions of Myers' model is that it is consistent with the observed practices of many firms to hold sizeable cash reserves and retain reserve borrowing capacity.

PRACTICAL CONSIDERATIONS INFLUENCING CAPITAL STRUCTURE

As we have discovered from the preceding sections, the theory of corporate capital structure is a complex and controversial topic in financial management. In this section we

will briefly review some of the more practical considerations which are likely to influence a firm's capital structure.

Asset structures

Firms with suitable assets (e.g. land and property) available to offer as security for loans will tend to utilise more debt finance than firms without such assets.

Control

Issues of ownership and management control can affect long-term financing policy. If, for example, existing shareholders are reluctant to see their current ownership position diluted by new equity issues they may act in favour of using debt when it comes to financing choices.

Alternatively managers may choose debt or equity depending on how vulnerable they view their current positions within the firm. For example, an over-reliance on debt increases the firm's financial risk and similarly the risk of managers losing their jobs if the firm fails.

Financial flexibility

As we noted previously some firms may wish to retain cash reserves and spare borrowing capacity to enable them to respond quickly to investment and market opportunities. For example, a firm with substantial cash reserves will probably find it easier to mount a successful takeover bid than a firm without cash reserves. Having cash reserves means that the firm can readily offer cash to the shareholders of the takeover target. This usually makes a takeover offer more attractive to the shareholders of the target company than a straight share swap and increases its chances of success.

Growth rates

A company's long-term financing policy is likely to be influenced by its growth rate. For example, a young, rapidly growing company will have a high demand for development finance. In such circumstances the company may limit, or even defer, dividend payments, preferring instead to retain a high proportion of its earnings to finance growth. In addition, a rapidly growing company will typically need to access the financial markets more frequently than slow-growing or stagnating companies, in order to finance its expansion plans.

Risk attitudes

The attitudes of managers and owners towards risk will influence corporate borrowing policies. As we know, managers and owners may be risk-averse, risk-indifferent or positively risk-seeking, in which case this will influence their financing decisions. A risk-averse or conservative management will tend to use less debt than their more aggressive

or risk-seeking counterpart.

Similarly the risk attitudes of lenders towards the firm and its management will influence their decisions whether to provide loans and under what terms and conditions. Lenders, for example, may insist on restrictive covenants and impose terms and conditions on loans which are considered so stringent by management as to make them seek an alternative form of financing.

Sales stability

A firm with relatively stable sales levels (e.g. utility companies) will have a steadier operating income from which to service debt, that is make interest and principal payments, than a firm with more volatile sales levels (e.g. construction companies).

GEARING

In financial management the term **financial gearing** is used to describe the way in which the owners of a firm can use debt finance to 'gear up' the assets and earnings of the firm. Employing debt allows the owners to control a greater volume of assets and produce a greater volume of earnings than they could by investing only their own money in the firm. The greater a firm's borrowings, the greater will be its financial gearing.

While our analysis of gearing (or leverage as it also called) has so far been mainly confined to financial gearing, there are in fact two dimensions to a firm's total gearing, financial gearing and operating gearing. **Operating gearing** refers to the proportion of fixed operating costs in a firm's total operating costs. The higher the proportion of fixed costs, the higher the level of operating gearing and also the higher the firm's operating or business risk.

This section will examine the effect of both financial and operating gearing on a firm's earnings and its returns to shareholders. We will begin with financial gearing.

Financial gearing

The higher the debt to equity ratio, the higher a firm's financial gearing and the level of its financial risk. The financial risk arises from the higher proportion of *fixed financial costs* in a firm's cost structure.

The degree to which a firm is financially geared can be measured as follows:

$$\text{Degree of financial gearing (DFG)} = \frac{\%\ \text{change in EPS}}{\%\ \text{change in EBIT}}$$

The DFG will indicate how sensitive or vulnerable a firm's earnings per share (EPS) is to a change in the firm's earnings before interest and tax (EBIT). The percentage change in EBIT will be the percentage variation from an expected mean or base case value. We can illustrate the degree of financial gearing (DFG) with an example.

Example 6 —Degree of financial gearing (DFG)

The financial manager of Ajit's Paints, a paint manufacturing company, expects the company to have earnings before interest and taxes (EBIT) of £50,000 in the current financial year. The company pays annual interest of 10 per cent on a long-term loan of £200,000 and has 100,000 ordinary shares in issue. Assume a tax rate of 20 per cent.

The financial manager is currently examining two scenarios, one where EBIT is 25 per cent less than expected and the second where EBIT is 25 per cent greater than expected.

	Scenario 1 (EBIT −25%) £	*Base case £*	*Scenario 2 (EBIT+25%) £*
EBIT	37,500	50,000	62,500
Interest (I)	20,000	20,000	20,000
EBT	17,500	30,000	42,500
Tax	3,500	6,000	8,500
EAIT	14,000	24,000	34,000
EPS	*0.14*	*0.24*	*0.34*
EPS Change	*−41.7%*	*0*	*+41.7%*

Notice that a ±25 per cent in the expected or base case EBIT produces a magnified or disproportionate change of ±41.7 per cent in EPS, where EPS is calculated as earnings after interest and tax (EAIT)/100,000 ordinary shares. The company's degree of financial gearing would be calculated as:

		Scenario 1	*Scenario 2*
DFG	=	$\dfrac{-41.7\%}{-25.0\%}$	$\dfrac{+41.7\%}{+25.0\%}$
	=	1.67	1.67

A DFG ratio greater than 1 indicates that the firm is financially geared and the higher the ratio the more vulnerable the firm's earnings, which are available to its shareholders, are to a drop in the firm's earnings before interest and tax.

The degree of financial gearing could also have been found more directly from the following formula:

$$\text{DFG for base case EBIT} = \frac{\text{EBIT}}{\text{EBIT} - \text{I}}$$

For Ajit's Paints this would be:

$$\text{DFG} \quad = \quad \frac{\pounds 50,000}{\pounds 50,000 - \pounds 20,000}$$

$$= \quad 1.67$$

The result is the same as before, but is achieved with less effort.

Operating gearing

Where financial gearing is related to the proportion of fixed financial costs in a firm's overall cost structure, operating gearing (or leverage) relates to the proportion of fixed operating costs in a firm's overall cost structure.

F**ixed operating costs** are those costs which, at least in the short term, remain unchanged irrespective of the changes in a firm's level of activity. Typical examples of fixed operating costs would include premises costs such as rents, rates and insurance. In contrast, **variable operating costs** are those costs of a firm's operations which will change over a given period of time in direct response to changes in volumes of activity or workload. Typical examples of variable operating costs would include raw materials and direct labour where wages are related to the units produced. Thus for our purposes a firm's total operating costs are structured as follows:

Total operating costs (TC)=Total fixed operating costs (TFC)+total variable operating costs (TVC)

In the same way as financial gearing is a measure of a firm's financial risk, operating gearing is a measure of a firm's operating or business risk. The higher a firm's fixed operating costs as a proportion of its total operating costs, then the higher the firm's operating or business risk. The airline industry, for example, is characterised by high fixed costs. Thus even a minor change in passenger numbers can have a significant impact on an airline's financial performance.

In assessing operating gearing we are interested in the relationship between changes in sales and changes in earnings before interest and taxes (EBIT). In particular we wish to evaluate the impact on a firm's EBIT of a change in its sales.

The degree to which a firm is operationally geared can be measured as follows:

$$\text{Degree of operating gearing (DOG)} \quad = \quad \frac{\% \text{ change in EBIT}}{\% \text{ change in Sales}}$$

The DOG will indicate how sensitive or vulnerable a firm's earnings before interest and tax (EBIT) are to a change in the firm's sales. The percentage change in sales will be the percentage variation from an expected mean or base case value. As with financial gearing, if the quotient in the above equation is greater than 1 then operating gearing is present.

We can illustrate the degree of operating gearing (DOG) with an example.

Example 7 —Degree of operating gearing (DOG)
    The financial manager of Ajit's Paints expects the company to generate sales of £500,000 in the current financial year. An analysis of the firm's operating cost structure has revealed that variable operating costs constitute 40 per cent of sales value and fixed operating costs are £250,000.
    The financial manager wishes to explore the effect on earnings of changes in sales and consequently has developed two scenarios, one where sales revenue is 10 per cent less than expected and the second where sales revenue is 10 per cent greater than expected.

	Scenario 1 *(Sales−10%) £*	*Base case* *£*	*Scenario 2* *(Sales+10%) £*
Sales	450,000	500,000	550,000
Variable costs	180,000	200,000	220,000
	270,000	300,000	330,000
Fixed costs	250,000	250,000	250,000
EBIT	*20,000*	*50,000*	*80,000*
EBIT Change	*−60%*	*0*	*+60%*

In this case a relatively small change (±10 per cent) in expected sales revenue produces a dramatic, six-fold effect (±60 per cent) on the firm's earnings before interest and tax (EBIT). Clearly the EBIT of this company would be highly vulnerable to even a small drop in sales. Because of its high proportion of fixed operating costs, this firm has a high level of business or operating risk.

Presumably fixed costs are high due to the investment required in fixed assets (e.g. buildings and manufacturing equipment) in such a manufacturing environment. This would involve, for example, expenditure on premises costs such as rents, rates, insurance, power and other factory overheads.

The company's degree of operating gearing would be calculated as:

		Scenario 1	*Scenario 2*
DOG	=	$\dfrac{-60\%}{-10\%}$	$\dfrac{+60\%}{+10\%}$
	=	6	6

This confirms that the firm has a very high degree of operating leverage.

Alternatively the degree of operating gearing could be calculated as follows:

$$\text{DOG at base sales revenue, SR} = \frac{SR - TVC}{SR - TVC - TFC}$$

Which for Ajit's paints this would be:

$$\frac{£500,000 - £200,000}{£500,000 - £200,000 - £250,000} = \frac{£300,000}{£50,000} = 6$$

Total gearing

We can obtain an assessment of a firm's total or overall gearing by combining its financial gearing and its operating gearing. By combining the two forms of gearing we can establish the direct link between a change in a firm's sales and the impact on its earnings per share. The *degree of total gearing (DTG)* can be related to the degree of operating gearing (DOG) and the degree of financial gearing (DFG) as follows:

DTG=DOG×DFG

For Ajit's Paints the DTG can be determined as:

$$DOG = \frac{60\%}{10\%} = 6$$

$$DFG = \frac{41.7\%}{25.0\%} = 1.67$$

$$DTG = 6 \times 1.67 = 10.0$$

This means that for every 1 per cent change in sales, the impact on earnings per share will be magnified by a factor of 10. Note that the DTG is simply the product of the firm's DFG times its DOG, it is not their sum as the two measures are independent.

The degree of total gearing (DTG) can also be calculated as:

$$\text{Degree of total gearing (DTG)} = \frac{\%\text{ change in EPS}}{\%\text{ change in sales}}$$

Similar to the other gearing measures, the percentage change in sales is measured by reference to an expected or base case sales figure.

EXERCISE 5 —GEARING

Construct a table which shows clearly the total gearing (combined financial and operating gearing) position of Ajit's Paints based on the sales scenarios presented in Example 7 together with the relevant financial information from Example 6. Calculate the degree of total gearing (DTG) for Ajit's Paints and comment on your findings.

PRACTICAL OBSERVATIONS ABOUT CAPITAL STRUCTURE

There are a number of practical observations which can be made about corporate capital structure and these are summarised as follows.

Industry structure

In practice different firms employ different capital structures depending on their individual circumstances, such as the structure of the industry in which the firm operates. In fact the character of the industry in which a company operates seems to have a strong influence on its capital structure, a pattern which is evident worldwide. For example, heavily capitalised manufacturing, and utility companies tend to have high gearing ratios, while companies in the services and rapidly developing technology sectors tend to be mainly equity financed.

OPTIMAL CAPITAL STRUCTURES

There is empirical evidence to suggest that companies in practice tend to operate within a target or optimal capital structure range. Moreover, if companies have to move outside this optimal range by taking on more debt than they would prefer because of business circumstances (e.g. financing a substantial expansion programme or defending against a hostile takeover) they will revert to their considered optimal or target structure range as soon as is feasible.

Taxes

In practice taxes, and particularly the existence of a corporate tax shield, tend to influence the choice of capital structure.

SUMMARY

While the capital structure decision is clearly relevant, it is, however, important to keep the debate in context. In reality the more important concern for a firm is not with how,

when and what type of securities the firm is financed, but rather with how profitably the funds raised are invested and utilised by the firm. It is *the quality of the firm's long-term investment decisions,* rather than its long-term financing decisions, which really matters in terms of adding value to the firm.

As the opening vignettes to this chapter indicate, capital structure is an aspect of corporate financial management which does have practical relevance to firms and their managers. In practice many firms try to operate within 'norms' for their industry. Moreover, managers of many companies operate, explicitly or intuitively, within the realms of what they consider to be a target or optimal capital structure for their company, that is one which *they* consider will maximise the company's value.

For example, in its 1998 annual report, J Sainsbury plc clearly stated that: 'It is group policy to set a target maximum for gearing of 50 per cent.' The Sainsbury Group defines gearing as the ratio of net debt arrangements to ensure that no more than 25 per cent of the Group's net debt matures in any one year.

Although finance will probably have been raised from different sources over time depending on circumstances—for example, when interest rates are low more debt finance may be raised—in the long run the capital structure of many firms will tend to gravitate towards some preferred 'norm' or target level.

As we shall soon see in the next chapter, this same argument can also be applied to the firm's **dividend decision,** which has similarly been referred to as the ***dividend puzzle.***

In conclusion, while capital structure decisions are clearly important, they should not be allowed to cloud the fact that it is investment decisions which ultimately determine a firm's future and its value.

RECAP

Capital structure: This refers to the combination of debt and equity capital which a firm uses to finance its long-term operations. Capital in this context refers to the permanent or long-term financing arrangements of the firm.

Capital structure models: The three main capital structure models which have evolved are respectively referred to as: **(1) the traditional model, (2) the Modigliani and Miller (M&M) model,** and **(3) the modern trade-off model.**

The traditional capital structure model: The essence of the traditional model is that the value of a company and its capital structure are related, and that an optimal capital structure exists at the point where the weighted average cost of capital (WACC) is minimised.

The Modigliani and Miller (M&M) model: M&M originally advanced two capital structure propositions, based on the assumptions of perfect capital markets and the absence of taxes. **Proposition I** asserted the market value of any firm to be independent of its capital structure and **Proposition II** asserted a firm's cost of equity capital to be a *linear function* of its capital structure.

When the M&M model is modified to include taxes, the value of an ungeared company becomes:

$$V_u = \frac{EBIT(1-T)}{k_{eu}}$$

and the cost of equity for a geared company in a tax environment becomes:

$$k_{eg}=k_{eu}+(k_{eu}-k_d)(1-T)(w_d/w_e)$$

The trade-off model: The modern, or current mainstream, view prefers to explain capital structure in terms of a trade-off between agency and bankruptcy costs and an interest tax shield. In the trade-off model there is a point at which the advantages of the tax shield on debt financing are neutralised by agency and bankruptcy costs, resulting in an optimal or balanced capital structure.

Other models of capital structure: Two other categories of corporate capital structure models have emerged in recent years. The first can broadly be referred to as **information asymmetry and signalling models** and the second is the **Pecking Order Model** developed by Stewart Myers.

Practical considerations: Some of the more practical considerations which are likely to influence a firm's capital structure include: **asset structures, ownership and control, financial flexibility, growth rates, attitudes to risk and sales stability.**

Gearing: There are two dimensions to a firm's total gearing, financial gearing and operating gearing. **Financial gearing** refers to the way in which the owners of a firm can use finance to 'gear up' the assets and earnings of the firm. The greater a firm's borrowings, the greater will be its financial gearing and its financial risk.

Operating gearing refers to the proportion of fixed operating costs in a firm's total operating costs. The higher the proportion of fixed costs, the higher the level of operating gearing and also the higher the firm's operating or business risk.

Practical observations on capital structure: There are a number of practical observations which can be made about capital structure. Observed practice would suggest that the capital structures of firms are influenced by: **industry structure,** the notion of an **optimal capital structure,** and the existence of a corporate **tax shield.**

REVIEW QUESTIONS

Concept review questions

1 How would you define the term 'capital structure'? What is meant by the term 'optimal capital structure'?
2 What is the essence of the traditional model of capital structure?
3 (a) What are M&M's propositions on capital structure? (b) State the assumptions of the M&M model, (c) How are these modified to take account of corporate taxes?

4 What is meant by the 'trade-off' model of capital structure?
5 Distinguish between the following:

  (a) agency costs and bankruptcy/financial distress costs;
  (b) financial gearing and operating gearing;
  (c) business risk and financial risk.

6 What are the main practical considerations which are likely to influence a firm's capital structure?

Practice questions

7 **M&M's Proposition I.** (a) Bramble Food Processors is debt-free, has earnings before interest and taxes (EBIT) of £2.5m and a cost of capital of 12 per cent. Calculate the market value of the company. (b) If Bramble now borrows £5m and uses it to replace equity, calculate the market value of the company, assuming a corporate tax rate of 30 per cent.

8 **M&M's Proposition II.** (a) Winger Toys, a toy manufacturing company, has a bond on which it pays an interest rate of 9 per cent and a WACC of 18 per cent. If the financial manager informs you that the company's debt-equity ratio is 50/50, calculate the company's cost of equity, ignoring taxes. (b) Recalculate the cost of equity assuming a corporate tax rate of 30 per cent and comment on your findings.

9 **Financial Gearing.** The financial manager of Eden Enterprises, a garden design and supply company, expects the business to have earnings before interest and taxes (EBIT) of £180,000 in the current financial year. The company pays annual interest of 12 per cent on a long-term loan of £500,000 and has 50,000 ordinary shares in issue.
  The financial manager has asked for your help in examining two scenarios, one where EBIT is 20 per cent less than expected and the second where EBIT is 20 per cent greater than expected.
  You are required to produce a table clearly showing the effects of the financial scenarios on the company's expected earnings per share and to calculate the company's degree of financial gearing (DFG). Assume a tax rate of 25 per cent.

Test questions

10 **Operating Gearing.** Eden Enterprises expects to generate sales of £700,000 in the current financial year. An analysis of the firm's operating cost structure has revealed that variable operating costs constitute 30 per cent of sales value and fixed operating costs are £310,000. The tax rate is 25 per cent.
  The financial manager of Eden Enterprises has decided to explore the effect on earnings of possible changes in the company's sales levels. She wishes to create two financial scenarios, one where sales revenue is 10 per cent more than expected and the second where sales revenue is 10 per cent less than expected.
  You are required to produce a table clearly showing the effects of the financial

scenarios on the company's expected earnings and to calculate the company's degree of operating gearing (DOG). Comment on your findings.

11 **Total Gearing.** Construct a table which sets out clearly the total gearing (combined financial and operating) position of Eden Enterprises based on the sales scenarios presented in Question 10 together with the relevant financial information from Question 9. Calculate the degree of total gearing (DTG) for Eden Enterprises and comment on your findings.

12 **Capital Structure.** The finance director of Netra plc, a company listed on the AIM (Alternative Investment Market) wishes to estimate what impact the introduction of debt finance is likely to have on the company's overall cost of capital. The company is financed only by equity.

Netra plc
Summarised Capital Structure

	£000
Ordinary shares (25 pence par value)	500
Reserves	1,100
	1,600

The company's current share price is 420 pence, and up to £4 million of fixed rate five year debt could be raised at an interest rate of 10% per annum. The corporate tax rate is 33%.

Netra's current earnings before interest and tax are £2.5 million. These earnings are not expected to change significantly in the foreseeable future.

The company is considering raising either:

(i) £2 million in debt finance

or

(ii) £4 million in debt finance

In either case the debt finance will be used to repurchase ordinary shares.

Required:

(a) Using Modigliani and Miller's model in a world with corporate tax, estimate the impact on Netra's cost of capital of raising:

(i) £2 million and
(ii) £4 million in debt finance.

State clearly any assumptions that you make.

(b) Briefly discuss whether or not the estimates produced in part (a) are likely to be accurate.

NOTES

1 Annual Report 1997.
2 Annual Report 1997.
3 The equation $k_a=(w_dk_d)+(w_ek_e)$ can be rearranged and solved for k_e, the cost of equity capital, as follows:

$$k_a=(k_dw_d)+(w_ek_e)$$
Multiplying both sides of the equation by $(w_d+w_e)/w_e$:
$$k_a[(w_d+w_e)/w_e]=k_d(w_d/w_e)+k_e$$
$$k_e=ka[1+(w_d/w_e)]-k_d(w_d/w_e)$$
$$=k_a+k_a(w_d/w_e)-k_d(w_d/w_e)$$
$$=k_a+(k_a-k_d)(w_d/w_e)$$

FURTHER READING

Students wishing to explore the capital structure debate further could consult the following. The classic works on capital structure irrelevancy are:
• 'The Cost of Capital, Corporation Finance and the Theory of Investment.' Modigliani, F. and Miller, M.H., *The American Economic Review*, June 1958.
• 'Corporate Income Taxes and the Cost of Capital: A Correction.' Modigliani, F. and Miller, M.H., *The American Economic Review*, June 1963.
    The classic insight into the capital structure puzzle is presented in:
The Capital Structure Puzzle.' Myers, S.C., *The Journal of Finance*, July 1984.
    Capital structure and signalling theory are discussed in:
'The Determination of Financial Structure: The Incentive-Signaling Approach.' Ross, S.A., *Bell Journal of Economics*, Spring 1977.
    For an extensive review of capital structure theory see:
The Theory of Capital Structure.' Harris, M. and Raviv, A., *Journal of Finance*, March 1991.
    For more contemporary coverage and some international comparisons on the use of debt finance see:
• 'Debt, Folklore and Financial Structure.' Rajan, R. and Zingales, L., *Mastering Finance*, Issue 2, Financial Times, 1997.
    The following article illustrates how the conclusions of both M&M and CAPM can be used to calculate a company's cost of capital or project discount rates:
• 'All Together Now—Capital Asset Pricing Model and Modigliani and Miller (with Taxation) Capital Structure Theory.' Slack, R., *ACCA Students' Newsletter*, April 1998.

REFERENCES

Modigliani, F. and Miller, M.H. 'The Cost of Capital, Corporation Finance and the Theory of Investment.' *The American Economic Review* , June 1958.

Modigliani, F. and Miller, M.H. 'Corporate Income Taxes and the Cost of Capital: A Correction.' *The American Economic Review* , June 1963.

Myers, S.C. 'The Capital Structure Puzzle.' *Journal of Finance* , July 1984.

Myers, S.C. 'Still Searching for an Optimal Capital Structure.' *Journal of Applied Corporate Finance* , Spring 1993.

Ross, S.A. 'The Determination of Financial Structure: The Incentive-Signaling Approach.' *Bell Journal of Economics* , Spring 1977.

DIVIDEND POLICY

> This chapter examines the determination of a firm's dividend policy and its relationship to a firm's value. The following aspects are covered:
>
> the nature of the dividend decision;
> dividend policy and the value of the firm;
> share repurchase schemes and special dividends.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 explain the fundamentals of a firm's dividend payment/earnings retention policy;
2 describe the main theories of dividend policy;
3 recognise the practical considerations which may influence dividend policy;
4 explain why firms repurchase shares and make special dividend payments;
5 appreciate the empirical evidence in relation to dividend policy.

OVERVIEW

This chapter deals with another very controversial area of corporate financial management, that is a firm's **dividend decision.** It is an aspect of modern financial management which, like the capital structure decision, is the subject of continuing debate. In the words of Fischer Black (1976): 'The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together.'

Similar to the debate on capital structure, which was discussed in the preceding chapter, the essence of the ongoing debate on dividend policy concerns its **relevancy,** that is, whether or not a firm's dividend policy has any effect on the market value of its shares.

Allied to this is the question of whether there exists an **optimal dividend policy.** If dividend policy is considered relevant to share value, then it follows that (just as in the capital structure debate) there must be an optimal policy—one which maximises a firm's share value. If an optimal dividend policy does exist, then clearly managers should concern themselves with its determination.

On the other hand, if dividend policy is not considered relevant, managers need not

concern themselves with formulating a particular dividend policy, as any dividend policy will do, one policy will be equal to another. These are the issues we will explore in this chapter.

DIVIDEND POLICY FUNDAMENTALS

The **dividend decision** is an integral part of the firm's strategic financing decision. It essentially involves a firm's directors deciding how much of the firm's earnings, after interest and taxes (EAIT), should be distributed to the firm's ordinary shareholders in return for their investment in the firm, and how much should be retained to finance future growth and development.

The objective of the firm's dividend decision, like all financial decisions, should be the maximisation of shareholder wealth. Although how, if at all, the dividend decision affects shareholder wealth is a highly contentious point.

The *Oxford Dictionary* defines a policy as: 'the plan of action adopted by a person or organisation'. A firm's **dividend policy** can be defined as the plan of action adopted by its directors whenever the dividend decision is to be made. In practical terms, a range of factors (e.g. profitability, liquidity, legal and contractual) will restrict a firm's dividend policy options.

As will become apparent later in this chapter, whether a firm's dividend policy actually has any relevance for its share value remains an unsolved puzzle in financial management. If dividend policy is considered relevant, then it follows that (just as in the capital structure debate) there must be an **optimal dividend policy,** that is, one which, by providing the optimum balance between dividend payout and earnings retention, maximises a firm's share value.

If an optimal dividend policy does exist then clearly managers should concern themselves with its determination; if it does not, then any dividend policy will do, as one policy will be equal to another.

It should be noted that the dividend decision and dividend policy relate only to ordinary share capital. The payment of preference share dividends is not considered part of a firm's dividend policy, as the level of, or method of calculating, the preference dividend is fixed in advance by the terms and conditions of the original preference share offer.

Once a dividend policy has been formulated, setting out the amount and timing, etc. of dividend payments, it should be followed with stability and consistency as its guiding principles. As we shall discuss later, changes to a firm's dividend policy can be interpreted in various ways by the financial markets, sometimes with dramatic consequences for the firm's share price.

You will note that the dividend decision is made at the level of the firm's most senior managers—at board of director level. It is the directors who will decide the amount and timing of dividend payments. Under UK company law the directors cannot be compelled to recommend a dividend and shareholders cannot vote themselves a higher dividend than that recommended by the directors.

Payment of dividends

In the UK, in common with many other countries, dividends are usually paid to shareholders twice a year. An **interim payment** is made half-way through the financial year, with a **final payment** being made after the end of the financial year. Dividends are paid to the shareholders listed on a firm's Share Register on a specified date, known as the **Record Date.**

In the stock market, shares of listed companies are traded on what is known as either a **cum-dividend** or **ex-dividend** basis. A listed company's shares are traded cum-dividend for a period after the company announces its results, interim and final.

When the shares are trading cum-dividend, buyers of the shares will be entitled to receive the dividend payment. When the shares are trading ex-dividend, buyers will not be entitled to receive a dividend payment. This explains why (assuming the absence of any other relevant factors) there is usually a drop in a share's price, roughly equivalent to the value of the dividend per share, when the share goes ex-dividend. The dividend payment procedure can be illustrated with the example presented in Table 14.1, taken from the accounts of Tesco plc.

Dividends can only be paid out of **distributable profits,** that is profits which are classified as distributable by company law. For instance, distributing capital or certain types of reserves (e.g. share premium account) as dividends is prohibited by company law.

The determination of distributable profits is set out in a detailed code of statutory regulations. For public and private companies, the Companies Act 1985 defines distributable profits as: 'accumulated realised profits, so far as not previously utilised by distribution or capitalisation, less accumulated realised losses, so far as not previously written off in a reduction or reorganisation of capital duly made'.

These legal restrictions on the payments of dividends are necessary to maintain the capital of a company and to protect the rights and claims of creditors.

Table 14.1 Tesco plc: financial diary, 1999
Tesco plc: financial diary, 1998

Financial year end	27 February
Results announced	Late-April
Ex-dividend date for final dividend	Late April
Annual General Meeting	June
Final dividend paid	Early July
Half year end	Mid-August
Interim results announced	Late September
Ex-dividend date for interim dividend	Late September
Interim dividend pay date	Early December

As a rule, companies will not pay out all of their available distributable profits as dividends; they will only pay out a proportion each year, retaining the rest as a key source

of corporate financing. Deciding what proportion, if any, to pay out, and what to retain is the crux of the dividend decision.

The dividend payment

In practical terms a firm's dividend payment is important to its shareholders. It is part of the return (the other part is a capital gain—see Chapter 6) which shareholders receive for their investment in the firm. The dividend payment is also a favoured method by which shareholders and investors estimate a firm's share value, where the value of a share is equal to the present value of the expected future dividend payments—the dividend valuation model (see Chapter 8).

The actual dividend payment will usually be expressed in terms of pence per share. For example, Table 14.2 illustrates the recent dividend payment history of Reuters Group plc, a leading financial and news media information company.

Table 14.2 Reuters Group plc: dividend payments
Reuters Group plc: dividend per ordinary share
(DPS), financial year ended 31 December

	1994	1995	1996	1997
Interim	1.9	2.3	2.75	3.10
Final	6.1	7.5	9.00	9.90
DPS (pence)	8.0	9.8	11.75	13.00

As Table 14.2 indicates, Reuters' financial year end is the 31 December. The interim dividend is usually paid in September to the shareholders actually listed on the company's share register at a Record Date in August. The final dividend is normally paid in April of the following year to shareholders registered on the Record Date in March.

Notice the tendency for the final dividend to be significantly greater than the interim— this is the common, financially prudent, approach adopted by most company boards. Clearly directors will wish to be certain of how a company has performed for the year overall, before committing valuable cash resources to a dividend payment.

Shareholders, depending upon the individual company's articles of association, may have the right to receive dividends in the form of fully paid ordinary shares instead of cash, if they so elect. This type of dividend is known as a **scrip dividend,** where the dividend is in the form of additional shares rather than cash.

Some companies offer **enhanced scrip dividends** to their shareholders. In this case the value of the additional shares offered is significantly greater than the cash value of the dividend. Enhanced scrip dividends generally increase the attractiveness of a firm's shares to investors.

By electing to accept additional shares in place of a dividend, shareholders are in effect reinvesting the cash dividend in the firm and increasing their equity stake. The benefit to the firm is that the cash which would have been paid out as dividend can be retained as a source of funding in the company. In effect the firm is raising additional equity capital, in what is usually a very cost-effective way—it is generally less expensive than a fresh

equity issue in the capital markets.

Where, usually for tax reasons, a share dividend alternative cannot be offered, a company may operate a formal **dividend reinvestment plan ('DRIP')** instead. Under such a plan shareholders can, if they wish, use the entire cash dividend to buy additional shares of the company in the market, usually at a competitive dealing rate.

Dividend payout/earnings retention policy

Table 14.3 demonstrates that Reuters has maintained a consistent dividend payout policy in relation to its earnings. The company's dividend per ordinary share (DPS), as a proportion of its earnings per ordinary share (EPS), in other words its **dividend payout ratio,** (DPS/EPS), has grown steadily at the rate of approximately 1 per cent per year; from 37 per cent of earnings in 1994 to 39 per cent of earnings in 1996. In 1997, Reuters' total earnings actually declined but growth in DPS was maintained, resulting in a significant increase in the payout ratio.

Table 14.3 Reuters Group plc: dividend payout/earnings retention ratios
Reuters Group plc: dividends and earnings,
financial year ended 31 December

	1994	1995	1996	1997
DPS (pence)	8.0	9.8	11.75	13.0
EPS (pence)	21.7	25.8	30.4	29.1
DPS/EPS, d	37%	38%	39%	45%
Retentions, r	63%	62%	61%	55%

The flip side of the dividend payout ratio is the **earnings retention ratio.** If d in Table 14.3 denotes the dividend payout ratio, then the earnings retention ratio, $r,$ is given by $1—d.$ This effect is shown in Table 14.3, which demonstrates that as Reuters' dividend payout ratio, $d,$ has progressively increased, its earnings retention ratio, $r,$ has correspondingly declined. Over the years the company has gradually retained a diminishing amount of its earnings as a source of internal financing.

It will be a matter for each company's management which side of the dividend/ retentions coin it wishes to emphasise. For example, managers may focus more on retentions if there is a substantial capital investment programme in place.

Reuters is in the fortunate position of being able to finance its operations entirely from internally generated funds and to simultaneously increase its dividends to shareholders. In fact, during 1998 Reuters underwent a capital restructuring rather than make a special dividend payment (mainly for taxation reasons at the time). This was specifically to allow the company to return £1.5 billion of surplus cash to shareholders through a share repurchase scheme (see 'Share Repurchase Schemes' later in this chapter).

Dividend cover

The dividend cover ratio was introduced in Chapter 9 as a measure of evaluating a firm's

capital structure. The ratio is used to assess a company's ability to pay dividends to its ordinary shareholders from its distributable earnings, which are the earnings remaining after all other commitments, such as interest and tax liabilities and preference dividends, have been met.

The dividend cover ratio indicates the vulnerability, or the margin of safety, of dividend payments to a drop in earnings. It is calculated as follows:

$$\frac{\text{Earnings per share (EPS)}}{\text{Dividends per share (DPS)}} = \text{times}$$

In the case of Reuters, the dividend cover ratios for 1996 and 1997 are calculated as follows:

1996	1997
$\frac{\text{EPS}}{\text{DPS}} = \frac{30.4p}{11.75p} = 2.6 \text{ times}$	$\frac{\text{EPS}}{\text{DPS}} = \frac{29.1p}{13.0p} = 2.2 \text{ times}$

This reveals that the level of earnings, after interest and tax, were sufficient to cover the dividend payment more than two times over.

A dividend cover ratio of around 2.5 is typical for many companies. Although since the mid-1980s, in the UK, dividend payout ratios in general have tended to increase and consequently cover ratios have declined.

Dividend yield

The dividend yield was also introduced in Chapter 9, as a profitability/investment performance measure. The dividend yield measures the return (dividend) received by the investor (ordinary shareholder) in relation to a share's market price. It is calculated as:

$$\frac{\text{Dividend per ordinary share (DPS)}}{\text{Market price per ordinary share}} = \%$$

As we know from our studies of risk and return, the yield or return on a share is inversely related to its price. For a quoted company, if its share price in the market is rising the dividend yield will be falling. However, a rising price gives the investor the opportunity for an increased capital gain.

Under the UK taxation system, shareholders effectively receive their dividends net of tax. When a company makes a dividend payment to its shareholders, it also makes a tax payment to the Inland Revenue. The tax is paid on the *net* dividend distribution to shareholders, and is at the lower income tax rate (which may be changed from time to time in the Chancellor of the Exchequer's annual budget). This tax payment by the company is known as Advance Corporation Tax (ACT)—it is in effect an advance payment of a company's corporation tax.

For example, if a company pays a dividend of £50,000 to its shareholders and the

lower income tax rate is 10 per cent, it will make an ACT payment to the Inland Revenue of £50,000×10/90=£5,556. Thus the company will make a total payout of £55,556, that is, £50,000 in dividends to its shareholders and £5,556 in tax to the Inland Revenue. Alternatively the net dividend can be converted to a gross figure by multiplying it by $1/(1-t)$, where t represents the relevant income tax rate. Thus £50,000×1(1−0.10) =£55,556.

Under the *imputation system* of tax in the UK, this ACT payment is imputed to shareholders. In other words shareholders receive credit for this tax. Their dividend income is not taxed again—unless they are liable to income tax at the higher rate.

Shareholders and investors frequently prefer to calculate their dividend yield on a *'gross'* basis. This makes the return (yield) more comparable with returns from other investments (which are usually quoted gross, that is before any tax effects) in which the investor may be interested.

Table 14.4 Ordinary share dividend: Cadbury Schweppes
Cadbury Schweppes: ordinary share dividend, 1997

	Pence per share
Interim dividend	5.50
Tax credit 20%	1.38
Final dividend	12.50
Tax credit 20%	3.12
	22.50

Thus if a shareholder receives a net dividend per share of £0.18 this would be equivalent to a gross dividend per share of £0.20, [£0.18×1/(1−0.10)], if the relevant tax rate is 10 per cent. An actual example of the tax credit effect is shown in Table 14.4.

Dividends paid after 5 April 1999

Following announcements made in the Budget on 17 March 1998, ACT is to be abolished with effect from 6 April 1999. Companies paying dividends on or after this date will no longer have to account to the Inland Revenue for ACT in respect of these dividends.

Notwithstanding the abolition of ACT, tax credits will continue to be available to individual shareholders resident for tax purposes in the UK, although the amount of the tax credit will be reduced to one-ninth of the amount of the net, or cash dividend— equivalent to 10 per cent of the gross dividend.

Lower and basic rate taxpayers, as before 6 April 1999, will have no further liability to tax on their dividends. Higher rate tax payers will, as before, be able to offset the tax credit against their liability to tax on the gross dividend. UK resident individual shareholders who are not liable to income tax in respect of the dividend will not generally be entitled to reclaim any part of the tax credit.

Tax credits are no longer available to UK pension funds. Under legislation introduced in the Finance (No. 2) Act 1997, UK pension funds are not entitled to reclaim the tax credits on dividends paid to them by a company. Similarly, after 6 April 1999 tax credits

in respect of dividends paid, which constitutes the income of a charity or venture capital trust, will not be repaid.

There is some speculation that, in the future, companies may increase their dividend distributions to compensate these investing institutions for the loss of their tax credits.

EXERCISE 1 —DIVIDEND YIELD

If the share price for Cadbury Schweppes was 622p at the end of 1997, calculate the gross dividend yield for the year. Compare this with the yield for 1996 using a gross dividend of 21.25p and a share price of 487p. Comment on your findings.

THEORIES OF DIVIDEND POLICY

Over time many theories on dividend policy, often controversial ones, have emerged. The central area of controversy has, and continues to be, concerned with whether or not there is a real connection between dividend policy and the market value of the firm. In this section we will review the following main theories of dividend policy:

1 the residual theory of dividend policy;
2 dividend irrelevancy theory;
3 the bird-in-the-hand theory;
4 dividend signalling theory;
5 the dividend clientele effect;
6 agency cost theory.

We will begin by examining the residual theory of dividend policy.

The residual theory of dividend policy

The essence of the **residual theory of dividend policy** is that the firm will only pay dividends from residual earnings, that is, from earnings left over after all suitable (positive NPV) investment opportunities have been financed.

Recall from the previous chapter that, according to Myers' Pecking Order Theory, managers will prefer to utilise retained earnings as the primary source of investment financing, before resorting to issuing debt or equity. Retained earnings are the most important source of financing for most companies (see Chapter 3, Table 3.1). They are a cheaper source of finance than making a fresh issue of equity due to expensive equity issue costs (e.g. advertising, brokerage and underwriting fees).

The existence of these issue costs—which are examples of real world market imperfections (see dividend irrelevancy theory below)—it is suggested by some theorists, would lead companies to favour using retained earnings to finance investment projects rather than making a fresh equity issue. This implies a residual approach to dividend policy, as the first claim on retained earnings will be the financing of investment projects.

With a residual dividend policy, the primary focus of the firm's management is indeed on investment, not dividends. Dividend policy becomes irrelevant, it is treated as a passive, rather than an active, decision variable. The view of management in this case is that the value of the firm and the wealth of its shareholders will be maximised by investing earnings in appropriate investment projects, rather than paying them out as dividends to shareholders.

Thus managers will actively seek out, and invest the firm's earnings in, all acceptable (in terms of risk and return) investment projects, which are expected to increase the value of the firm. Dividends will only be paid when retained earnings exceed the funds required to finance suitable investment projects. Conversely, when the total investment funds required exceed retained earnings, no dividend will be paid.

Motives for a residual policy

The motives for a residual, or high retentions, dividend policy commonly include:

- A high retentions policy reduces the need to raise fresh capital (debt or equity), thus saving on associated issue and flotation costs.
- A fresh equity issue may dilute existing ownership control; this may be avoided if retentions are consistently high.
- A high retentions policy may enable a company to finance a more rapid and higher rate of growth.
- When the effective rate of tax on dividend income is higher than the tax on capital gains, some shareholders, because of their personal tax positions, may prefer a high retention/low payout policy.

Residual policy in practice

There is some evidence in the real world supporting the residual approach to dividend policy. Established, mature companies with limited growth prospects tend to have higher dividend payout ratios than young, rapidly growing companies.

However, this does not mean that young, growing companies, with numerous attractive investment opportunities, necessarily have erratic dividend payment patterns. Observed dividend payment patterns simply do not fluctuate as markedly as the adoption of a pure residual policy would imply.

In reality the overwhelming tendency is for companies to pay a stable pattern of dividends to shareholders and for company managers to be very reluctant to change existing payout policies. For instance, look at the dividend payout pattern of Pizza Express in Table 14.5.

Pizza Express is a young, rapidly growing restaurant business with ambitious expansion plans. If the company was following a purely residual policy then there would conceivably be periods in which the equity required to finance investment projects is greater than the company's retained earnings. In such circumstances no dividend would be paid, but in practice this rarely happens.

From Table 14.5 it can be seen that Pizza Express has steadily increased its dividend payments each year, with the increase in dividends lagging behind the increase in

earnings. Presumably the company is restraining dividend payments until management is more certain that the longer-term trend in earnings is sustainable—a very common type of dividend policy (see the section 'Empirical Evidence on Dividend Policy' later in this chapter).

Table 14.5 Pizza Express plc: dividend payout/earnings retention ratios
Pizza Express plc: dividends and earnings financial year ended 30 June

	1995	1996	1997	1998
DPS (pence)	2.2	2.7	3.35	4.25
EPS (pence)	8.4	13.6	20.1	27.20
DPS/EPS, *d*	26.2%	19.9%	16.7%	15.6%
Retentions, *r*	73.8%	80.1%	83.3%	84.4%

It is interesting to observe in Pizza Express's case that, despite the reduction in the actual dividend payout ratio, the company's share price over the same period continued to increase significantly—primarily due to investors' favourable expectations about future growth in the company's earnings. Investors seemed to consider that retained earnings were being invested profitably and to be satisfied with the overall level of return.

The residual theory implies that if a company is unable to earn a rate of return from its investments that is at least equal to the return required by investors, then the company should pay out its earnings as dividends to its shareholders.

This in turn implies that it is a company's investment policy, rather than its dividend policy, that matters to investors. In the context of residual theory dividend policy therefore is irrelevant—the value of the firm being a direct function of its investment decisions.

EXERCISE 2 —RESIDUAL DIVIDEND POLICY
What do you consider might be the disadvantages or drawbacks of a residual dividend policy?

Dividend irrelevancy theory

Dividend irrelevancy theory asserts that a firm's dividend policy has no effect on its market value or its cost of capital. As we discussed in the preceding section, dividend irrelevancy is implied by the residual theory, which suggests that dividends should only be paid if funds are available after all positive NPV projects have been financed. The theory of dividend irrelevancy was perhaps most elegantly argued by its chief proponents, Modigliani and Miller (usually referred to as M&M) in their seminal paper in 1961.

In the same manner in which they argued for capital structure irrelevancy (discussed in Chapter 13) M&M assert that the value of a firm is primarily determined by its ability to generate earnings from its investments and by its level of business and financial risk.

They argue that dividend policy is a 'passive residual' which is determined by a firm's need for investment funds.

According to M&M's irrelevancy theory, it therefore does not matter how a firm divides its earnings between dividend payments to shareholders and internal retentions. In the M&M view the dividend decision is one over which managers need not agonise, trying to find the optimal dividend policy, because an optimal dividend policy does not exist.

M&M built their dividend irrelevancy theory on a range of key assumptions, similar to those on which they based their theory of capital structure irrelevancy. For example they assumed:

- **Perfect capital markets,** that is, there are *no taxes (corporate or personal), no transaction costs* on securities, *investors are rational, information is symmetrical—* all investors have access to the same information and share the same expectations about the firm's future as its managers.
- The firm's investment policy is fixed and is independent of its dividend policy.

You may consider that the theory can be dismissed because the underlying assumptions are simplistic and idealistic. However, as M&M themselves argued, all economic theories are based on simplifying assumptions, and it is not their lack of realism which matters but the ability of the theory itself to stand up to empirical testing. The model's robustness can be tested by introducing real-world factors and observing their effect.

We can illustrate the M&M dividend irrelevancy argument with the aid of an example.

Example 1 —M&M dividend irrelevancy

The current balance sheet, *at market values,* for the Green Isle Publishing Company is as follows:

	£
Fixed assets	90,000
Current assets (cash only)	10,000
Total assets	100,000
Less: Long-term loan	40,000
Net assets	60,000
Capital and reserves	
Equity shareholders funds (30,000 shares)	60,000

The company's directors wish to pay out the cash balance to shareholders as dividends, thus transferring some of the company's wealth to its shareholders. They also wish to invest £10,000 in an investment project which is expected to return a positive net present value (NPV). How can the directors' objectives be achieved without affecting shareholder value?

If the present cash balance of £10,000 is used to pay the dividend, the cash necessary to finance the investment can be obtained by a fresh issue of equity for £10,000. The company cannot issue debt as

this would alter the company's capital structure.

Assuming the equity is issued at the current market value of £2.00 (£60,000/30,000), 5,000 new shares would be issued. The revised balance sheet, after payment of the dividend and receiving the proceeds from issuing the equity, would appear as follows:

	£
Fixed assets	90,000
Current assets (cash from equity issue)	10,000
Total assets	100,000
Less: Long-term loan	40,000
Net assets	60,000
Capital and reserves	
Equity shareholders funds (30,000+5,000 shares)	60,000

The equity value of the company remains as before, £60,000. However, there are now 35,000 shareholders, giving a share value of £1.71. Has the wealth of the original shareholders been reduced?

The answer is no. The value of the equity held by the original shareholders is now £50,000 (£60,000 minus the value of the new equity raised of £10,000). The original shareholders have also received a dividend worth £10,000, which when added to their current equity stake of £50,000 leaves their total wealth unchanged at £60,000.

Remember that this analysis has relied on M&M's assumptions of a perfect market.

EXERCISE 3 —DIVIDEND IRRELEVANCY AND SHAREHOLDER WEALTH

For the original shareholders of Green Isle Publishing, show how the transactions will affect their wealth, if at all, measured in terms of the asset value per share.

The bird-in-the-hand theory

The essence of the **bird-in-the-hand theory** of dividend policy (advanced by John Lintner in 1962 and Myron Gordon in 1963) is that shareholders are risk-averse and prefer to receive dividend payments rather than future capital gains. Shareholders consider dividend payments to be more certain that future capital gains—thus a 'bird in the hand is worth more than two in the bush'.

Gordon contended that the payment of current dividends *'resolves investor uncertainty'*. Investors have a preference for a certain level of income now, rather than the prospect of a higher, but less certain, income at some time in the future.

The key implication, as argued by Lintner and Gordon, is that because of the less risky nature of dividends, shareholders and investors will discount the firm's dividend stream at a lower rate of return, r, thus increasing the value of the firm's shares.

Recall from Chapter 8 that, according to the constant growth dividend valuation (or Gordon's growth) model, the value of an ordinary share, SV_0, is given by:

$$SV_0 = \frac{D_1}{(r-g)}$$

Where the constant dividend growth rate is denoted by g, r is the investor's required rate of return, and D_1 represents the next dividend payment. Thus the lower r is in relation to the value of the dividend payment D_1, the greater the share's value. In the investor's view, according to Lintner and Gordon, r, the return from the dividend, is less risky than the future growth rate g.

M&M argued against this and referred to it as the *bird-in-the-hand fallacy.* In their irrelevancy model, M&M assume that the required rate of return or cost of capital, r, is independent of dividend policy. They maintain that a firm's risk (which influences the investor's required rate of return, r) is a function of its investment and financing decisions, not its dividend policy.

M&M contend that investors are indifferent between dividends and capital gains—that is, they are indifferent between r and g in the dividend valuation model. The reason for this indifference, according to M&M, is that shareholders simply reinvest their dividends in shares of the same or similar risk companies.

Dividend signalling theory

In practice, changes in a firm's dividend policy can be observed to have an effect on its share price—an increase in dividends producing a increase in share price and a reduction in dividends producing a decrease in share price. This pattern led many observers to conclude, contrary to M&M's model, that shareholders do indeed prefer dividends to future capital gains. Needless to say M&M disagreed.

M&M suggested that the change in share price following a change in dividend payment, is due to the **informational content** of the dividend payment, rather than the dividend payment itself.

In other words, the change in dividend payment is to be interpreted as a **signal** to shareholders and investors about the future earnings prospects of the firm. Generally a rise in dividend payment is viewed as a *positive signal,* conveying positive information about a firm's future earnings prospects resulting in an increase in share price. Conversely a reduction in dividend payment is viewed as a *negative signal* about future earnings prospects, resulting in a decrease in share price.

As we discussed in relation to capital structure in the previous chapter, signalling theory argues that shareholders and the investing community understand these issues; that managers have more information about a firm's future prospects **(information asymmetry)** and use dividend and financing policy to signal this information to their less well-informed shareholders and investors.

The dividend clientele effect

The **dividend clientele effect** is a feature of M&M's dividend irrelevancy theory. In relation to dividend policy, M&M argued for the existence of a clientele effect, where the nature of a firm's dividend policy will attract a particular clientele of shareholders.

Investors who prefer income to capital growth will be attracted to companies with high dividend payout policies and vice versa. For example, many charities, pension funds and retired senior citizens, have a need for a stable, regular income to meet their operating expenses and other financial commitments.

With regard to charities (and also other institutions such as universities which receive endowments and legacies) often the terms and conditions of endowments will prohibit a charity's trustees from spending the capital sum endowed. The capital endowment therefore has to be invested, in perpetuity, to generate income. In such circumstances, investing in high dividend paying companies has its appeal.

In contrast, other groups of investors who (perhaps for taxation reasons, where an investor's capital gains may be taxed at a lower rate than the investor's income) may prefer capital growth to income, will be attracted to firms with high earnings retention and low dividend payout policies.

In the main, the existence, or otherwise, of investor clienteles is generally considered to have no effect on an individual firm's share value. M&M stated that: 'each corporation would tend to attract itself a clientele consisting of those preferring its particular dividend payout ratio, but one clientele would be as good as another in terms of the valuation it would imply for firms'.

It is argued that as long as, in the stock market overall, there are enough shares available to satisfy the needs of particular investor clienteles, then they will have no impact on share value. For example, the share price of a high dividend paying company may increase if the demand for the shares of companies operating this kind of dividend policy exceeds supply in the stock market.

The implication is that a firm's management can develop the dividend policy which it considers most appropriate for the individual circumstances of the firm and need not concern itself with particular clienteles—'one clientele is as good as another'. But managers do need to be aware of potential shifts in their dividend clienteles, if they decide to suddenly change a firm's existing dividend policy.

Any sudden and dramatic change of policy is likely to cause a similar, sudden and dramatic shift in its shareholder clientele and possibly in its share price. Shareholders and investors who find the new policy meets their needs will be attracted to the firm. Any existing shareholders who no longer find the policy suitable will sell their shares.

M&M argued that shareholders who need regular income can create their own **homemade dividends** by selling some of their shares. In a perfect capital market, which is one of M&M's key assumptions, investors can freely buy and sell shares at no cost— there are no transaction costs or taxes in a perfect market.

However, in reality, buying and selling investments, particularly for small investors, can be costly because of transaction costs (e.g. brokers' fees and commissions). Small investors may also be liable to capital gains tax on the disposal of shares. These factors

are likely to deter such investors from creating home-made dividends.

For large institutions this problem is not so acute. Large institutions, such as the major insurance companies and pension funds, can sell their shares in large blocks, and because of their financial power are in a position to negotiate very low transaction costs.

An additional reality factor is that, before changing its dividend policy, a firm would have to assess if there is a sufficient 'clientele' of shareholders and investors who would be attracted to the new policy.

The dividend clientele effect, like many other aspects of dividend policy, has remained difficult to verify in practice.

Agency cost theory

In Chapter 2, where the nature of the agency relationship was first discussed, **agency costs** were defined as those incurred in attempting to minimise the **agency problem.** The agency problem is the potential for conflict in objectives which exists in a principal-agent relationship. In the corporate finance world, the principals are the shareholders who own the firm and managers act as their agents.

For the shareholders of a firm where ownership is separate from managerial control, the agency problem is that managers, who are in day-to-day control of the firm, may tend to act in their own personal best interests rather than those of the shareholders, the firm's owners.

Recall that a firm's owners will incur agency costs whenever they introduce procedures and mechanisms aimed at reducing the potential for conflict between the personal objectives of managers and the objectives of the owners. Incurring agency costs has the effect of reducing shareholder value.

In the context of dividend policy, if, as a consequence of the firm's dividend payout policy, managers need to make periodic equity issues to finance the firm's investments, each fresh equity issue will expose the firm's managers and finances to the scrutiny of the investment community (bankers, financiers, underwriters, institutional investors and so forth).

Seeking additional equity from the financial markets requires managers to justify the reasons for the equity issue. This process is helpful to owners and reduces their agency costs, as managers are less likely to engage in activities which are not consistent with shareholder wealth maximisation if they know that the firm will be regularly exposed to this type of external scrutiny.

In this context, where the payment of dividends (like the raising of debt finance in the capital structure debate), at least in an indirect way, leads to the activities of managers being subjected to closer external investigation, then dividend (and financing) policy may indeed have a beneficial effect on the value of the firm. Agency cost theory would imply that firms adopt high dividend payout policies, after all suitable investment projects have been financed.

The mainstream, modern view of dividend policy emphasises the valuable role of dividend policy in helping to resolve the agency problem and thus in enhancing shareholder value.

PRACTICAL CONSIDERATIONS IN THE FORMULATION OF DIVIDEND POLICY

As we discussed in relation to the theories of capital structure, there are a range of **practical considerations** which will influence a company's dividend policy. These include:

Profitability and liquidity

A company's capacity to pay dividends will be determined primarily by its ability to generate adequate and stable profits and cash flows. As dividend payments represent cash outflows, a company which is not earning profits and/or has liquidity problems, will experience difficulties in sustaining dividend payments.

Legal and contractual

As previously indicated, under company law, dividends can only be paid out of distributable profits. Alternatively a company's dividend policy may be restricted by covenants on loan agreements. To protect their interests, lenders may impose restrictions limiting the amount of dividends which a company can pay out. In other cases government, or industry regulators (e.g. Ofwat, the water industry regulator), may introduce legislation or regulations which will, directly or indirectly, require companies to restrict dividend payments to shareholders.

Taxation

Corporate dividend policy is likely to be influenced by the tax regime of the country in which the company operates. An individual country's taxation system may have a favourable, unfavourable, or even neutral, effect on dividend policy.

In the tax regimes of many countries, the income from dividends and the capital gains on the disposal of shares are taxed at differential rates. Usually, the effect of the tax system (after adjusting for allowances and exemptions) is that income from dividends is effectively taxed at a higher rate than capital gains.

In the UK, this tax rate differential was effectively removed in 1988. However, the availability of annual exemptions from capital gains tax may produce a preference among some shareholders for companies with low dividend payouts.

At the level of personal taxation, income from dividends is normally treated as pan of the personal income on which an individual's annual income tax liability is calculated. Receiving dividend income may have the effect of elevating a shareholder into a higher income tax bracket, thus increasing the shareholder's marginal rate of tax on the dividend income. For some shareholders, this marginal rate of tax on dividends may then turn out to be higher than the effective rate of tax on capital gains.

In addition to the benefit of possibly a lower effective tax rate, there is usually a timing

benefit with capital gains tax (CGT), as the shareholder is not liable to pay capital gains tax until any gain becomes realised, that is, when the share is actually sold. The shareholder thus has the opportunity to defer the payment of capital gains tax (CGT), which will lower the cost of the tax, due to the present value effect.

Because of personal tax considerations, shareholders, who would possibly be liable to higher marginal tax rates on dividend income, may prefer to invest in companies which operate low dividend payout and high retention policies—in effect these shareholders will be forming taxation clienteles. There is research evidence supporting this clientele effect of marginal tax rates, see, for example, Elton and Gruber (1970).

Investment opportunities

A lack of appropriate investment opportunities, that is those with potentially positive NPVs, may encourage a company to increase its dividend distributions. Conversely if funds are required to finance an extensive investment programme, then dividend payments may be curtailed.

Capital structure

A company's managers may wish to achieve or restore an optimum or balanced capital structure. If, for example, a company's managers consider that gearing is currently too high, they may limit dividends and allow reserves to accumulate until a more appropriate capital structure is restored.

Industry practice

Companies will be reluctant to deviate from any accepted dividend practices or payment 'norms' which may obtain in their particular industry sector.

Growth stage

Dividend policy is likely to be influenced by a company's growth stage. For example, a young, rapidly growing company is likely to have a high demand for development finance. In such circumstances dividend payments may be strictly limited or even deferred until the company reaches a mature growth stage.

Ownership structure

A firm's dividend policy may be driven by its ownership structure. Normally in small firms, where owners and managers are one and the same, dividend payouts tend to be very low, or even non-existent. Whereas large, quoted public companies tend to pay out significant proportions of their earnings as dividends in small firms, the values and preferences of a closely knit, small group of owner-managers will exert a more direct influence on dividend policy.

It is also interesting to note that, almost without exception, when private companies

become public their dividend payouts increase.

Shareholder expectations

Shareholder clienteles that have become accustomed to receiving stable, and possibly increasing, dividends will reasonably expect a similar pattern of dividend payments to continue in the future. Any sudden reduction or reversal of such a policy is likely to incur the wrath of these shareholders, perhaps even prompting them to dispose of their shares and causing the share price to fall.

SHARE REPURCHASE SCHEMES

In the UK the ability of a company to repurchase its shares became legal following the introduction of the 1981 Companies Act. However, it is only in recent years that the practice of initiating share repurchase, or buyback, schemes has become a very popular way for companies (mainly in the UK and in the US), which have accumulated substantial balances of surplus cash, to return some of this cash to their shareholders.

These schemes are often promoted by companies as a means of returning value, in the form of excess cash, to shareholders. Under a share repurchase scheme, which must be approved by shareholders, a company returns surplus cash to its shareholders by buying back some of its shares—from those shareholders who are willing to sell.

Essentially a company can avail itself of three methods of repurchasing its shares. It can use the *open market,* it can make a *tender offer,* or it can make a private *arrangement* with perhaps a group of major shareholders.

Shareholders are not obliged to participate in a share repurchase arrangement if they do not wish to. They can retain their shares and, as has happened in many buyback schemes, see the value of their existing shareholding increase.

However, one of the troublesome aspects of share repurchase schemes is striking a price which is fair to those shareholders who, and those who do not, wish to sell. The price offered in a buyback is usually at a premium to the current market price to entice shareholders to sell.

Some of the more notable share repurchase schemes in the UK include:

- *Barclays.* In the mid to late 1990s, Barclays Bank (one of the forerunners of share repurchases in the UK) engaged in a continuing programme of returning substantial volumes of cash to shareholders through share repurchases. For example, during 1995/ 96 Barclays initiated three buybacks, returning a total of almost £1 billion of capital to shareholders.
- *Bass.* In 1998, Bass plc, the brewing and leisure group, returned an estimated £850 million to shareholders after disposing of most of its tenanted pub estate in 1997. Even after the share buyback, Bass still had an estimated £2 billion to spend on investments.
- *Boots.* From 1994 to 1997, Boots plc, the retail chemist group, returned a total of approximately £1.7 billion to its shareholders through a combination of share repurchases and special dividend payments.

- **_Diageo._** Shareholders in Diageo, the food and drinks company formed by the merger of Grand Metropolitan and Guinness in December 1997, received approximately £2.8 billion in a share buyback offer, after the newly formed company restructured its equity capital.
- **_Reuters._** In 1998, Reuters initiated a complex scheme involving a company restructuring and the distribution of around £1.5 billion to shareholders. Although the return of excess cash to shareholders was achieved in the form of a capital reorganisation, rather than an actual share repurchase scheme.

It seems that UK companies have the financial resources to continue with buyback activity. An analysis by Lehman Brothers, a US investment bank, reported in _The Independent_ newspaper on 10 March 1998, suggested that UK companies have the financial resources to buy back around £30bn worth of shares.

Advantages of share repurchases

Utilisation of idle cash

Companies which have accumulated cash balances, substantially in excess of any future investment needs, may find a share repurchase scheme an effective method of returning the cash to shareholders.

Continuing to carry excess cash may prompt a company's management to invest unwisely, simply as a means of utilising the excess cash. For example, a company may invest the surplus cash in an expensive acquisition, thus transferring most of the accumulated value to another group of shareholders entirely. There is a tendency for more mature companies to continue with investment plans even when expected returns are lower than the cost of capital.

When Reuters announced its major share repurchase programme, Peter Job, the company's chief executive said: 'There is a tendency to think that if you have loads of cash then you can invest in any project that interests you, and that is not a good approach.'

Enhanced dividends and earnings per share

Following a share buyback the number of shares in issue will fall. Consequently, in normal circumstances, both dividends per share (DPS) and earnings per share (EPS) will be enhanced.

When buybacks are announced, managers and the financial media tend to emphasise the beneficial effect on EPS. However, the increase in EPS is really no more than a bookkeeping effect: the earnings figure will remain the same but the number of shares will be reduced.

Enhanced share price

Companies which undertake share repurchase programmes generally experience an increase in the market price of their shares. This may be partly explained by the increase in earnings per share, having less shares available to trade in the market and/or a positive market signalling effect that the shares are undervalued (see below).

Research on European share repurchase schemes published in January 1998 by J.P. Morgan, a leading investment bank, revealed that share repurchases normally have a very favourable effect on share price. Of the 67 share repurchase schemes studied by J.P. Morgan, share price increased significantly, above the market average, in 41 cases.

Market signalling

Similar to dividend signalling, share repurchases can be used to signal information about the company's future prospects to the financial markets. For example, by initiating a share repurchase, directors, who have inside knowledge about the company, may be trying to convince the financial markets that the company's share are undervalued.

For example, when Rio Tinto (the largest mining company in the world and listed on both the UK and Australian stock markets) announced in January 1998 a plan to buy back up to 10 per cent of its share capital, the company's chairman publicly stated that: 'We consider that buying back shares, particularly in current market conditions, should achieve earnings per share improvement for the shareholders of both companies and enhance the underlying value of those shares which remain outstanding.'

Capital structure

A company's managers may use a share buyback as a means of correcting what they perceive to be an unbalanced capital structure. If shares are repurchased from cash reserves, equity will be reduced and gearing increased, assuming there is existing debt in the capital structure. Alternatively a company may decide to correct an imbalanced capital structure by raising debt to finance a repurchase. Replacing equity with debt can reduce a company's overall cost of capital due to the tax advantages of debt.

For instance in the Rio Tinto case mentioned above, the chairman also referred to the impact on capital structure, he said: 'We wish to ensure that the group has the maximum flexibility to manage its capital structure in order to reduce its cost of capital and enhance shareholder value.' The company estimated that for every 1 per cent of equity repurchased, gearing would rise by 1.5 per cent. At the time of making the announcement the company's gearing was around 27 per cent—which was described as modest.

Employee incentive schemes

Instead of cancelling all the shares repurchased a company can retain some of the shares for employee share option or profit-sharing schemes. Barclays, for example, has retained some of the shares it has repurchased, with dividend and voting rights, for its employee

profit-sharing schemes.

Reduced takeover threat

A share buyback reduces the number of shares in circulation and also the number of 'weak' shareholders, that is those shareholders who have no strong loyalties to the company, as buybacks will induce them to sell. This helps to reduce the threat of an unwelcome takeover, as it makes it more difficult for a predator company to gain control. This is sometimes referred to as **reverse dilution.**

Taxation

In the UK, share buybacks were favoured by companies which would have encountered difficulties with unrelieved advance corporation tax (ACT) if they used their excess cash to pay a special dividend.

As previously mentioned, ACT (to be abolished from 6 April 1999) is the tax which a company pays (in advance of its mainstream corporation tax payment) to the Inland Revenue. The amount of ACT is computed in relation to the dividend distribution and becomes payable soon after the dividend payment is made to shareholders. If a company generates sufficient profits it can relieve the ACT against its Mainstream Corporation Tax (MCT). MCT is the tax a company pays on its taxable profits.

When there are insufficient taxable profits, a company cannot obtain relief on all the ACT paid, thus accumulating unrelieved ACT. A key attraction of share buybacks is that they avoid any problems with ACT, compared to making special dividend payments. How the abolition of ACT will affect share buyback activity remains to be seen.

Disadvantages of share repurchases

High price

A company may find that it has paid too high a price to repurchase some of its shares, to the detriment of the remaining shareholders.

Market signalling

Despite directors' best efforts at trying to convince markets otherwise, a share repurchase may be interpreted by the financial markets as a negative signal suggesting that the company has a lack of suitable investment opportunities. It may even be interpreted as a sign of management failure.

Loss of investment income

When a company uses some of its excess cash to buyback shares, it will lose the interest earned from investing the surplus cash.

Taxation

Some shareholders who sell their shares in a buyback offer may be liable to capital gains tax.

SPECIAL DIVIDEND PAYMENTS

As an alternative to share repurchases, companies may decide to utilise excess cash by making special dividend payments to shareholders. Notable examples are Boots plc and National Grid, which owns the electricity transmission network in England and Wales.

A special dividend payment, which is in addition to the normal dividend, is usually for a substantial amount and is non-recurring—although some companies, for example Boots, can make a series of special dividend payments.

Like share repurchases, special dividend payments have become a popular way for companies to return surplus cash to their shareholders. In 1996, for example, an estimated £4 billion was paid out by UK companies in the form of special dividend payments.

EMPIRICAL EVIDENCE ON DIVIDEND POLICY

A classic piece of research into the attitudes of managers in the United States towards dividend policy was carried out by John Lintner in 1956. Lintner found that, in the opinion of corporate managers, the dividend decision does matter. Managers consider it to be important.

Lintner's research revealed that managers have a preference for maintaining a stable and increasing dividend payment policy, and aim towards a target dividend payout ratio, in the longer term. Moreover, Lintner found that managers are not inclined to increase the dividend per share payment, unless they are very confident of not having to reduce it again at some future stage.

Lintner's findings have generally been supported by subsequent research. For example Fama and Babiak (1968), and more recently in a survey by 3i, the UK's leading investment capital company, published in the *Bank of England Quarterly Review* in 1993.

In summary the empirical evidence, to date, on managers' attitudes to dividend policy suggests that managers:

1 prefer a dividend policy which is smooth and consistent;
2 prefer a dividend policy which is directed towards a long-run target payout ratio; and
3 are extremely reluctant to cut the dividend per share payment.

A DIVISIVE POLICY?
An interesting insight into the practical relevance of dividend

policy is provided in the case of LucasVarity (an automotive and aerospace engineering company, created by the merger in 1996 of Lucas Industries in the UK and Varity Corporation in the US).

In 1997 LucasVarity attempted to abolish dividend payments as a matter of principle. The company wished to introduce an ongoing programme of share buybacks instead of dividends.

The move was vigorously opposed by the company's major institutional investors, most of which were tax-exempt pension funds. These investors expressed a distinct preference for regular dividend payments as a steady source of income and for the tax breaks which were available to them—essentially they could reclaim the ACT on their dividends paid by the company on their behalf.

Some of these investors also claimed that if the LucasVarity abolished dividend payments, they would be in breach of their trust rules, which require them to invest only in dividend paying companies.

One of the largest investors in LucasVarity was reported as saying that they would prefer 'a sensible progressive dividend policy' and that share-buybacks should only occur in exceptional circumstances.

COMMONLY USED DIVIDEND POLICIES

In practice, a firm may operate one, or even a combination, of the following commonly used dividend policies.

Smooth-stream dividend policy

Many leading companies (see 'Dividend Policy in Practice') tend follow the same policy of a stable, but progressively increasing, dividend per share payment. For example, in its flotation prospectus the directors of the Thomson Travel Group declared they intended to: 'follow a progressive dividend policy which will take into account the underlying earnings of the Group, whilst maintaining an appropriate level of dividend cover'. [1]

Constant dividend payout ratio

A firm operating this type of dividend policy will pay its shareholders a constant proportion of its earnings—the dividend per share will be a fixed percentage of the earnings per share.

If followed strictly this policy may lead to erratic dividend payments, particularly if earnings are fluctuating or maybe even losses are incurred. This in turn, perhaps due to the signalling effect, may lead to erratic movements (sometimes favourable, sometimes adverse) in the firm's share price.

Constant dividend per share (DPS)

Some firms follow a policy where they pay a constant or regular dividend amount, in terms of dividend per share. For example, a firm's directors may decide to pay, each year, a regular dividend of 8 pence per share.

This regular DPS payment will only ever be increased when the directors are convinced that the increase can be sustained. Conversely this policy implies that directors are extremely reluctant to reduce dividend payments, because this will be interpreted as a negative signal by shareholders and investors.

Low regular dividend with periodic enhancements

This type of policy involves the firm paying a small regular dividend, which in high earnings years is supplemented by an enhanced dividend, usually included with the final dividend payment.

This policy has the advantages of offering the shareholder the certainty of a regular payment element and of providing the firm with a degree of flexibility in its dividend policy. However, it has the disadvantage that the enhanced element may gradually become part of the shareholders' expectations.

Dividend policy in practice

This section is simply intended to provide an insight into the types of dividend policies actually followed by some of the leading companies listed on the London Stock Exchange.

Tables 14.3 and 14.5 illustrated the dividend policies of two distinctly different companies; Reuters which is a large, mature company, and Pizza Express a young, dynamic and rapidly growing company. For convenience the relevant extracts are summarised in Table 14.6.

Table 14.6 Dividend payment practice
Reuters Group plc: dividend payments, financial year ended 31 December

	1994	1995	1996	1997
DPS	8.0p	9.8p	11.75p	13.01p
Increase over previous year	n/a	+22%	+20%	+11%
Payout ratio	37%	38%	39%	45%

Pizza Express plc: dividend payments, financial year ended 30 June

	1995	1996	1997	1998
DPS	2.2p	2.7p	3.35p	4.25p
Increase over previous year	n/a	+23%	+24%	+27%
Payout ratio	26.2%	19.9%	16.7%	15.6%

Both companies display the same pattern of a significant annual increase in actual

dividend per share payments. However, their actual dividend payout ratios are radically different. Reuters' payout ratio has progressively increased, whereas that of Pizza Express has substantially declined.

Most leading companies tend follow the same policy of a stable, but progressively increasing, dividend per share payment—sometimes referred to as the *smooth-stream dividend policy*—referred to above. For example, major listed companies such as Airtours, BP, Cadbury Schweppes, Tesco, and Unilever have all maintained a policy of regularly increasing their actual dividend per share payments over recent years. This would seem to provide some further evidence in support of Lintner's original research findings.

An example of this smooth-stream policy is presented in Table 14.7. Table 14.7 illustrates Cadbury Schweppes' dividend policy over the eight years 1990 to 1997. The company has maintained a steady and progressive growth in the dividend per share payment to shareholders.

Table 14.7 Smooth-stream dividend policy
Cadbury Schweppes: dividend policy

Year	1990	1991	1992	1993	1994	1995	1996	1997
EPS (p)	23.9	26.0	25.4	29.4	30.2	31.3	34.1	37.2
DPS (p)	10.9	11.8	12.5	13.8	15.0	16.0	17.0	18.0
Payout (%)	45.6	45.4	49.2	46.9	49.7	51.1	49.9	48.4
EPS change (%)	−4.4	8.8	−2.3	15.7	2.7	3.6	8.9	9.1
DPS change (%)	7.9	8.3	5.9	10.4	8.7	6.7	6.3	5.9

It is interesting to note that in four of the eight years (1990, 1992, 1994 and 1995) the percentage growth in dividend per share (DPS) has exceeded the percentage growth in earnings per share (EPS), as evidenced by the increase in the payout ratio.

Even when earnings per share declined (by 4.4 per cent in 1990 and by 2.3 per cent in 1992) dividend per share was increased (by 7.9 and 5.9 per cent, respectively), thus maintaining the dividend payment pattern. This strategy was probably intended as a signal to shareholders that the directors expected earnings to recover, and of their confidence in being able to sustain a steady growth in dividends.

As we have already noted, company directors in general are extremely reluctant to cut dividends, as this may be interpreted negatively by shareholders and investors, resulting in a share price fall. Directors consider that maintaining consistent dividend growth promotes the image of a financially sound company.

SUMMARY

At this stage it would be helpful to try and summarise the various views on dividend policy.

Miller and Modigliani (M&M) have demonstrated that, assuming **perfect capital market conditions,** a firm's dividend decision is irrelevant; dividend policy has no

influence on share value. Therefore, in a perfect market, it does not matter whether a firm has a dividend policy or not.

In the real world, **market imperfections,** such as taxation and transaction costs, do exist. Expensive equity issue costs (e.g. underwriting and brokerage fees) would induce firms to use internally generated funds, that is, retentions, to finance positive NPV investments, rather than make a fresh equity issue. This, some theorists argue, leads to a residual approach to dividend policy. Earnings will be primarily used to fund investments; dividends will be paid from any earnings remaining after all suitable investments have been funded.

Taxation is a market imperfection which, many critics of M&M argue, has a significant bearing on dividend policy and therefore makes dividend policy a relevant factor in determining the value of the firm.

In addition, investors who, because of their individual financial circumstances, prefer steady income to capital growth or vice versa, create a **clientele effect**—a firm will attract the investor clientele to which its dividend policy most appeals. But the existence of clientele groupings is generally considered irrelevant. It is argued that clienteles have no effect on an individual firm's share value as long as there are enough shares widely available in the capital markets to satisfy the needs of various clienteles.

A firm's share value may also be affected by other market imperfections such as **information asymmetry,** where the information content or **signalling effect** of dividends seems to be relevant. Indeed, this is one aspect of dividend theory which does seem to be clear, and on which there is widespread general agreement—*the important role of dividend policy in signalling information to shareholders and investors.*

Financial markets and investors do not like strategic shocks or surprises. Therefore a firm's management should be wary of making any sudden and dramatic changes, particularly reductions, to a firm's dividend policy, as this will probably also cause a sudden and dramatic change in its shareholder clientele and probably its share price. The available evidence would suggest that a firm maintains a stable and consistent dividend policy over time.

The mainstream, modern **agency cost** view of dividend policy argues for the valuable role of dividend policy in helping to resolve the agency problem, reducing agency costs, and thus in enhancing shareholder value. Agency cost theory would imply that firms adopt high dividend payout policies, after all suitable investment projects have been financed.

Although the jury is still out on dividend policy, and there is no general consensus on the relationship between dividend policy and share value, the empirical evidence available would seem to suggest that, at least in practical terms, dividend policy is highly relevant to corporate managers, shareholders and investors, particularly the large institutional investors. It would only seem logical therefore that this **behavioural aspect** of dividend policy is recognised by a firm's managers in the formulation of its own dividend policy.

It is intriguing that, over twenty years later, and despite voluminous academic research, the two basic questions posed by Fisher Black, in his famous article 'The Dividend Puzzle' in 1976: (1) Why do corporations pay dividends? and (2) Why do investors pay attention to dividends? still remain without definitive answers.

> **KEY LEARNING POINT**
> Miller and Modigliani are the leading proponents for the irrelevancy of dividend policy—in conditions of perfect capital markets. In reality, the relevance or otherwise of dividend policy, may be influenced by the existence of the main capital market imperfections, that is, taxation, information asymmetry, and agency costs. However, precisely how these factors impact on dividend policy is as yet undetermined.

RECAP

The dividend decision: The dividend decision is a key part of the firm's strategic financing decision. It essentially involves a trade-off between the payment of dividends to shareholders and the retention of earnings to finance investment.

Dividend policy: A firm's dividend policy can be defined as the plan of action adopted by its directors whenever the dividend decision has to be made.

Dividend ratios: The key ratios in relation to the analysis of dividend policy are: the **dividend payout ratio, the earnings retention ratio, dividend cover** and the **dividend yield.**

Theories of dividend policy: The main theories of dividend policy which have evolved are: **(1) the Residual Theory; (2) the Miller & Modigliani (M&M) Irrelevancy Theory; (3) the Bird-in-the-Hand Theory; (4) Dividend Signalling Theory; (5) the Dividend Clientele Effect**; and (**6) Agency Cost Theory.**

Practical aspects of dividend policy: There are a range of practical considerations which will influence a company's dividend policy, for example, **profitability, liquidity, legal and contractual, taxation, industry practice, growth stage, ownership structure and shareholder expectations.**

Share repurchase schemes: These schemes are a means of returning value, in the form of excess cash, to shareholders. Under a share repurchase scheme a company returns surplus cash to its shareholders by buying back some of its shares, from those shareholders who are willing to sell.

Special dividend payments: As an alternative, or even in addition, to share repurchases, a company may decide to return cash to shareholders by means of a special dividend payment.

Commonly used dividend policies: The types of dividend policies frequently operated by companies include: **smooth-stream dividend policy; constant dividend payout ratio; constant dividend per share (DPS); and low regular dividend with periodic enhancements.**

REVIEW QUESTIONS

Concept review questions

1 (a) What is the nature of a firm's dividend decision? (b) How would you define the term 'dividend policy'? (c) What is meant by the term 'optimal dividend policy'?

2 (a) Describe the residual theory of dividend policy, (b) How is a residual policy likely to affect a firm's dividend payments?

3 What are the essential characteristics of M&M's dividend irrelevancy theory?

4 Briefly describe dividend signalling theory.

5 Explain how agency costs might influence dividend policy.

6 Summarise the practical considerations which are likely to influence a firm's dividend policy.

7 Why do firms undertake share repurchase schemes?

8 (a) State four types of dividend policy commonly found in practice, (b) Why might a firm's managers and shareholders prefer to have a stable dividend policy?

Practice questions

9 **Dividend ratios.** The Java Paper and Packaging Company has reported the following information for the financial year just ended.

	£m
Turnover	20.67
Profit before tax	4.13
Taxation	1.24
Profit after tax	2.89
Dividend (net)	0.95
Retained earnings	1.94

The company has an issued share capital of £5m (at 25p par) and the market price of the share at the year end was £2.75.

Using the above information calculate:

(a) Dividend per share (DPS);
(b) Earnings per share (EPS);
(c) Dividend payout ratio;
(d) Earnings retention ratio;
(e) Dividend cover;
(f) Dividend yield (gross).

Assume an income tax rate of 20 per cent where relevant.
Comment on your findings.

10 **Evaluation of dividend policies.** Energy Systems, a company which designs and manufactures sophisticated electronic energy control systems, has experienced a period of rapid growth in recent years. The directors will soon meet to discuss the company's financial plan for the next five years. A key item on the agenda for the meeting is the discussion of the company's dividend policy over the planning period.

The managing director has suggested that the following dividend policies should be considered:

1 Maintain the same divided payout ratio as in the current year; or
2 Increase the dividend per share by a constant 20 per cent per year.

The managing director's objective is to avoid any reduction in dividends.

The company has ambitious growth plans and based on the company's strategic business plan, the financial director has prepared the following forecast financial data:

Year	Forecast EPS (pence)
Current	9.80
1	11.90
2	10.10
3	13.30
4	14.50
5	17.40

It is approaching the end of the current financial year and the directors are proposing a final dividend of 2.9p per share. An interim dividend of 1.02p per share has already been paid.

(a) As an assistant to the financial director you have been asked to calculate the dividend per share (DPS) and the dividend payout ratios for each of the two policies over the five-year period and comment on your findings.

Based on the information provided, state in your answer which policy, if any, you consider financially feasible and give your reasons.

(b) The financial director has now determined that, in order to be able to finance its planned investment programme over the five years, the company will need to retain at least 70 per cent of its earnings in years 1 to 3 and at least 50 per cent in years 4 to 5.

Show how this is likely to affect the proposed dividend policies over the five-year period. Assuming the directors do not wish to raise additional financing, indicate the maximum dividend payable.

Test questions

11 **Evaluation of dividend policy.** Hiome plc has experienced a period of above average growth for its industry, but is now growing at the normal rate of about 10

per cent per year. The company's directors are reviewing the current dividend policy. One director has suggested that, as the company no longer needs as much internally generated funds to finance new investment, a higher proportion of earnings should be paid out as dividends in order to benefit the company's shareholders. Another director has read that two eminent economists, Miller and Modigliani, have stated that the pattern of dividend payouts is irrelevant, and therefore shareholders will experience no gain from a higher level of dividends.
Required:
Discuss whether or not an increase in dividends is likely to benefit the shareholders of Hiome plc.

12 **Evaluation of dividend policies.** The board of directors of Deerwood plc are arguing about the company's dividend policy.
Director A is in favour of financing all investment by retained earnings and other internally generated funds. He argues that a high level of retentions will save issue costs, and that declaring dividends always results in a fall in share price when the shares are traded ex div.
Director B believes that the dividend policy depends upon the type of shareholders that the company has, and that dividends should be paid according to shareholders' needs. She presents data to the board relating to studies of dividend policy in the USA, and a breakdown of the company's current shareholders.

Company group (10 companies per group)	USA dividend research Mean dividend yield (%)	Average marginal tax rate of shareholders (%)
1	7.02	16
2	5.18	22
3	4.17	25
4	3.52	33
5	1.26	45

Deerwood plc: analysis of shareholding

	Number of shareholders	Shares held (million)	% of total shares held
Pension funds	203	38.4	25.1
Insurance companies	41	7.8	5.1
Unit and investment trusts	53	18.6	12.1
Nominees	490	32.4	21.2
Individuals	44,620	55.9	36.5
	45,407	153.1	100.0

She argues that the company's shareholder 'clientele' must be identified, and dividends fixed according to their marginal tax brackets.
Director C agrees that shareholders are important, but points out that many institutional shareholders and private individuals rely on dividends to satisfy their current income requirements, and prefer a known dividend now to an uncertain

capital gain in the future.

Director D considers the discussion to be a waste of time. He believes that one dividend policy is as good as any other, and that dividend policy has no effect on the company's share price. In support of his case he cites Modigliani and Miller.

Required:

Critically discuss the arguments of each of the four directors using both the information provided and other evidence on the effect of dividend policy on share price that you consider to be relevant.

13 **Evaluation of dividend policy,** (a) Pavlon plc has recently obtained a listing on the Stock Exchange. Ninety per cent of the company's shares were previously owned by members of one family but, since the listing, approximately 60 per cent of the issued shares have been owned by other investors.

Pavlon's earnings and dividends for the five years prior to the listing are detailed below:

Years prior to listing	Profit after tax (£)	Dividend per share (pence)
5	1,800,000	3.60
4	2,400,000	4.80
3	3,850,000	6.16
2	4,100,000	6.56
1	4,450,000	7.12
Current year	5,500,000 (estimate)	

The number of issued ordinary shares was increased by 25 per cent three years prior to the listing and by 50 per cent at the time of the listing. The company's authorised capital is currently £25,000,000 in 25p ordinary shares, of which 40,000,000 shares have been issued. The market value of the company's equity is £78,000,000.

The board of directors is discussing future dividend policy. An interim dividend of 3.16p per share was paid immediately prior to the listing and the finance director has suggested a final dividend of 2.34p per share.

The company's declared objective is to maximise shareholder wealth.

(i) Comment upon the nature of the company's dividend policy prior to the listing and discuss whether such a policy is likely to be suitable for a company listed on the Stock Exchange.

(ii) Discuss whether the proposed final dividend of 2.34p is likely to be appropriate:

• If the majority of shares are owned by wealthy private individuals;
• If the majority of shares are owned by institutional investors.

(b) The company's profit after tax is generally expected to increase by 15 per cent per annum for three years, and by 8 per cent after that. Pavlon's cost of equity capital is estimated to be 12 per cent per year. Dividends may be assumed to grow at the same rate as profits.

(i) Using the dividend valuation model give calculations to indicate whether Pavlon's shares are currently undervalued or overvalued,

(ii) Briefly outline the weaknesses of the dividend valuation model.

14 **Evaluation of dividend policies and share repurchase.** DIVS plc is a large international company with widespread interests in advertising, media and various consultancy activities associated with sales promotion and marketing. In recent years the company's earnings and dividend payments, in real terms, have grown on average by 15 per cent and 12 per cent per year, respectively.

The company is likely to have substantial cash surpluses in the coming year, but a number of investment opportunities are being considered for the subsequent two years. The senior managers of the company are reviewing their likely funding requirements for the next two to three years and the possible consequences for dividend policy.

At present the company has a debt:equity ratio of 1:5, measured in market value terms. It does not want to increase this ratio at the present time but might need to borrow to pay a maintained dividend in the future.

The senior managers of the company are discussing a range of issues concerning financial strategy in general and dividend policy in particular.

Required:

Assume that you are an independent financial advisor to the Board of DIVS plc. Write a report to the board which discusses the following issues:

(i)   The repurchase of some of the company's shares in the coming year using the forecast surplus cash, the aim being to reduce the amount of cash needed to pay dividends in subsequent years. Other implications of share repurchase for the company's financial strategy should also be considered.

(ii) The advisability of borrowing money to pay dividends in years 2 and 3.

(iii) The likely effect on the company's cost of equity if the company decides on share repurchase and/or further borrowing.

Practical project

Obtain the annual report and accounts of a company relevant to your area of study. It may be helpful to obtain the reports for the two most recent financial years. Using relevant information in the reports you are required to:

(a) Prepare a table showing the following:

(i)   The dividend per share (DPS) and earnings per share (EPS) for the past three years;

(ii) The percentage increase (or decrease) in DPS and EPS for each year;

(iii) The dividend payout ratio, earnings retention ratio, and dividend cover, for the same period.

(b) Draw a chart illustrating the trends in the actual DPS and EPS for the company over the three years.

   (c) Given the information in your table and chart, explain the type of dividend policy adopted by the company.

   (d) Did your company at any stage reduce its dividend payment? If so, what explanations were given in the relevant annual report? Did this seem to have an effect on the company's share price?

   (e) Is there any information given on the structure of share ownership? Do you think there is a particular shareholder clientele?

   (f) Has the company been involved in share repurchases, or made special dividend payments? If yes:

(i)   Is there any evidence that this had an impact on the company's share price?
(ii) What reasons did the company give for buying back its shares, or making the special payment?

CASE STUDY 5 —STRATEGIC FINANCING

PolyStores Plc

   PolyStores Plc owns and operates a chain of retail food and home improvement stores. The company has had a very successful trading history, with sales and earnings growing substantially since its formation eight years ago. Sales for the current financial year were £345 million, and profit before interest and tax (PBIT) was £19.4 million. In the past growth has been achieved organically by building new stores on green field sites and through the acquisition of existing stores from a variety of independent retailers. It is anticipated that this growth strategy will continue.

   The company has ambitious plans for further growth and store development over the next five years, for which approximately £80 million additional long-term financing will be required. The company's current capital structure has evolved over time, with most of the company's growth to date being financed by borrowings from several lending institutions. Restrictive covenants on the loan agreements stipulate that interest cover must not at any time fall below 2.5, and the total dividend payout ratio cannot exceed 50 per cent of after-tax profits. It is expected that these conditions would be applied to any further borrowings, and perhaps even become more stringent.

   The board is considering three alternative capital structure proposals which have been prepared by the financial director, and

these are as presented below, together with the company's current capital structure.

PolyStores Plc Capital Structure	Proposal			
	Current	**1**	**2**	**3**
	£m	**£m**	**£m**	**£m**
Ordinary Share Capital (£1 par value shares)	20	100	80	36
Preference Share Capital	5	5	25	9
Long-Term Loans	75	75	75	135
Total	**100**	**180**	**180**	**180**

The average cost of borrowings, before tax, is currently 10 per cent and the relevant taxation rate is 30 per cent. Any additional borrowings would raise the average cost of debt to 12 per cent before-tax. The dividend on preference share capital is 7 per cent and is not expected to change. The ordinary share dividend for the current year amounted to £3 million and the directors would like this to be at least maintained.

1 Calculate the effect of each proposed structure on the company's gearing (debt/ debt plus equity), earnings per share (EPS), dividend per ordinary share (DPS), interest cover, and total dividend cover.

2 Using your findings in (1) above, discuss the advantages and disadvantages of each capital structure proposal.

3 Several directors have expressed a preference for a structure which substantially increases the company's equity base and are currently in favour of adopting Proposal 1. Explain why you think the directors would seem to favour this particular proposal.

4 One director has proposed using a rights issue and has suggested a one-for-four offer.

(a) Briefly state the advantages to the company of making a rights issue.

(b) Assume, for this part of the case study only, that the current market price of an ordinary share is £3.10 and a discount of 20 per cent has been indicated. Calculate: (i) the number of shares which would need to be issued under this offer, (ii) the amount of additional equity it would be expected to raise, and (iii) the theoretical ex-rights price (TERP). Comment briefly on your findings, stating clearly whether you think this offer would be appropriate in the circumstances presented.

5 Which capital structure, if any, would you recommend the company to adopt? Give reasons for your recommendation.

NOTES

1 Thomson Travel Group, Share Offer Prospectus, May 1998.

FURTHER READING

Students wishing to gain further insights into the dividend policy debate should consult the following articles:

The classic work on dividend irrelevancy is:
- 'Dividend Policy, Growth and the Valuation of Shares.' Miller, M.H. and Modigliani, F., *Journal of Business ,* October 1961.

The classic insight into the dividend puzzle is presented in:
The Dividend Puzzle.' Black, F., *Journal of Portfolio Management ,* Winter 1976.

The bird-in-the-hand theory is dealt with in:
Imperfect Information, Dividend Policy, and the 'Bird in the Hand' Fallacy . Bhattacharya, S., *Bell Journal of Economics ,* Spring 1979.

Dividend signalling theory is examined in:
Dividend Policy Under Asymmetric Information.' Miller, M.H. and Rock, K., *Journal of Finance ,* September 1985.

For a review of a several dividend studies see:
'Behavioral Rationality in Finance: The Case of Dividends.' Miller, M.H., *Journal of Business ,* October 1986.

For an examination of the agency cost model see:
'Agency Costs of Free Cash Flow, Corporate Finance and Takeovers.' Jensen, M.C., *American Economic Review ,* May 1986.
The Determinants of Corporate Leverage and Dividend Policies.' Barclay, M.J., Smith, W.S. and Watts, R.L., *Journal of Corporate Finance ,* Winter 1995.

In relation to share repurchases see:
Share Repurchases—a New Fashion in Corporate Finance?' Shaw, A., *The Treasurer ,* January 1995.

REFERENCES

Black, F. 'The Dividend *Puzzle.' Journal of Portfolio Management ,* Winter 1976.

Elton, E.J. and Gruber, M.J. 'Marginal Stockholder Tax Rates and the Clientele Effect.' *Review of Economics and Statistics ,* February 1970.

Fama, E.F. and Babiak, H. 'Dividend Policy: An Empirical Analysis.' *Journal of the American Statistical Association ,* December 1968.

Gordon, M.J. 'Optimal Investment and Financing Policy.' *Journal of Finance*, May 1963.

Lintner, J. 'Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes.' *American Economic Review ,* May 1956.
Lintner, J. 'Dividends, Earnings, Leverage, Stock Prices, and the Supply of Capital to Corporations.' *Review of Economics and Statistics ,* August 1962.

Miller, M.H. and Modigliani, F. 'Dividend Policy, Growth and the Valuation of Shares.' *Journal of Business ,* October 1961.

The Independent. 'UK firms could afford £30bn buybacks', 10 March 1998.
3i. 'Dividend Policy: Survey of Finance Directors.' *Bank of England Quarterly Review ,* August 1993.

part six
STRATEGIC FINANCIAL PLANNING AND CONTROL

PART 6 CONTAINS THE FOLLOWING:

- Chapter 15—   Strategic Financial Planning and Control
- Case Study 6—   Avion Airlines

In this part we proceed to explore the final, planning and control stages of the financial management process and our concern is mainly with the strategic dimension. The operational dimension of financial planning and control is dealt with in Part 7.

Part 6 concludes with a case study on strategic financial planning.
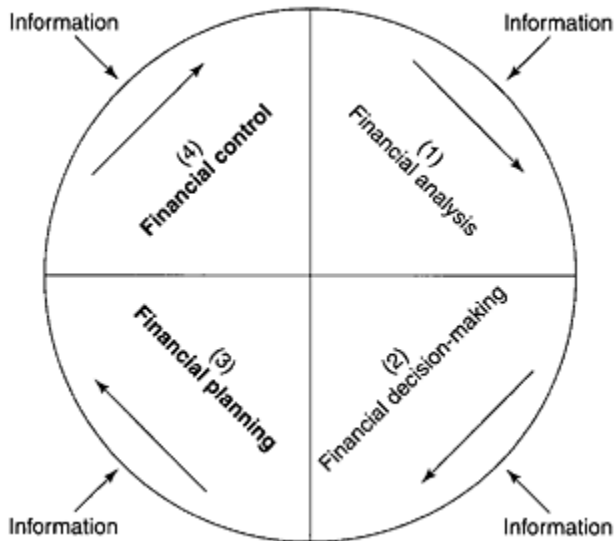
Part 6 diagram The financial management process: **financial planning and control**

15
STRATEGIC FINANCIAL PLANNING AND CONTROL

> This chapter features an introduction to financial planning and control and their respective roles in strategic financial management. The following topics are discussed:
>
> > an overview of planning and control;
> > types of planning;
> > the financial planning process;
> > financial control.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the nature and role of financial planning and control;
2 describe the financial planning and control processes;
3 describe the benefits and drawbacks of business models;
4 discuss the role of computer-based planning models.

OVERVIEW

> Planning is the design of a desired future and of effective ways of bringing it about.
>
> > (Ackoff 1981)

Planning and control exist in a symbiotic relationship: they are interdependent, as planning provides the foundation for future control and the frame of reference against which actual performance can be judged. Planning maps out the future direction for the organisation: control ensures that the directions on the map are followed. Thus without prior planning, control becomes a futile activity.

A more formal definition of planning is given by the Chartered Institute of Management Accountants (CIMA) in its official terminology (1996) which defines planning as:

The establishment of objectives, and the formulation, evaluation and selection of the policies, strategies, tactics and action required to achieve them.

Planning comprises long-term/strategic planning, and short-term operation planning. The latter is usually for a period of up to one year.

In Ackoff's terminology, control is one of the effective ways of bringing about the 'desired future'. By putting effective control systems in place managers will be seeking to ensure that what they have planned to happen is happening, or reveal when it is not happening, so that effective remedial action can be taken.

Because the future is uncertain, 'the design of a *desired* future' will inevitably be based on some key assumptions and managerial judgements about future aspects of the business, such as its environment and its markets. The soundness of these assumptions and judgements will be a critical feature of planning and control: in effect, it may be fair to say that planning and control are only as good as the assumptions and judgements on which they are based.

PLANNING AND STRATEGY

Recall from Chapter 1 that in common with analysis, decision-making, and control, the key managerial function of planning can be broadly classified as **strategic, tactical,** and **operational.**

The term 'strategic' can sometimes be a source of confusion: it means different things to different people, even in the same organisation. In the interests of clarity and consistency let us begin by defining what we mean by strategy:

Strategy is the ***direction*** and ***scope*** of an organisation over the ***long term:*** which achieves ***advantage*** for the organisation through its configuration of resources within a changing ***environment,*** to meet the needs of ***markets*** and to fulfil ***stakeholder*** expectations.

(Johnson and Scholes 1999).

In addition, Johnson and Scholes distinguish between three different levels of strategy:

Corporate strategy

Corporate strategy is to do with the overall purpose and scope of the organisation and is usually determined at the corporate headquarters level. Strategic issues at this level concern what business or businesses should the organisation be in and how they are to be managed. It will very possibly involve consideration of diversification and acquisition and also of how the organisation is to be run in structural and financial terms.

For a multinational corporation it is also likely to involve decisions about the optimum allocation of resources across the world. All of these factors are likely to be influenced by the overall mission of the organisation. It is important to recognise that this level of strategy is the key basis of other strategic decisions.

Competitive or business unit strategy

At this level strategy is about how the organisation should compete successfully in a particular market. It is about securing advantage over competitors and about seeking new opportunities in markets, products or services. Objectives at this level are likely to include long-term profitability, market growth and/or measures of efficiency.

In this context strategy usually relates to a **strategic business unit (SBU)** —which is a discrete unit within the overall corporate entity, having its own defined range of products/services, serving its own external markets and is distinct from another SBU.

The focus of strategic decisions here is on how customer or client needs can best be met, usually with the aim of deriving competitive advantage for the organisation.

Operational strategy

This is concerned with how the different component parts of the organisation (its resources, its processes, its people and their skills) at the operational level are coordinated and combined in the most effective way to contribute to the other levels of strategy and to effectively deliver the organisation's overall or corporate strategic direction.

The characteristics of Johnson and Scholes' three levels of strategy broadly correspond to our strategic, tactical, and operational dimensions.

Figure 15.1 illustrates the general categorisation of planning and control introduced in Chapter 1. The organisation's strategic plans and objectives are determined by its senior management and are transmitted throughout the organisation, as indicated by the downward pointing arrows. Control information on progress towards strategic objectives is in turn transmitted back through the organisation to its senior managers. This effects the 'control loop' as indicated by the upward pointing arrows in Figure 15.1.

Figure 15.1 Dimensions of planning and control
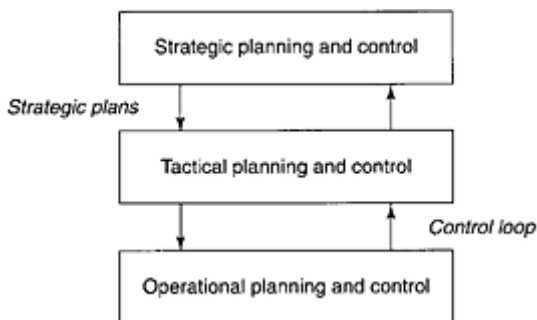
The respective characteristics of each dimension are described below. Remember that this is a general framework. The operation of planning and control systems and procedures is likely to vary from organisation to organisation, and will be influenced by an individual organisation's size, scale of operation, organisational culture, managerial style, and so

forth.

The dimensions of planning and control

We have already stated that planning and control can be broadly categorised as **strategic, tactical** and **operational.** This can be determined according to a range of characteristics such as *timeframe, level of aggregation* and *scope* as introduced in Chapter 1.

In Chapter 1 we also introduced the dimensions of management in the form of a continuum and for ease of reference it is reproduced in Table 15.1. In this case our particular emphasis is on planning and control. Table 15.1 illustrates the *relative* comparisons between each dimension.

Table 15.1 The planning and control continuum

| | Dimension | | |
Characteristic	*Strategic*	*Tactical*	*Operational*
• Timeframe	Long-term	Medium-term	Short-term
• Aggregation	High	Moderate	Low
• Scope	Broad	Medium	Narrow
• Level in organisation	High	Middle	Low
• Complexity	High	Moderate	Low
• Risk	High	Moderate	Low

Each dimension possesses essentially the same characteristic, but in varying degrees. For example, in relation to risk, all three dimensions of planning are inherently risky, but the activity of planning at the strategic level is much more risky than planning at the operational level. One reason being that the consequences of 'getting it wrong' at the strategic level are much greater, they are likely to affect the entire organisation and in a major way. We will now review some of the key characteristics of each dimension in more detail.

Strategic

Strategic planning and control are usually the responsibility of the top management team, such as the board of directors in a commercial company. In this sense it is carried out at a **high level** in the organisation.

It is also has a **long-term** timeframe (typically extending over a five-year planning horizon); is **broad in scope** as it affects the future of the entire organisation, or at least a very significant part of it, in a major way; and is **highly aggregated** in that it deals with very summarised information and very broadly stated goals, objectives and plans.

The strategic dimension is also characterised by high degrees of risk and complexity. Strategic decisions and plans are future-oriented, they require a substantial commitment of resources, particularly financial, and are invariably undertaken in the face of considerable **risk** and uncertainly. If strategic decisions and plans go wrong this can have profound effects for the entire organisation, perhaps in cases even threatening its very

survival.

Strategic decisions and plans are also highly ***complex.*** They typically affect many parts of the organisation often in diverse ways. Moreover, their implications and repercussions may not be fully understood throughout the organisation and their implementation, particularly in large organisations, is complex to control and coordinate.

Once determined by the top management team, the corporate strategy and direction are transmitted through the organisation as indicated by the downward pointing arrows in Figure 15.1.

Typically, following a comprehensive **strategic review** or analysis of the business by the top management team (an evaluation of its products, management, markets, finances, competitors and environment, etc.), the entire organisation's future, its direction, major objectives and plans will be determined and shaped.

The strategic review will reveal a series of **strategic options** or choices open to the organisation. Each option will in turn be evaluated in terms of its respective *costs and benefits* and its *risks and opportunities.*

Following the strategic review and assessment of options, management will make the relevant **strategic decisions** and determine the **strategic objectives** for the business as a whole.

The next step will require a **strategic plan** to demonstrate how the objectives are going to be realised. For example, will the objectives be achieved by organic (internal) growth, by expansion into foreign markets, by acquisitions, either domestic or international, or by a combination of these strategies? All feasible strategic options will be evaluated and the appropriate choices made.

A system of **strategic control** will need to be set in place to assist senior management monitor progress towards the achievement of strategic objectives. **Strategic control systems** will inform management about progress towards strategic objectives and this information will then be reported back into the management information system (MIS) as shown by the upward arrows in Figure 15.1. Control information will allow management to take corrective action if progress is not in line with plans or perhaps provide a basis for modifying plans and objectives, if this is judged necessary.

We noted in Chapter 1 that a distinguishing characteristic of the strategic dimension is that objectives and plans tend to be expressed in broad, general terms. For example, to increase market share by 20 per cent, or to achieve a doubling in earnings per share (EPS) or of return on investment (ROI) over a five-year period, might be just a few of the strategic objectives to emerge from the review.

Strategic objectives are thus general statements of intent. How they are actually going to be achieved will require much more detailed expression. This will happen as the planning process gradually evolves through the strategic, to the tactical, and finally to the operational stages.

Whether this planning process is *'top down',* or *'bottom up',* or some blend of the two, will essentially depend on the management style and culture in place in each individual organisation. A 'top down' approach to planning means that objectives and plans are created at the highest level of management and imposed down the organisation. In a top down style, there is very little involvement of lower level managers in the planning process. In contrast, a 'bottom up' approach to management allows for the active

participation of lower level managers and key work groups.

Tactical

This is an *intermediate dimension* which serves as means of coupling together the two more distinct categories of strategic and operational. As it usually, in large organisations, falls within the responsibility of middle managers it is described as **mid-level** in the organisation. The timeframe is **medium term** (typically a 2–3 year planning horizon).

Data is **moderately aggregated** in that information, objectives and plans are more detailed and specific than at the strategic stage but not as detailed as they become in the operational dimension. This tactical interface serves to link and integrate the strategic and operational dimensions.

In this dimension the broad strategic objectives and plans begin to take shape and gradually become more specific. The responsibilities of individual managers and teams become clearer in relation to the implementation and realisation of the overall business strategy. In large corporations for example, divisional, business unit or product group managers would be involved in the tactical decision-making.

Typical tactical objectives would include: modernising production/operations systems, probably by the introduction of new technology, and revitalising the existing range of products or services, for instance introducing new product varieties.

For example, following a strategic review of its business, the newly appointed Chief Executive of Volvo, the Swedish car and truck manufacturer, announced in late 1997 a three-year business plan which included the following objectives:

- increasing productivity by 5 per cent per year;
- increasing operating profit margins to 5–7 per cent of sales.

The objectives are clearer and more specific than general strategic objectives. Yet how they are to be achieved will require very detailed planning. For instance, the objective of increasing productivity by 5 per cent per year will have to be translated into very detailed operational action plans and objectives for relevant business units, departments, functions, and work groups.

Operational

In contrast, the operational management process is performed at a **low level** in the organisation as it affects the operating core. The timeframe is **short-term** (usually up to one year ahead). The data used tends to be **disaggregated** in the sense that it deals with very detailed and specific information, objectives, plans and targets. Operational is also **narrow in scope** as the focus is on a particular part of the organisation, such as a specific operating unit or division.

This is the 'nuts and bolts' or 'factory floor' dimension, where the strategic aspirations ultimately become translated into very specific and detailed short-term objectives, targets and plans, with clearly identified lines of responsibility for individual managers and employees. For example, to achieve a 50 per cent growth in market share over a five-year period, while an admirable strategic objective, is a meaningless and vague one for an

individual sales executive or product manager operating in a particular geographic region.

The strategic objective has to be translated into specific sales, cost, volume and profit targets for the managers of individual products and services. This will be achieved, in pan, through the preparation of detailed monthly, perhaps even weekly, sales, cost and production budgets.

The operational dimension is also characterised by comparatively low degrees of risk and complexity. Their effects and implications for the organisation if they fail will not be as profound as the failure of strategic decisions and plans. As the operational dimension timeframe is short term they are accompanied by less risk and uncertainty.

While it is helpful to our understanding to distinguish different types of planning and control, it should be remembered that planning and control activities are, or should be, *dynamic* (as indicated in Figure 15.2) and that the various types will inevitably overlap and interact along the continuum.

TO PLAN OR NOT TO PLAN?

It is axiomatic that in today's rapidly changing business environment, the past is no longer an adequate guide to the future. Indeed a cynic might argue that, because the firm's environment is changing so rapidly, trying to plan and control the firm's activities by the application of budgeting and other planning techniques is an irrelevance: not so! It is true that trying to plan and control in an increasingly uncertain future represents a clear challenge to management, but the future presents both *risks* and *opportunities.* There is an old Chinese saying that risk is a combination of danger and opportunity!

Planning equips the organisation with the resources and capabilities to actively seek out and exploit value-adding business opportunities. Deciding not to plan is like setting out aimlessly on a journey with no sense of direction or purpose, and thus no understanding of resource requirements for the journey ahead.

Not to plan, and to adopt instead some kind of *'freewheeling opportunism'* approach to business, is simply exposing the organisation's future to the whims of fate and making it a *'slave of chance',* to paraphrase Shakespeare. Planning requires managers to anticipate, and hopefully exploit, changing business conditions and also reduces the risks of strategic surprises.

Recognising that the future is uncertain, it is sensible to allow some **flexibility** for changing circumstances in the planning process. **Contingency planning** —whereby future business conditions (risks and opportunities) are assessed and alternative strategies for responding rapidly to the changing conditions are developed—should be employed. A contingency plan will define the action to be taken to adjust to changing circumstances.

In relation to the benefits of planning, military planners refer to the **six Ps of planning: *P** rior *P** lanning *P** revents *P** itifully *P** oor *P** erformance, although pitiful has been substituted in this text for a less congenial term!

THE THREE STAGES OF PLANNING

There are essentially three distinct stages to planning and a simple planning framework can be developed by addressing three essential questions:

1 Where are we now?
2 Where do we want to get to?
3 How do we get there?

Planning is a bridge to the future, it connects the present to the future by linking the 'where are we now?' state to the 'where do we want to get to?' state. It essentially provides a 'how we get there' bridge between them. Analysing the difference between 1 and 2 above is often referred to as *'gap analysis'* and a plan is the means of bridging that gap.

FINANCIAL PLANNING

In financial terms, answering question 1 above is the financial analysis stage. Answering question 2 involves sketching out the *desired future* (the desired financial goals and objectives), while question 3 implies developing the financial plans or route maps for getting to the desired future and achieving the prescribed goals and objectives. A financial plan therefore charts out the ways and means by which the financial goals and objectives are to be realised.

The role of financial planning

In financial planning the financial manager and the finance function fulfil two distinct but interrelated roles (McNamee 1985):

1 a *controlling role,* how finance can be used to implement, monitor and evaluate a business strategy; and
2 a *creative role,* how finance can be used in a creative fashion to power an organisation towards its objectives and to give the firm advantages over its competitors.

Two aspects of financial planning

The **financial plan** reveals and quantifies, as far as is feasible, the anticipated financial effects and implications for the organisation of all the previous planning decisions that have been made; the effects on profits, cash flows and shareholder value. The financial plan will in effect translate these decisions into an integrated set of financial statements and objectives.
   There are essentially two critical aspects to financial planning:

1 cash (or liquidity) planning; and
2 profit planning.

Cash planning

This will show the effects of planning decisions on the firm's *liquidity* and *cash flow* position. It will include the preparation of cash flow budget statements and forecasts.

Profit planning

This will show the effects of planning decisions on the firm's financial returns and profitability. It will include the preparation of planned (budget) profit and loss statements and balance sheets.

We will return to cash and profit planning in Chapter 16, when we examine short-term financial planning and control.

Other considerations in financial planning

There are several other important aspects of the financial planning role which need to be mentioned.

Financial feasibility

The organisation's plans and objectives need to be tested for their financial feasibility. Can the plans and objectives be realised in financial terms? Are they financially feasible? Is the organisation able to raise the necessary financial resources?

While it may be admirable and attractive to set the organisation off in the direction of ambitious and challenging goals and plans, their realisation will be dependent upon sufficient finance being available. It would not make business sense to overstretch the organisation financially, and perhaps set it off in the direction of financial distress, in the pursuit of overly ambitious growth and development plans. In short, the organisation's plans need to be subject to a ***financial health check.***

Volume and mix of financing

Invariably, implementing the organisation's plans and goals will require additional finance to be raised. Achieving the ***optimal volume*** and the ***optimal mix*** of financing (e.g. long-term versus short-term, internal versus external, debt versus equity) will be a key task for the financial manager or treasurer. This means endeavouring to have *the right amount of finance available, at the right time, at the right cost and from the right source*. Each type and source of finance has its role and attractions, as well as its drawbacks.

The financial manager will seek to achieve an appropriate balance between short-term and long-term, internal and external, and debt and equity financing. For example it is not usually advisable, although it is done in practice, to finance long-term assets with short-

term financing such as bank overdrafts and loans, whether they can be rolled over or not. Prudent financial management would dictate matching the maturity of the finance with the maturity of the asset.

Financial risk and financial return evaluation

The anticipated effects of the organisation's plans on financial returns and financial risk (gearing) need to be evaluated. Are they expected to achieve a level of return commensurate with the level of risk? How do they affect the level of financial risk? What impact are they likely to have on the market price of the share?

Resource allocation

The financial plan will show the planned allocation of financial resources across the organisation and the pattern of resource allocation should be consistent with and support the overall financial strategy. Resource allocation could be shown on an investment project by project basis, on a divisional or product grouping basis, or some other method that is relevant to the strategic characteristics, ambitions and priorities of the organisation.

Financial control

Effective systems for monitoring and controlling the acquisition, allocation and utilisation of finance, in accordance with the agreed plans, should be set in place.

Scenario planning

Scenario planning can be defined as: 'a means of modelling the future' (Asch and Kaye 1996). Financial planning will entail the preparation and review of a range of alternative financial plans and options before the final plan is chosen and implemented. Typically a set of scenarios will be produced covering *best, middle* and *worst (BMW)* case business conditions. These will be based on a varying range of assumptions and judgements about future business conditions.

As discussed in Chapter 11, scenarios can be *'hard'* (derived essentially from quantitative data) or *'soft'* (developed from qualitative, descriptive information) and clearly they can comprise a combination of both.

Creating a range of scenarios introduces greater flexibility into the planning process and allows the financial manager to assess the effects of alternative investment and financing options on the organisation's planned financial performance, its financial condition, and its market value.

CONTROL

Planning is a prerequisite for control: it provides the benchmarks against which actual progress can be measured and controlled. Control is the function of ensuring that what

should be done (according to the plan) is being done, or revealing when it is not being done so that appropriate managerial action can be taken to correct deviations.

Various control systems will be established to provide the necessary control information and reports to management. Control, therefore, cannot exist without some prior plans or performance standards having been established.

In relation to financial management, the financial plan will provide the financial performance standards against which actual financial performance will be compared and controlled.

As we have indicated, control, like planning itself, can be exercised at the strategic, tactical or operational levels, although the managerial needs for control information and reporting systems at each level will differ.

Elements of a control system

Having asserted the need for effective control systems, it will now be helpful to determine what constitutes a good control system. According to Anthony and Govindarajan (1995), any control system should have at least four elements:

1 A *detector* or *sensor,* which is a measuring device that identifies what is actually happening in the process being controlled.
2 An *assessor,* which is a device for determining the significance of what is happening. Usually, significance is assessed by comparing the information on what is *actually happening* with some standard or expectation of what *should be happening.*
3 An *effector,* which is a device that alters behaviour if the assessor indicates a need for doing so. This device is often called 'feedback'.
4 A *communications network,* which transmits information between the detector and the assessor and between the assessor and the effector.

Anthony and Govindarajan go on to describe the activities involved in **management control,** they include:

1 *planning* what the organisation should do;
2 *coordinating* the activities of several parts of the organisation;
3 *communicating* information;
4 *evaluating* information;
5 *deciding* what, if any, action should be taken; and
6 *influencing* people to change their behaviour.

We shall see in the next chapter how the financial system of budgetary planning and control matches up to the above definitions. But for now let us examine more closely the management control process.

A management control model

Set out below is a model of the management control process (adapted from Wilson and McHugh 1987). The model in Figure 15.2 shows management as a system, having *inputs*

in the form of objectives, plans and resources, a *transformation process* in which the inputs are transformed or converted into *outputs.*
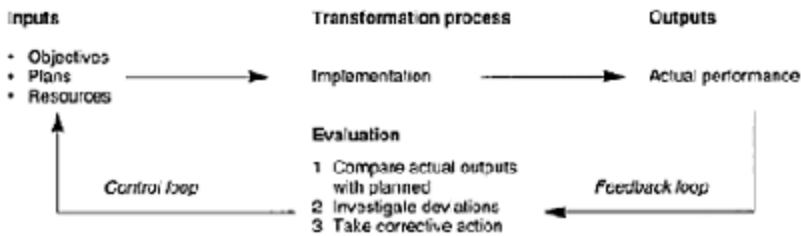
Figure 15.2 The management control process

In the model, outputs are defined as the level and standard of performance actually achieved. Actual performance then has to be *evaluated* in relation to the level and standard which were expected at the outset. This is achieved through a *feedback loop* which, as its name implies, relays back actual information to an assessor for comparison with predetermined plans, standards or targets.

Any significant deviations from plans, predetermined standards, or targets are investigated and appropriate *managerial action* is instigated to correct deviations or to modify plans and standards if required. This completes the *control loop.*

It is important to emphasise the need for managerial intervention and action in the management control process. In order for things to change, people, i.e. managers, have to intervene and interact with other people in the process of control. It does not matter how sophisticated or superbly designed the control system actually is, if managers do not *act* then the process will drift, and control will be lost.

The management control process is not automatic in the way that, for example, temperature is controlled in the human body, or in a central heating system. Unlike automatic control systems—such as the regulation of room temperature where actual temperature is controlled *automatically* within set tolerance limits by a thermostat— management control systems require managers to exercise discretion and judgement in their operation. For example, managers will have to decide whether deviations are sufficient to warrant investigation, and also what type of action, if merited, should be taken.

Financial control

We can apply these general management control principles and processes specifically to financial control. The objective of financial control is to keep the organisation 'on track' financially, as set out in the organisation's financial plans. At any time, systems of financial control and reporting will inform management as to the organisation's actual financial position and progress compared to the financial plan.

If actual events are out of line with plans, **corrective action** will be taken to bring events back on track, and this is known as **feedback control.** Alternatively, the control process may prompt the modification of plans in the light of actual experience, and this is

known as *feedforward control.*

With feedforward control a prediction is made of what outputs are expected at some time in the future. If these predictions then differ from what is desired, control action is immediately initiated to minimise future differences. The objective of feedforward control is to anticipate future deviations based on current projections and to act in advance to prevent these deviations from occurring. In summary, feedback is post-event control, feedforward is pre-event control.

Control systems will be required, not just at the operational level, but at the strategic and tactical levels too although the requirements of control systems at, for example, the strategic and operational levels will be quite different. One factor is the differing time scales: it is easier to define control requirements for the short term than it is for the longer term.

In the longer term, the impact of 'uncontrollable' external factors becomes a more significant issue. External factors may not exert such a significant influence in the short term, as over the short term the external environment may be more stable.

PLANNING MODELS

In many professional disciplines, such as architecture, design, and engineering, it is standard practice to develop models (physical, mathematical, computerised simulation, etc.) to test designs and plans and present a view of reality.

Before proceeding it may be appropriate to clarify what we mean by a business model.

What is a model?

A model is usually defined as **a representation of reality,** and a business model:

> allows management to test out the implications of their plans, strategies and tactics without committing the company either to expensive experiments or to irreparable steps into the unknown. This is achieved by producing alternative plans and testing out their effect on the business model. The model represents the firm and its behaviour and generates reports on the outcome of alternatives.
>
> (Asch and Kaye 1996)

The benefits of models

Producing models has many distinct benefits, not least of which is the time and expense saved by not having to correct fundamental design errors during construction or production. This is not to say that it is the models themselves which will eliminate such errors and mistakes—after all, models are created and designed by people—but the process of model building is a *learning process* and will at least reduce the risk of these types of costly errors occurring.

In the business world, the development of business models covering all aspects of the business (e.g. finance, marketing, operations and environmental aspects) facilitates and

supports the business decision-making and planning processes. Models offer managers the opportunity to explore and test the various implications (financial, marketing and operational, etc.) of their assumptions, decisions and plans in an environment free from the risk of disastrous real-world consequences.

Until recently the benefits of building sophisticated business models were only available to those companies which had access to expensive computing facilities. With the advent of personal computers and low cost software, the benefits of computerised business, and in particular financial, modelling are now widely available.

The financial model

Clearly the primary concern and role of the financial manager will be to analyse and interpret the financial implications of proposed decisions and plans. The financial manager may very well wish to develop a specialist computer-based financial model of the business, to test the financial effects, on profits, cash flows, capital structure, share price and so forth, of alternative business planning scenarios and decisions. In a financial management model, *cash flow will be the key variable* and the financial manager will be acutely interested in modelling the cash flow effects of decisions and plans.

The financial manager will actively search the business model to identify the key areas and activities which add to, and preferably ***maximise the value of the business:*** particularly seeking out those activities which are *cash generators* and those which are *cash absorbers.*

As we stated earlier, financial and business modelling are most likely to be carried out, to varying degrees of sophistication, using computer systems. We can now briefly review the advantages and disadvantages of computer-based modelling.

Advantages of computer-based modelling

Problem-solving

One of the key advantages of computer-based modelling is that it facilitates problem-solving. Computer-based financial models in particular allow the financial manager to explore alternative financing options and test the effects of business plan assumptions on the organisation's finances. This process helps to identify any potential financial problems that may underlie business plans and thus enables managers to take measures to avoid such problems before they arise.

Organisational learning

Model building is an organisational learning process. By building a business model an improved understanding of the interrelationships and complexities of the organisation is achieved.

Cost and time savings

A major advantage of model building is that it accelerates the decision-making and planning process as it allows the effects of various alternatives to be evaluated very quickly and the optimum solution found. In addition, standard software packages are readily available. Today these are fairly sophisticated and relatively inexpensive. They would be within the price range of all but the smallest of businesses.

Creativity and imagination

Building a computer-based model encourages greater creativity and imagination in decision-making and planning by allowing the more creative and imaginative options to be explored and tested in a risk-free environment.

Accuracy

Modern modelling packages have many in-built features for *auditing* not only the arithmetical accuracy but also the logical rules and algorithms on which the model has been constructed. Once the logic of a computer-based financial model has been fully tested it can be relied on for arithmetical accuracy. Unfortunately even the most highly trained financial people can make arithmetical errors especially if they are working under pressure and trying to conform to tight project deadlines.

Disadvantages of computer-based modelling

The Frankenstein syndrome

Because of the availability and advantages of low-cost computing power, models can sometimes take on a life of their own. They can grow and grow in both size and complexity, eventually becoming the organisation's own 'Frankenstein' monster. Model building requires a disciplined approach and the model building process itself needs to be rigorously appraised on a cost/benefit basis.

The model as an end in itself

Models are not ends in themselves, they are means to an end, that is they should lead to better decision-making and value maximisation. Models are useful decision-making and planning aids or tools, they do not make the decisions. In the final analysis, it is senior managers, particularly at the strategic level, who must eventually make a judgement call based on a complex array of variables, of which the model is only one.

The 'illusion of certainty'

Models can sometimes create the 'illusion of certainty'. For example, an end product of

the model building process is likely to be tangible computer printouts and management reports containing 'hard' financial and other data which may create the impression of certainty for some managers, rather than being a representation or interpretation of reality.

Models contain a range of assumptions and judgements, some of which may simply prove to be wrong! The difficulty is that these are not always apparent at the outset.

Model building skills

Effective business model building requires *specialist skills* and models will be limited by the skills (financial, mathematical, statistical, etc.) of model builders. It is essential therefore that model builders whether they are accountants, marketing, technical or other professional staff are adequately trained in business modelling techniques.

Behavioural implications

The behavioural side of model building cannot be overlooked. The attitudes, biases, personal goals and objectives of managers and model builders will influence the final outcome. For example, managers may seek to include in the model their own pet theories and projects thus reducing the value of the model as an objective basis for decision-making.

Other considerations of computer-based model building

In 'Beyond the Spreadsheet' *(Management Accounting,* April, 1996), a survey by KPMG Management Consulting Group on the use of spreadsheet models found that some of the practical difficulties associated with spreadsheet models were:

- models on average required seven major modifications before the business requirement was fully met;
- over 25 per cent of spreadsheet models contained logic errors;
- 65 per cent of model builders have no formal training in building models;
- 90 per cent of organisations do not have formal modelling standards or guidelines;
- 50 per cent of spreadsheet models were built without prior design or planning.

> **KEY LEARNING POINT**
> Business models are undoubtedly very powerful management tools if created and used sensibly. However, it is important to bear in mind that a model is only a model, it is not reality and any model is only as good as the assumptions, characteristics and professional judgements which have been used to create it. Remember GIGO, garbage in, garbage out! *The critical success factor for sound model building therefore is to have good quality inputs.*

STRATEGY AND PLANNING—A PRACTITIONER'S VIEW

We will round off this chapter on planning and control with an extract that offers a personal insight into the practical operation of business strategy by someone who, for 33 years, ran one of the largest multinational companies in Europe—General Electric Company (GEC) UK—with a stock market capitalisation in excess of $17,086 million.

STRATEGY AND PLANNING—A PRACTITIONER'S VIEW

To be successful in business, you have to have objectives in mind before you start. At a certain phase, you can see so far and no further. That doesn't mean the future is closed, only that you need more data. As time goes by, your perspective extends further—with more, or fewer, possibilities—into the future; and, anyway, things happen which you did not take into account before. Thus, business objectives must allow for an adequate level of flexibility, and it is highly desirable to have alternatives, even if they are less favoured than your first choice.

And any short-term objectives you pursue must be compatible with long-term aims, however hazy. This is important in planning levels of expenditure on research and development, and investment in plant. But even if these elements are appropriately conceived, neither of them, or both of them together, guarantee survival in the long term.

The principal thing needed for a secure future is an adequate supply of people with brain power and strength of character. You need enough clever people with the right characteristics—not egotistical types, but people whose personalities relate to the business, who can create a sort of communal imagination which enables you to exercise an adequate level of control over future events.

In GEC, we haven't been used to doing things formally; we don't often need to have formal meetings because the executives are all the time talking together. There is of course the budgetary and reporting routine, but we do not have formal plans committed to paper until the ideas have ripened to the point whence they can be pursued in a practical way at a broad level of consensus.

(Lord Weinstock, former Chairman of the General Electric Company (GEC), in an interview with the *Financial Times*—'The Company That Arnold built', *Financial Times,* 30 December 1996)

RECAP

Planning and control are interrelated financial management functions:

Planning maps out the future direction for the organisation, control ensures that the directions on the map are followed.

Dimensions of planning and control: There are usually three broad dimensions of planning and control that exist in organisations, **strategic, tactical** and **operational.** Each dimension has its own characteristics.

Control: This has the specific function of ensuring that what should be done (according to the plan) is being done, or revealing when it is not being done so that appropriate managerial action can be taken. The *elements of a control system* and a *management control model* were reviewed.

Financial control: The objective of financial control is to keep the organisation 'on track' financially as prescribed in the financial plans.

Financial planning: The financial plan charts out the way financial goals and objectives are to be achieved. Moreover, the financial plan reveals and quantifies, as far as is possible, the anticipated financial effects and implications for the organisation of all the previous planning decisions that have been made: the effects on profits, cash flows and shareholder value. The financial plan will in effect translate planning decisions into an integrated set of financial statements and objectives.

Financial planning involves **cash, or liquidity, planning** and **profit planning.**

Planning models: Business planning models are very powerful **management tools** but must be created and interpreted sensibly. Models are only representations of reality and are only as good as the assumptions, characteristics and professional judgements which have been used to create them. Therefore the critical success factor for sound model building is to have good quality inputs.

REVIEW QUESTIONS

Concept review questions

1 Briefly discuss the respective characteristics of strategic, tactical and operational planning and control.
2 (a) Outline the role of financial planning, (b) What are the two key elements in financial planning? (c) What do you understand by the term 'scenario planning'?
3 Define the key elements of a management control system.
4 (a) What is a planning model? (b) Explain how a financial model is of use to the financial manager, (c) Discuss the advantages and disadvantages of computer-based financial modelling.

Test question

5 **Financial modelling.** You are a qualified accountant working as assistant to the Finance Director of a medium-sized company engaged in the manufacture of kitchen and bathroom furniture. In your previous job you gained experience of preparing medium-term and long-term corporate and financial plans. Your present

employers do not have a corporate planning department and are thinking of using a firm of outside consultants to prepare a five-year corporate financial plan. The Finance Director thinks this would be a very expensive exercise and, knowing your background, has suggested to the board that you be asked to co-ordinate this task, instead of using consultants. The board has agreed to this suggestion.

You are required:

(a) to list and briefly explain the steps you would take to construct the framework for a five-year corporate financial model and to comment on the problems you might experience in its construction and use;

[*Note:* You are not expected to discuss the *technical* processes involved in constructing a *computer* model.]

(b) to describe **three** methods of incorporating uncertainty into the model;

(c) to explain how mathematical programming or other computer models might assist your planning procedures and to describe the dangers inherent in their use.

Author's note. Students not familiar with mathematical programming models should simply limit their answers to a discussion of computer models.

CASE STUDY 6 : STRATEGIC FINANCIAL PLANNING—AVION AIRLINES

Avion Airlines has been operating as an independent airline for five years following a management buyout from a major airline. The airline operates a range of scheduled services in the UK and Europe.

Avion's profits to date have been marginal, but in the past 18 months there has been a sustained growth in passenger numbers on all the company's routes. This growth is expected to continue, and forecasts by various industry bodies have estimated that revenue-paying passenger growth, for the European industry in general, will continue at an average of 5–6 per cent per year for the next four years.

The directors would like to capitalise on these trends and, following a strategic review of the business, they have prepared a three-year strategic growth plan for the company.

The key elements of the company's future strategy are:

• to develop what the directors believe to be under-served, European routes;

• to seek strategic alliance agreements with other, selected major carriers in order to generate increased passenger volumes and to enhance the company's market profile;

• to continue to develop the capacity, quality, and operating performance of its air fleet;

• to obtain a stock exchange listing within the next three years. The proceeds from any stock exchange flotation would be used

to launch new routes and develop existing routes.

The directors are currently finalising negotiations on new strategic alliance arrangements with several selected airlines to expand Avion's route network. To date, no binding agreements have actually been signed, but Avion has begun to operate two new services for one major carrier. The directors' strategic plan assumes that all alliance agreements being negotiated will become fully operational.

Based on these agreements, Avion's scheduled services would be expected to grow by 20 per cent per year in year one, and by 25 per cent in years two and three. Charter services are forecast to increase by 10 per cent per year over the next three years. The directors are confident that current gross profit margins can be maintained on all planned service developments.

The planned growth in services would require the company to fund leasing payments for two new, larger and more technologically advanced and efficient aircraft. The lease payments will gradually escalate from current levels over the three-year period, by 30 per cent in year one and by a further 20 per cent per year in years two and three, to reach the maximum annual rental payments of £1.03 million in year three.

The growth plan assumes that other operating costs will behave as follows:

- Staff costs are expected to increase by 25 per cent in year one, a further 20 per cent in year two, and an additional 10 per cent in year three.
- Fuel costs are estimated at 5 per cent of total turnover. Fuel costs form a significant proportion of the company's total operating costs and the company's operating performance is regarded as being sensitive to changes in fuel costs. The strategic plan assumes than any increases in fuel prices can be recovered by increasing fares.
- Depreciation is estimated to increase by £0.01 million in year one and then remain unchanged for years two and three.
- Other costs are forecast to increase by 10 per cent per year.

In general, Avion's cost structures are characterised by high fixed costs, which do not vary significantly in relation to the number of passengers carried. Accordingly the company's profitability is regarded as being highly sensitive to the volume of fare-paying passengers carried, as even a relatively minor change in fare-paying passenger numbers can have a substantial impact on the company's financial performance.

The directors have stated that any future earnings will be retained to fund business developments and that dividends will not be paid over the next three years, after which time this policy will be kept under review.

The directors plan to spend £0.05 million per year on fixed assets and invest £0.01 million each year in net working capital. The company's fixed assets consist mainly of equipment and vehicles—it does not own any land or buildings.

The company's profit and loss account and cash flow statement for the financial year just ended are as follows:

Avion Airlines
Profit and Loss Account for
Year ended 31 December

	£m
Turnover	
Scheduled services	3.66
Charter services	1.83
	5.49
Cost of sales	3.29
Gross profit	2.20
Operating costs:	
Staff	0.69
Leasing rentals	0.55
Fuel	0.27
Depreciation	0.05
Other	0.55
Operating profit (loss)	*0.09*
Taxation (25%)	0.02
Profit after tax	*0.07*
Dividends	0.00
Retained profits	*0.07*
Average number of shares (million)	0.5

Avion Airlines
Cash Flow Statement for
Year ended 31 December

	£m
Operating profit	0.09
Depreciation	0.05
	0.14
Capital expenditure	0.00
Net working capital	0.00
Taxation	0.02

Cash flow	<u>0.12</u>

Similar companies in the same industry as Avion have an average P/E ratio of 18.

As an independent consultant you have been asked, based on the above information and making what other assumptions you consider reasonable, to review the directors' strategic plan and to:

(a) prepare a forecast profit and loss account for each of the next three years;
(b) prepare a cash flow forecast for each of the next three years, assuming no time lag in tax payments;
(c) identify and briefly comment on the risk factors (economic, financial, industrial, competitive, regulatory, etc.) which you consider relevant to an appraisal of the company's strategy and which would merit further assessment.
(d) based on your analysis, comment on the suitability of the company's future strategy and objectives. State any other information, financial and non-financial, which you think would assist your analysis.

For convenience work in £m and round your figures to two decimal places.

FURTHER READING

General

The following texts, which have been referred to in this chapter provide excellent insights into planning and control in general.
• *Creating the Corporate Future* . Ackoff, R.L., Wiley, 1981.
• *Management Control Systems* . Anthony, R.N. and Govindarajan, V., 8th edition, Irwin, 1995.
• *Tools and Techniques for Strategic Management* . McNamee, P.B., Pergamon Press, 1985.
   A helpful article on business forecasting methods is:
ꞌerry, S. 'Applied Business Forecasting.' *Management Accounting ,* March 1994.

Financial planning and modelling

• *Financial Planning: Profit Improvement through Modelling* . Asch, D. and Kaye, R.G. 2nd edition, CIMA/Kogan Page, 1996.
• *Financial Modelling for Business Decisions* . Kefford, B., CIMA/Kogan Page, 1995.
For readers wishing to develop their practical computing skills a helpful practical book

on the use of spreadsheets for computerised financial modelling is:

• *Mastering Spreadsheet Budgets and Forecasts—A Practical Guide* . Secrett, M., Pitman Publishing, 1997.

A very useful book specifically on financial planning is:

Financial Analysis and Planning: Theory and Application . Lee, C.F., Addison-Wesley, 1985.

While the following text specifically adopts a model-building approach to corporate finance:

• *Corporate Finance: A Model-building Approach* . Schlosser, M., Prentice-Hall, 1989.

REFERENCES

Ackoff, R.L. *Creating the Corporate Future* . Wiley, 1981.

Anthony, R.N. and Govindarajan, V. *Management Control Systems* . 8th edition, Irwin, 1995.

Asch, D. and Kaye, R.G. *Financial Planning—Profit Improvement through Modelling* . 2nd edition, CIMA/Kogan Page, 1996.

Johnson, G. and Scholes, K. *Exploring Corporate Strategy* . 5th edition, Prentice-Hall, 1999.

Kefford, B. *Financial Modelling for Business Decisions* . CIMA/Kogan Page, 1995.

KPMG Management Consulting Group 'Beyond the spreadsheet.' *Management Accounting ,* April 1996.

McNamee, P.B. *Tools and Techniques for Strategic Management* . Pergamon Press, 1985.

Wilson, R.M.S. and McHugh, G. *Financial Analysis: A Managerial Introduction* . Cassell, 1987.

part seven
SHORT-TERM FINANCIAL MANAGEMENT

PART 7 CONTAINS THE FOLLOWING:

Part 7 is devoted to short-term financial management. It is only through effective financial management in the short term that the firm's long-term goals and objectives (and sometimes even survival) can be secured.

In this part we explore how the financial management process operates in the short term and examine the nature of short term financial decision-making, planning and control.

Financial management in the short term focuses on the management of the firm's short-term, or current, assets, liabilities and cash flows. It involves short-term financial decision-making related to the investment and financing of the firm's current assets.

Chapter 16 provides an introduction to the nature of short-term financial management (alternatively referred to as working capital management). The chapter progresses to develop the theme of financial planning and control (presented in Chapter 15) by reviewing the operation of the firm's short-term planning and control systems. Short-term cash and profit planning are emphasised.

Chapter 17 develops the analysis of short-term financial management by exploring short-term investment and financing decisions in relation to the management of the firm's working capital. The chapter proceeds to examine the management of the short-term asset of stocks.

Chapter 18 extends the analysis of short-term financial decision-making to dealing with the management of the short-term assets of debtors and cash.

Chapter 19 reviews the management of the firm's current liabilities and the main sources of short- and medium-term business finance.

This part concludes with an integrative case study on short-term financial management and also includes a comprehensive case study which integrates a range of financial management topics covered in this text.
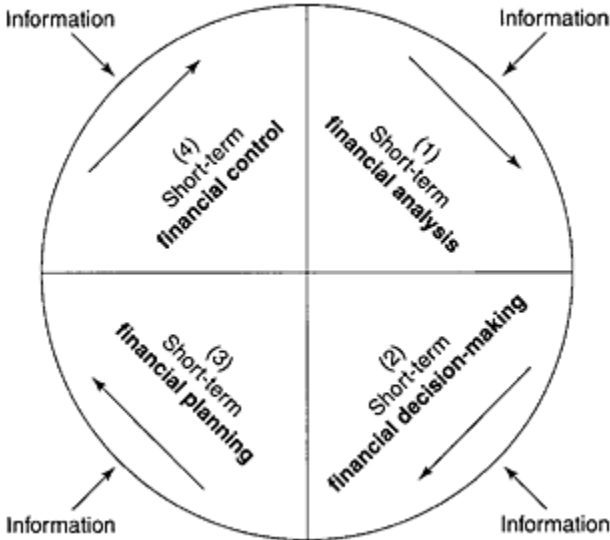
Part 7 diagram The financial management process: **short-term financial management**

16
SHORT-TERM FINANCIAL PLANNING AND CONTROL

> This chapter provides an introduction to short-term financial management and proceeds to develop the theme of financial planning and control by focusing on its short-term or operational dimension. The following topics are discussed:
>
> an introduction to short-term financial management;
> an overview of short-term financial planning and control;
> short-term cash planning;
> short-term profit planning.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 understand the nature and role of short-term financial management;
2 understand the nature and role of short-term financial planning and control;
3 explain the role of the sales forecast in financial planning;
4 explain the characteristics of short-term cash and profit planning;
5 construct and interpret a cash budget;
6 apply risk analysis techniques in cash planning;
7 construct and interpret a forecast profit and loss account, balance sheet, and cash flow statement;
8 appreciate the role of computer-based financial modelling.

OVERVIEW

In this and the following chapters we shift focus from the strategic to the operational dimension of financial management.

In the context of our overarching financial management model introduced in Chapter 1, short-term financial management emphasises financial decision-making, planning and control at the operational level of managing the firm's short-term assets, liabilities and cash flows.

Strategic investment and financing decisions affect the structure of firm's long-term (fixed) assets, its long-term liabilities, and its long-term cash flows. Operational

investment and financing decisions impact on the structure of the firm's short-term (current) assets, liabilities, and cash flows.

By short-term we mean that the decisions and plans will have an impact on the firm's finances within a one-year time horizon, that is, the assets being managed will be paid, within the timeframe of a year.

Because it is concerned with the management of current assets and current liabilities, short-term financial management is also very often referred to as working capital management. The terms tend to be used interchangeably.

SHORT-TERM FINANCIAL MANAGEMENT AND SHAREHOLDER VALUE

Right from the outset we have stressed the fundamental importance of the firm generating positive cash flows, i.e. cash flows which will enhance the value of the firm and the wealth of its owners. We have already demonstrated the central role of cash flows in a strategic financial management context, for example in evaluating strategic investment decisions. The role of cash flows in evaluating short-term financial decisions does not diminish.

Short-term financial management is guided by the same sound financial management principles and concepts as strategic financial management—specifying returns in terms of cash flows, evaluating their timings and risk, and assessing their impact on the firm's value—only the timeframe is different. In short-term financial management we focus on the generation and management of cash flows in the timeframe of days, weeks, or months rather than years.

While it is undoubtedly good quality strategic investment decisions which are *the* value-enhancing decisions for the firm, sound operational or short-term investment decisions (as following chapters will demonstrate) also contribute to the firm's value and are vital for its long-term survival and prosperity.

In Chapter 10 we stated that the goal of maximising shareholder wealth can be achieved by maximising the net present value of all the firm's investment cash flows, discounted at an appropriate cost of capital. This implies maximising the net present value of *all* the firm's cash flows, short-term and longer-term. Thus the same valuation framework applies to financial decision-making in an operational context as it does in a strategic context.

It is axiomatic that short-term or operational financial decisions must be made in the context of the firm's overall corporate strategy and similarly directed towards the achievement of the firm's strategic objectives and the primary goal of shareholder wealth maximisation.

Short-term financial management emphasises the management of short-term cash flows and liquidity. Consequently, if financial management is not carried out effectively in the short term there may not be a long term! This is one reason why, in practice, much of the financial manager's time—on average about 60 per cent—is actually devoted to working capital or short-term financial management.

SHORT-TERM FINANCIAL PLANNING AND CONTROL

In this section, and for the rest of this chapter, we will examine the key aspects of short-term financial planning and control. Other aspects of short-term financial management will be explored in subsequent chapters. To avoid undue repetition we will trim the expression 'planning and control' to simply 'planning'—the control function is implied.

Short-term financial planning will typically involve the preparation of detailed financial plans for a time horizon of one year ahead—although less detailed and summary plans may also be prepared for further years ahead.

It is difficult to overstate the importance of short-term financial planning, particularly cash planning—for any organisation, profit oriented or non-profit oriented. Many organisations, commercial and non-commercial, have collapsed, or come very near to collapsing, as a result of weak and ineffective day-to-day financial planning arrangements. It is only through maintaining effective short-term financial planning systems and procedures that any organisation's longer-term objectives and plans can be realised.

Clearly short-term financial and other operating plans (e.g. marketing plans) will be prepared in the context of the organisation's long-term or strategic plans. This is the key point illustrated in Figure 16.1, which presents an overview of short-term or operational planning. The diagram is simply meant to be an illustrative, not a comprehensive, representation of a typical short-term planning framework. We will explore other relevant aspects of Figure 16.1 as we progress through this chapter.

Figure 16.1 short-term planning framework

The short-term financial plan

The short-term financial plan has the clear benefit of summarising in a few key financial statements the short-term financial effects and consequences of all the firm's previous planning decisions. The total short-term financial planning package will normally comprise the detailed preparation of the following:

- forecast profit and loss account;
- forecast balance sheet;
- planned capital expenditure—the 'capex' plan; and
- cash budget.

Forecast profit and loss account

The forecast profit and loss account evaluates and summarises the expected impact on profitability of all the firm's plans. It sets out the ***profit performance*** and ***level of return*** which, as a result of all the previous planning decisions taken, the firm is expected to earn. It will provide an important basis for assessing future investment, dividend, and financing decisions.

Forecast balance sheet

The forecast balance sheet evaluates the likely impact of the planning process on the firm's ***financial condition*** and level of ***financial risk.***

Recall from our study of financial analysis that the profit and loss account measures *financial performance* and *financial return:* the balance sheet measures *financial condition* and level of *financial risk.* A few key financial ratios, based on the forecast financial statements, will also be determined, against which actual ratios will be compared.

Capital expenditure (CAPEX) plan

The capital expenditure plan details the expenditures and their timings associated with the acquisition (and disposal) of the fixed assets needed to support the firm's planned level of activities.

Cash budget

The cash budget sets out the volumes and timings of all the cash receipts and cash payments expected to occur over the planning period. It will identify the times when cash surpluses, or cash deficits, are expected to occur, thus enabling the financial manager to plan ahead arrangements for the short-term investing or borrowing of cash.

The integrated financial plan

When combined, the various elements of financial planning as outlined above provide a complete and integrated master summary of all the various planning components. It represents the operational master plan for the organisation.

It is important to recognise that the master plan is not an end in itself, it is an important instrument (and should not be an inflexible one) for guiding and controlling the future direction of the organisation in the short term.

The sales forecast

It is with the sales forecast that short-term financial planning normally originates.

However, before proceeding to examine the sales forecast, a word on terminology may be appropriate here. Although the terms *forecast, plan,* and *budget* often tend to be used interchangeably, there is a subtle distinction between them. A budget is in fact a specific plan, it is an explicit statement of what management wants to happen, of the outcome (s) that are desired for the organisation. An individual budget will usually form an integral part of an organisation's coordinated corporate budgeting programme.

A forecast, in contrast, is an expression of what is *likely* to happen, of what will be the probable outcomes, given a certain state or combination of circumstances. In practice, forecasts are likely to be used as the basis for preparing budgets, and in many cases forecasts and budgets may well coincide—although this does not automatically follow.

For example, the preparation of an initial sales or profits forecast may indicate a future situation which management finds unacceptable. This will stimulate management to produce a formalised plan prescribing the action to be taken to achieve a more acceptable or desirable outcome.

To avoid undue repetition we will use the terms, budget, forecast, and plan interchangeably—assuming that they are all in harmony.

As stated above, the sales forecast is where the operational financial planning process usually begins. This is indicated in Figure 16.1, which shows that the determination of the sales forecast will be guided by the requirements of the firm's strategic plan.

The sales forecast is a critical element in financial planning—everything else in the short-term financial planning process flows from it. It is perhaps the most important, and, at the same time, probably the most difficult financial plan to prepare, as there is usually a multitude of variables to be reconciled. The sales forecast lays the foundation on which all other operational plans and forecasts are built. Clearly if errors or misjudgements are made with the sales forecast they will have repercussions throughout all the firm's other plans, for example its production and cash strategies.

The sales forecast is usually prepared by the marketing or sales department using marketing information. This is likely to include market forecasts, trade surveys and reports, pricing policies, market trends (growth, decline, stagnation, etc.). Statistical techniques such as correlation, exponential smoothing, and regression analysis will also be employed to develop the final sales forecast figures.

One statistical approach would be to develop a simple probability distribution of possible outcomes for the forecast sales figure and calculate an expected or average value. This is illustrated in Example 1. As we discussed in relation to risk and return, an *expected value* is a weighted average of all the given possible outcomes, where the respective weightings are the probabilities.

Example 1 —MJM Enterprises—calculation of annual sales forecast

The marketing manager of MJM Enterprises has supplied you with

the probability distribution for its annual sales as, set out below. You have been asked to calculate the expected sales value for use in the sales forecast.

Sales value (£m)	Probability
4.8	0.10
5.5	0.15
6.8	0.50
7.4	0.20
7.8	0.05

The *expected value (EV)* of sales is:

EV(sales)=0.10(£4.8m)+0.15(£5.5m)+0.50(£6.8m)+0.20(£7.4m)+0.05(£7.8m)

=£6.58 million

EXERCISE 1 —EXPECTED VALUE

Icarus Publications is in the process of preparing its annual sales forecasts and has supplied you with the probability distribution for its annual sales as set out below. You have been asked to calculate the expected sales value for use in the sales forecast.

Sales value (£m)	Probability
40	0.10
45	0.15
50	0.50
55	0.15
60	0.10

As a practical guide, the sales forecast can be compiled along the following lines:

1 review of past performance;
2 review of current trends;
3 identification of any limiting factor(s);
4 review of external factors.

Review of past performance

This will involve an identification and evaluation of any past trends in sales and sales mix which are relevant to the new forecast period. How have actual sales performed in, say, the past year? How has past performance compared with previous forecasts? Are there any lessons to be learned from previous forecasts and forecasting rounds? Were previous forecasts too optimistic or pessimistic?

In start-up situations, such as new businesses, or the launching of new products or services, there will be no past sales history to use as a baseline reference.

Review of current trends

What do the most recent trends in sales tell us? Is the rate of sales growth above or below expectations? Are we signing up many new customers or contracts? Is there any evidence of changes in seasonal factors? Taking the hotel, leisure and tourism industry as an example, this stage would include an evaluation of current trends in advance bookings for holidays, banquets and functions, etc.

Identification of any limiting factor(s)

Almost certainly the business will encounter some limiting factor(s). Examples would include: shortages of essential raw materials; shortages of suitably skilled and trained labour; limited production capacity; a static market; access to adequate finance. Any one of these factors, or a combination of several, could inhibit the firm's aspirations in terms of expected sales.

Ironically, for many businesses it will often be the level of sales which is the key limiting factor—especially for those in industry sectors where competitive rivalry is intense.

Review of external factors

Stages 1 to 3 above have essentially concentrated on assessing internal factors. Stage 4 involves scanning the external environment to discover what external factors will impact on the sales forecast. These are likely to include:

- *competition* (e.g. the intensity of competition, new entrants—actual and potential, pricing tactics of competitors, etc.);
- *market conditions* (e.g. is the market in general growing or declining? is market share growing or declining?);
- *'PEST' survey.* This involves an assessment of how *political/legal, economic, social* and *technological* factors are likely to impact on forecast sales. Political/legal factors will include assessing the impact of new legislation, government initiatives and policies. Economic factors will include economic growth, inflation, interest rates, and levels of disposable incomes. Social factors relate to changing life styles, changing consumer tastes and preferences, changing social values and attitudes, and so forth. Technological factors will include an assessment of how developments, innovations and changes in technologies (e.g. production and processing technologies, computing and communications technologies) are likely to impact, both directly and indirectly, on sales.

The outcome of the four stages is a prediction of the total sales revenue for the forecast period ahead. This will probably be analysed by predicting sales volumes and selling

prices for each individual product, and probably also analysed by geographic region.

In preparing forecasts managers are likely to utilise statistical techniques such as probability theory, time-series analysis, and extrapolation.

The two critical aspects of financial planning

In the previous chapter we briefly reviewed the two critical aspects of financial planning, that is, **cash (or liquidity) planning** and **profit planning.** In this section we will explore in more depth the operation of the firm's short-term cash and profit planning systems.

Remember that cash planning will show the potential effects of planning decisions on the firm's *liquidity* and *cash flow* position. It will include the preparation of cash flow forecasts and cash budgets. Profit planning will show the potential effects of planning decisions on the firm's financial returns and profitability. It will include the preparation of forecast or budget profit and loss statements and balance sheets. The budget or forecast balance sheet will also indicate the potential effects of decisions on the firm's level of *financial risk.*

Cash planning—the cash budget

We have already alluded to the critical importance of the **cash budget** (or cash forecast) as a financial planning tool. The cash budget sets out the amounts and timings of the cash inflows and outflows, from every source, which are expected to occur over a defined period of time in the future.

It will therefore help to identify, in advance, any short-term peaks and troughs expected to occur in the firm's future cash flows. That is, the times in the period ahead when the firm may experience cash surpluses or cash deficits. This will enable management to examine the expected cash flow effects of business decisions and take appropriate actions, such as making advance arrangements for investing or borrowing cash.

The cash budget therefore plays an extremely important role in planning the short-term liquidity of the firm and we will consequently devote some time to explaining its role. In the context of this section we will define the term 'budget' to mean a short-term (usually up to a year ahead) financial plan.

Recall from our study of financial analysis how critically important effective **liquidity management** is to the survival and growth of the firm. We know that a business cannot survive and grow if it does not have sufficient cash available to pay its bills. Some of the costs associated with having too little cash available include:

- profitable investment opportunities may have to be overlooked as insufficient funds are available to exploit them;
- increased borrowing and financing costs to cover cash shortages;
- increased risk of insolvency as insufficient cash may be available to pay debts when they fall due;
- loss of goodwill as creditors may become impatient with slow payments due to lack of cash.

Alternatively, having too much idle cash on hand is an inefficient use of resources. First there is the opportunity cost of investment opportunities foregone as surplus cash is not invested to at least earn interest. Second, in periods of high inflation the value of excess cash held will depreciate.

The purpose of the cash budget is therefore to help the financial manager match the firm's cash flows to its operational needs and avoid either extreme of a 'cash famine' or a 'cash mountain'.

Thus the key task in cash planning is to ensure that *the right amount of cash is available, at the right time and at the lowest cost,* to enable the firm's objectives to be realised. Any firm can set out challenging sales, profit and investment objectives, but if adequate cash is not available to support the firm's planned activities, then its objectives cannot be achieved. Thus it is vital that the cash requirements of the firm's total planning programme are carefully scrutinised and planned.

The objective of the cash budget

The objective of the cash budget is to provide the financial manager with an overall picture of the firm's expected cash flow position for the budget period ahead. It will reveal the times when surplus cash may be available for investment and/or when there are cash shortages and funds need to be borrowed. The cash budget will be used as a basis for making short-term financing and investment decisions and will provide the financial manager with a very powerful short-term financial planning and cash management tool.

Preparing the cash budget

The cash budget is prepared by analysing all the firm's budgets (e.g. the sales, marketing and capital expenditure budgets) for their cash flow effects. Then all the expected **cash receipts** (such as receipts from cash and credit sales, disposal of assets and new loans) and expected **cash payments** (such as payments to suppliers for raw materials, payments for expenses, dividends and taxes) are summarised. Any *non-cash items* such as depreciation will be excluded.

As it is based on the information contained in all the firm's other budgets, sales, purchases, expenses and so forth, the cash budget will be affected by any errors they contain.

When completed, the cash budget will show if the firm's plans can be financed over the budget period ahead. It will reveal, for example, if and when extra short-term cash is needed or if and when surplus cash is available for short-term investment.

A typical cash budget format is presented in Example 2.

Example 2 —Cash budget layout for a 12 month budget period

	Jan.	Feb.	Mar.	....	Oct.	Nov.	Dec.
1 Cash receipts (£000s)							
2 Less: Cash payments (£000s)	__	__	__	....	__	__	__
3 Net cash flow							
4 Add: Opening cash balance	__	__	__	....	__	__	__

*5*Closing cash balance
6Less: Minimum cash balance __   __   __   ....__   __   __
*7*Cash (deficit)
*8*Cash surplus   __   __   __   ....__   __   __

Each element of the cash budget is made up as follows.

1 **Cash receipts.** These will include anticipated cash inflows arising from: cash sales, credit sales, cash from the disposal of assets, dividend income, and any other cash receipts expected during the budget period.
2 **Cash payments.** These will include all the anticipated cash outflows for the budget period and will typically consist of: payments to suppliers for purchases; payments for operating expenses such as salaries, wages, rents, insurance, transport and travel; payments of taxes, dividends and interest; and the purchase of fixed assets.
3 **Net cash flow.** This is the difference between the budgeted cash receipts and the budgeted cash payments for each month: it is equal to 1 minus 2 above. If receipts are greater than payments this will be a positive figure: it will be negative if payments is the greater figure.
4 **Opening cash balance.** This is the opening cash balance at the start of each month, it will be the same as the closing cash balance for the previous month. Again this can be a positive or negative figure.
5 **Closing cash balance.** By adding the opening cash balance for a month to the net cash flow for the same month the closing cash balance is determined: it is equal to 3 plus 4 above. Whether this is a positive or negative figure will depend on the positive or negative characteristics of items 3 and 4 above.
6 **Minimum cash balance.** The firm may have a policy of ensuring that it maintains at least a minimum cash balance at all times. If the closing cash balance revealed at 5 above is less than the required minimum there will be a *cash deficit* and the firm will need recourse to some short-term financing. Should the closing cash balance be greater than the required minimum then there will be a *cash surplus* available for investing in suitable short-term, liquid investments.

Cash budget preparation

We will now examine each individual element of the cash budget by working through a complete example. Remember that we are only concerned with income and expenditure items which have a cash flow impact: non-cash items such as depreciation expense will therefore be ignored.

> ### *Example 3 —MJM Enterprises—cash budget for period January to June*
> MJM Enterprises is involved in the manufacture and distribution of

health food products. The financial manager is currently constructing a cash budget for the first six months, January to June, of the new financial year and has collected the following information. The completed cash budget is presented in Figure 16.2.

Receipts

MJM had actual sales of £400,000 and £480,000 in November and December, respectively, of the previous year. The sales budget shows total sales of £400,000 each month for January to March inclusive. The launch of a new product range is planned for April and total sales have been budgeted at £500,000 per month from April to June and £550,000 for July to reflect this. Approximately 20 per cent of the company's sales are for cash and 80 per cent are on credit. Normally half of the credit sales are paid for one month after sale and the remainder is collected two months after sale: no allowance is made for bad debts.

The company expects to receive £30,000 from the disposal of old equipment in March and investment income in the form of interest of £20,000 in June.

Payments

Purchases represent 60 per cent of sales and are bought in one month before the month of sale. MJM normally pays for 80 per cent of its purchases within one month of delivery and the remaining 20 per cent is paid one month later.

Salaries and wages are budgeted at £45,000 per month from January to March and at £55,000 per month from April to June.

Additional advertising and promotional expenditures associated with the launch of the new product range are budgeted at £30,000, £20,000 and £20,000 for April, May and June, respectively.

Dividends of £35,000 are to be paid in March and taxes of £55,000 are to be paid in June.

New equipment costing £60,000 will be purchased in February and paid for in March.

Other overheads are budgeted at £55,000 per month from January to March and at £65,000 per month from April to June.

Depreciation is estimated at £10,000 in total for the period.

The opening cash balance is estimated at £25,000 and the company wishes to maintain a minimum cash balance of £20,000 at all times.

Bank overdraft and short loan facilities are available up to £100,000 if required.

Preparation

Before we can prepare the cash budget proper, there are two

preliminary stages we must go through. First we need to construct a *schedule of cash receipts* from expected sales as there is a time lag with credit sales between the time the goods are sold and when the cash is actually received from the customer. Second we need to construct a similar *schedule of purchase payments* as again there is a time lag between receipt of goods by MJM and actual payment to suppliers. We will begin by creating a schedule for sales receipts.

Sales receipts schedule

The first line of the schedule (Figure 16.2) represents budgeted sales. These sales figures are needed to calculate the cash receipts but they do not form part of the main cash budget. The budget for monthly cash sales is simply 20 per cent of the total budgeted sales figure for that month. For example, January's cash sales of £80,000 are calculated as £400,000×0.2.

Credit sale collections represent the phasing of cash receipts from credit customers. In January for example, cash received will consist of 50 per cent of the credit sales for the previous December (£480,000−£96,000×0.5=£192,000) and the remaining 50 per cent of the credit sales in November (£400,000−£80,000×0.5=£160,000). Similarly cash collections for February will consist of 50 per cent of January's credit sales and the 50 per cent balance outstanding from December's sales.

Purchase payments schedule

Planned purchases are shown in the first row of the schedule, they are determined at 60 per cent of the next month's budgeted sales. Thus January's purchases of £240,000 are calculated at 60 per cent of the budgeted sales for February (£400,000×0.6). You will note that although the July sales figure lies outside the budget period, it is needed to calculate the purchases figure for June (£550,000×0.6).

As regards payments for purchases, there is a one month time lag in respect of 80 per cent of purchases: these do not have to be paid for until the following month. The remaining 20 per cent is paid for in two months time. Therefore the payments figure for January consists of 80 per cent of December's purchases (£240,000×0.8=£192,000) plus 20 per cent of November's purchases (£288,000×0.2=£58,000, to nearest £000). Again, although the purchases for November and December lie outside the defined budget period, this information is necessary in order to calculate the credit payments for January and February.

Having now determined two of the most important, and probably also the two most troublesome pieces of information, we can now proceed to develop the main cash budget for MJM. We will start by

summarising all the anticipated cash receipts.

Cash receipts

Having established the monthly cash receipts from the sales figures, these are then included in the 'Cash Receipts' section of the cash budget together with any other items of cash income such as the £30,000 proceeds from the sale of equipment due in March and the investment income of £20,000 due to be received in June. All cash receipts are then totalled for each month of the budget period.

Cash payments

The entries for purchases represent the anticipated cash payments in respect of the planned purchases as determined from the purchase payments schedule. Other entries include budgeted payments for expenses, taxes, dividends, purchase of equipment and the total payments for each month. Depreciation is ignored as it is not a cash expense.

Net cash flow

This is found by subtracting total cash payments from total cash receipts and will reveal whether the net cash flow for each month is positive or negative. In the case of MJM, negative cash flows of £5,000 and £18,000 are predicted for the months of March and April, respectively.

Opening and closing cash balances

The opening cash balance at the start of the budget period was estimated at £25,000. Adding to this the net cash flow of £82,000 for the month of January produces the closing cash balance for January of £107,000 and of course this in turn becomes the opening cash balance for February and so on for every other month. We can see that the company starts off with an opening balance of £25,000 and is expected to end the budget period with a closing balance of £221,000.

Minimum cash balance

It is the company's policy always to have a minimum cash balance of £20,000 on hand to meet any contingencies.

Cash deficit/surplus

The minimum cash balance required is deducted from the closing cash balance figure to obtain, in MJM's case, a discretionary cash surplus for the month. For example the closing cash balance for January of £107,000 minus the minimum balance of £20,000, yields a 'discretionary' cash surplus of £87,000 for the month. This means

that the firm has some choices in what it can do with the surplus: it could, for example, be invested in short-term, interest-earning and easily liquidated deposit accounts.

If, on the other hand, the closing balance for January, or any other month, should appear as a negative figure, then the company would need to borrow short-term funds sufficient to cover the minimum balance of £20,000 plus the amount of any negative closing balance (see Figure 16.2).

Figure 16.2 Cash Budget: MJM Enterprises
Cash Budget—MJM Enterprises
Sales receipts schedule

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Sales (£000s)	400	480	400	400	400	500	500	500	550
Cash sales	80	96	80	80	80	100	100	100	110
Credit sale collections									
One month credit			192	160	160	160	200	200	
Two months credit			160	192	160	160	160	160	
			432	432	400	420	460	500	

Purchase payments schedule

		Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Purchases (£000s)		288	240	240	240	300	300	300	350
Payments									
One month credit				192	192	192	240	240	240
Two months credit				58	48	48	48	60	60
				250	240	240	288	300	300

Cash Budget	Jan.	Feb.	Mar.	Apr.	May	June	Total
Cash receipts (£000s)							
Sales	432	432	400	420	460	500	2,644
Disposal of equipment			30				30
Investment income						20	20
1 Total cash receipts	432	432	430	420	460	520	2,694
Cash payments (£000s)							
Purchases	250	240	240	288	300	300	1,618
Salaries and wages	45	45	45	55	55	55	300
Advertising				30	20	20	70
Dividends			35				35
Taxes						55	55
Equipment			60				60
Overheads	55	55	55	65	65	65	360
2 Total cash payments	350	340	435	438	440	495	2,498
3 Net Cash Flow (1−2)	82	92	−5	−18	20	25	196

4 Opening cash balance	25	107	199	194	176	196	25
5 Closing cash balance (3+4)	107	199	194	176	196	221	221
6 Minimum cash balance	20	20	20	20	20	20	20
7 Cash deficit							
8 Cash surplus	87	179	174	156	176	201	201

> **KEY LEARNING POINT**
> The **cash budget will only include those items of planned income and expenditure which are expected to have an actual cash flow effect. Non-cash items, for example depreciation, will be excluded. The respective** *timings* **of planned cash receipts and cash payments must also be accurately recognised.**

> ## EXERCISE 2 —SALES RECEIPTS SCHEDULE
> Charts and Maps designs and manufactures a comprehensive range of aeronautical and nautical charts and maps. In the current year the company had actual sales of £296,000 during the month of July and £364,000 during August. Forecast sales for the rest of the year are: £410,000 for September; £460,000 for October; £514,000 for November; and £561,000 for December.
> If 15 per cent of the company's sales are for cash, 50 per cent of the credit sales are paid one month after sale and the balance two months after sale, prepare a sales receipts schedule for the period September to December inclusive.

Interpreting the cash budget

The cash budget as presented now provides the financial manager with a complete picture of how the business plans and decisions are expected to affect the company's cash flow position over the next six months. For ease of reference and illustration of principles, we have simply confined the budget period to six months ahead, in practice it would likely be for twelve months ahead. In any event, having determined the cash budget for MJM Enterprises, the next step is to assess its implications for the business.

Overall MJM would appear to be in the fortunate position of expecting to generate a healthy positive cash flow over the budget period. The business seemingly starts out with a positive cash balance of £25,000 which is expected to grow to almost nine times that amount, £221,000 by the end of the six-month period: there is no apparently no need to draw on any of the short-term financing facilities at any stage.

Looking at the cash flows more closely, the net monthly cash flow profile is encouraging: it is positive for four of the six months. The business is expected to generate

substantial positive cash flows during the initial months of January and February. Although the monthly cash flows reduce to what, in the overall financial context of the budget, can be considered as marginally negative amounts in March and April—largely as a result of the planned £60,000 expenditure for new equipment—they are expected to return to positive cash flows again in the later months.

The question arises as to what to do with the expected cash surplus. There are several options, including for example, any one or a combination of the following:

1 invest in short-term, interest-earning securities or deposit accounts;
2 increase marketing expenditures on the launch of the new product range;
3 purchase fixed assets; increase dividends; or make payments in advance to key creditworthy suppliers.

Clearly any decisions should be made in the context of the longer-term business strategy. For example, if *financial flexibility* is the priority, in order to take advantage of any strategic business opportunities which may arise in the near future, then options which would involve a permanent commitment of available cash flows, such as purchasing fixed assets, increasing dividends or advertising spends, would be eliminated.

Hopefully it is now easier to appreciate some of the key benefits of producing a cash budget, or any budget. The process requires managers to think ahead, allows them to create alternative 'what if?' financial scenarios and through this try to anticipate and influence future changes and business conditions.

Short-term investing and financing

In cases where the cash budget reveals an expected cash surplus during the budget period, then this will allow the financial manager to plan ahead for suitable short-term investments.

On the other hand if the cash budget reveals a need for short-term financing at some stage during the budget period, then this will allow the financial manager to plan ahead for suitable sources of short-term financing.

Short-term investment opportunities

In cases where a company is in the fortunate position of generating cash surpluses, then, after allowing for an appropriate 'safety margin', excess cash can be invested on a short-term basis. In the current context short-term usually means for a period of up to one year ahead. Short-term investment opportunities would typically include:

1 **Short-term interest-earning deposits.** These are available with most financial institutions, foreign and domestic. There are a multitude of options available (e.g. 30, 60, 90 day bank deposits, offering fixed or variable rates of interest).
2 **Marketable securities.** These are short-term, easily liquidated, interest-earning government and non-government money market instruments. Examples include Treasury bills (Tbs), certificates of deposit (CDs), commercial paper, and perhaps eurodeposits if the amounts are very substantial.
3 **Payments in advance.** Payments can be made in advance to creditworthy suppliers enabling significant discounts to be negotiated. The benefits of paying in advance

would clearly have to be weighed against the cost of any interest lost from investing the funds.

Short-term investment criteria

The short-term investment decisions would be guided by the context of the projected or forecast cash surpluses and by the following investment criteria:

- **Liquidity.** Investments should be *easily liquidated* or *realised* in the event of sudden adverse changes or set-backs in business conditions.
- **Maturity.** Investments should have a *short term to maturity,* usually less than one year, thus investing in a five-year bond would be inappropriate in this context. Remember the *maturity matching or hedging principle,* match the maturity (lifespan) of the asset with the maturity of the finance. Thus finance long-term assets with long-term sources of finance and finance short-term assets with short-term sources of finance.
- **Risk and return.** Any short-term investments should have a *low default risk* (the risk that interest and principal will not be paid when due) and no risk of capital loss (the risk that the capital value of the investment will decline, or even be lost completely). The investments should earn a *fair rate of return* commensurate with the risks involved. High risk, speculative investments should be avoided.
- **Cost.** Investment set-up, administration and arrangement costs should be low.
- **Taxation.** Investments should be tax-efficient.

Short-term financing

On the other hand, a company may well need access to short-term financing at some stage during the budget period. Sources of short- and medium-term business finance are dealt with more fully in Chapter 19, but for now we will summarise some of the more common short-term (for a period of up to one year ahead) financing options available.

Trade credit This is a major source of finance for many businesses, particularly small business enterprises. It may be possible to stretch the current period of credit taken from suppliers. However, *supplier goodwill* and tolerance should not be compromised as essential supplies may be withheld. It is also not advisable to forego *cash discounts* from suppliers for early settlement as this is a very expensive form of short-term financing. We will explore this further in Chapter 18.

Bank overdrafts and short-term loans These are a very common source of short-term finance and they may be *secured* or *unsecured.* A **bank overdraft** allows a business to draw on short-term funds as and when required up to a limit previously agreed with the bank. Interest is charged on the portion of the overdraft actually used.

Short-term bank loans can normally be arranged at fixed or variable rates of interest. The firm is required to take the full amount of the loan on which interest is periodically charged. This tends to make term loans more expensive than overdraft facilities. In both cases arrangement and administration costs will be involved.

An overdraft facility is the more flexible and cheaper of the two financing arrangements, although the use of unauthorised overdrafts (where, for example, the agreed limit on the overdraft facility is exceeded without the lender's permission) will incur the wrath of the lender. Consequently such a breach will cost the offending

company dearly, not only in terms of penalties and fees, but possibly withdrawal of the facility altogether, if the breach is serious.

Risk and uncertainty in the cash budget

So far we have assumed a world of 'virtual certainty' in dealing with the cash budget, but as with any financial decision or plan, the impact of risk and uncertainty on the process has to be recognised. Things may not (*will not,* may be more apt!) go according to plan.

Remember that risk has been defined as *the chance that the actual outcome will differ from the expected outcome* or more formally **the potential variability of future cash flows.** It is measured statistically by the standard deviation a, which is a measure of the dispersion or spread around an expected value.

In the case of MJM's cash budget the financial manager's concern is trying to evaluate the chance that the actual cash flows will differ from the budgeted or expected cash flows. Some measure of the potential variability of future cash flows is required.

On the downside for example, sales expectations may not be realised, market conditions and consumer attitudes can change dramatically, even in the short term. Remember the dramatic, virtually overnight effect consumers' reactions in the UK to health scares over beef had on the beef industry! Other possible risks are that raw material prices may escalate, the availability of materials may become restricted or industrial strikes may occur.

Alternatively on the upside, things may go better than planned, with perhaps sales exceeding even the most optimistic expectations. In any event, in quantifying risk we are concerned with trying to measure variability, good and bad, on either side of the expected value: the greater the overall variability, the greater the risk.

Any of the above, or other, factors could have a significant impact on the firm's ambitions. The risk assessment process will require managers to identify all the factors likely to impact on their plans and objectives, assess their relative significance and apply some kind of probability weightings to their occurrence.

Risk analysis techniques

There are several techniques available for dealing with risk and we have already examined a number of them (Chapter 11) in relation to investment appraisal; techniques such as: **(1) scenario analysis, (2) sensitivity analysis, and (3) simulation.** We will now look at their application to cash planning.

Scenario analysis

A common approach to risk evaluation is to use scenario analysis. This means essentially developing several cash budgets to determine how predicted cash flows are likely to vary in response to differing sets of business circumstances. The financial manager, with the aid of modern computing power, can very easily produce a number of budgets covering a range of different assumptions about business conditions.

At least three budgets should be produced covering **best, middle** and **worst** case scenarios (the BMW approach). From this the financial manager can view the range or

degree of cash flow variability between all three different case scenarios: the higher the degree of overall variability, the higher the risk.

Example 4 —MJM Enterprises—cash budget with scenario analysis

To illustrate the approach to scenario analysis let us take the budgeted cash flows for the month of April, assuming that the expected values used previously in the cash budget represent the middle case scenario.

| | Scenario | | |
	Best £000	Middle £000	Worst £000
Total cash receipts	480	420	370
Total cash payments	450	438	420
Net cash flow	30	−18	−50
Opening cash balance*	210	194	145
Closing cash balance	240	176	95
Minimum cash balance	20	20	20
Cash surplus	220	156	75

* Opening cash balance will have been derived *from* the previous month's related scenario.

The scenario, for the single month presented, shows that the firm still retains a cash surplus, with a range from best to worst case of £145,000 (£220,000−£75,000). The worst case scenario is approximately 52 per cent lower, and the best case scenario approximately 41 per cent higher than the middle or expected values.

For the monthly net cash flow the range is £80,000 (from a positive flow of £30,000 in the best case to a negative of £50,000 in the worst case). The worst case scenario shows a *negative* cash flow for the month approximately 178 per cent greater than the middle case scenario and the best case is approximately 267 per cent higher than the middle value.

The more the extreme case values diverge from the expected values, the greater the potential variability of budgeted cash flows. By creating several scenarios the financial manager begins to build up a picture and develop a feel for the variability of monthly cash flows.

Scenario analysis using probability estimates A refinement to the above is to create a scenario analysis, only this time assigning explicit probability estimates to predicted cash flows. It is likely that other key budget variables such as sales estimates will have already been determined using some kind of probability assessment, but here the focus of our attention is on expected cash flows. For instance, for the month of April, a simple probability distribution of the net monthly cash flow could resemble that in Example 5.

Example 5 —MJM Enterprises—cash budget scenario analysis using probability estimates

	Scenario		
	Best	*Middle*	*Worst*
Net cash flow (£000)	30	−18	−50
Probability (p)	0.25	0.60	0.15
Adjusted cash flow (£000)	7.5	−10.8	−7.5

The probability adjusted cash flow, that is, the **expected value (EV),** is calculated by multiplying the scenario cash flow by its respective probability: thus the adjusted cash flow for the best case scenario=£30,000×0.25=£7,500.

The expected value of the cash flow for April would be estimated as:

$$EV(\text{cash flow})=7.5+(-10.8)+(-7.5)=-10.8 \text{ (i.e. } -£10,800).$$

Of course the question arises as to how the probability estimates are determined. You will appreciate that they tend to be based on subjective assessments by managers.

Sensitivity analysis

This approach involves examining the impact on expected or base case cash flows of changes in one key variable at a time. In the cash budget under review, sales estimates (prices, volumes and mixes) of the new product range will be a critical variable.

The financial manager would at least wish to study the *'what if'* effect on predicted cash flows of changes in any of the sales variables such as selling prices, sales volumes and sales mixes. Sales mix is the relative proportion of each product in the range of products sold. For example, the sales mix of a large retail store is likely to consist of sales of: food, liquor, hardware, clothing, entertainment and so forth. The analysis of sales mix is important for product profitability and marketing reasons. In MJM's case, sales mix will also be a key variable as a range of new products with presumably differing profit margins is involved.

In our current context, the financial manager may wish to test the effects of, what if:

- sales volume is 10 per cent lower (or higher) than expected?
- selling prices are 5 per cent higher (or lower) than expected?
- the product launch is delayed for a month or longer?
- product launch costs are 15 per cent higher (or lower) than expected?

Again, with the aid of computing power, quite a number of variable changes can be tested. The aim is to identify how sensitive the net monthly cash flow is to changes in any of the variables and to determine which variables have the most significant impact on net cash flow.

Simulation

Recall that simulation (such as **Monte Carlo simulation** which was developed from mathematical work on casino gambling) is a sophisticated statistical modelling technique—usually computer based because of the extensive number crunching required—involving the evaluation of *simultaneous changes* in the key variables under review.

By using simulation the financial manager can develop a ***probability distribution*** of, say, the net cash flow for each month. It is a much more sophisticated approach to risk evaluation than the simple probability assessment which was applied in our scenario analysis example.

Profit planning

The objective of profit planning is to show the effects of planning decisions on the firm's expected level of financial returns and profitability over the planning period. In this section we will review the preparation of a forecast profit and loss account and balance sheet.

The forecast profit and loss account

The key distinction between profit planning and cash planning is that profit plans will have to recognise all revenues and expenses relating to the planning period, irrespective of whether they are to be paid during the period or not. Thus profit and loss statements will include non-cash items such as depreciation.

Profit and loss statements are prepared on an ***accruals/matching basis.*** This requires the matching of all revenues earned, or expected to be earned, during a defined accounting period, with all the expenses incurred, or expected to be incurred, in generating those revenues during the identical period.

Profit and loss statements will therefore have to be adjusted to account for *accruals and prepayments.* Accruals are essentially amounts owing at the end of an accounting period, in respect of goods or services consumed during the period, e.g. heat and light. Prepayments are amounts paid in advance during one accounting period which relate to the next accounting period, e.g. insurance premiums.

The preparation of a forecast, or *pro forma* as it is often called, profit and loss account for MJM Enterprises, for the six-month period January to June, is illustrated in Example 6. It has been prepared with reference to the information used to compile the cash budget for the same period. For practice you should attempt to prepare MJM's forecast profit and loss account before reviewing the example.

In preparing the forecast profit and loss account you should assume the following:

- the relevant corporate tax rate is 25 per cent;
- the dividend payout ratio is 33 per cent of after-tax profits;
- there has been no profit or loss on the disposal of fixed assets; and
- purchases are fully consumed during the month to which they relate.

Example 6 —MJM Enterprises—forecast profit and loss account for period January to June

MJM Enterprises
Forecast Profit and Loss Account
for the six-month period January to June

	£m	£m
Sales		2.70
Cost of sales		1.62
Gross profit		*1.08*
Less: Operating costs		
Salaries and wages	0.30	
Advertising	0.07	
Overheads	0.36	
Depreciation	0.01	0.74
Operating profit		*0.34*
Investment income		0.02
Profit before tax		*0.36*
Tax		0.09
Profit after tax		*0.27*
Dividends		0.09
Retained earnings		*0.18*

The basic data has been derived as follows:

Income

Similar to the cash budget, the starting point for profit planning is the all important sales forecast. Forecast sales for the period total £2.7m. This is the total value of goods the company expects to sell over the planning period, irrespective of whether they are paid for during the budget period or not. Any sales not paid for at the end of the budget period will appear as debtors in the forecast balance sheet.

In addition to sales revenue, the company is expecting to derive interest income from investments of £20,000. This is not earned as part of the normal trading activities of the firm and so is shown after operating profit. Any interest to be paid would be deducted at this stage.

Cost of sales

The firm's cost of sales is determined as:

	£000
Opening stock	240
Purchases	1,710
	1,950

Closing stock	330
Cost of sales	1,620

The opening stock of £240,000 at 1 January consists of the goods bought in December for use during January. It is assumed that by the 1 January all purchases relating to December's production will have been fully consumed. Similarly the closing stock at 30 June relates only to those purchases held for use during July.

Similar to sales, the total for purchases is the total value of purchases made during the period, whether or not they are paid for. Any amounts owing to suppliers for purchases at the end of the period will appear as creditors in the forecast balance sheet.

Operating costs

Other operating costs, salaries and wages, etc. are as shown in the cash budget. Note that depreciation is included as an expense item in the forecast and profit and loss account.

Although they do not appear in this case, it should be noted that any amounts owing for expenses incurred during the period would be included with creditors in the balance sheet. Any prepaid expenses would be included with debtors in the balance sheet.

Taxes and dividends

The figures shown in the cash budget for taxes and dividends are the payments in respect of the previous accounting period.

For the current forecast period, the rate of 25 per cent has been used to compute taxes and the payout ratio of 33 per cent of after-tax profits has been used to determine dividends. As these items will not be paid until a later date, usually after the accounting year end, they will appear under current liabilities in the forecast balance sheet.

In the absence of a detailed cash budget, a simplified approach to preparing a forecast profit and loss account is the ***per cent-of-sales*** approach. With this method all operating costs are expressed as a direct percentage of the forecast sales figure.

Using a per cent-of-sales approach, the forecast profit and loss account will be prepared by collecting some basic information about the relationships between costs and sales. The percentage relationships used may be based on a combination of knowledge of the business, experience, and past financial statements—suitably modified to reflect any new or changing circumstances.

For example, in the case of MJM Enterprises there is a direct relationship between purchases and sales: purchases are stated to be 60 per cent of sales. This is an alternative way of saying that the gross profit ratio is 40 per cent. In normal circumstances, percentage relationships between sales and other expenses may be determined from

previous accounts.

However, circumstances may not always be 'normal' and this will have to be recognised in establishing percentage relationships between key variables. For example, in the case of MJM Enterprises, the introduction of a new product range in April would clearly distort past relationships. Thus care needs to be taken in applying the simple per cent-of-sales method, in that past relationships between variables are not necessarily a reliable guide to future relationships.

The per cent-of-sales method implies a constant or linear relationship between variables—that one variable remains a constant percentage of another. Thus it implies that all costs are variable, that is, it assumes that all costs will vary directly in line with changes in sales. As virtually all firm's will have some fixed costs, it is important to analyse a firm's cost structure (the breakdown of fixed and variable costs) before applying the per cent-of-sales technique.

In other cases this linear relationship is also not likely to hold, for instance where assets (e.g. stocks of essential raw materials) may only be purchased in minimum, indivisable consignments or batches. In such cases inventories are likely to change in a step, rather than a linear, fashion in relation to changes in sales or activity levels.

The per cent-of-sales method is attractive in its simplicity, but clearly discretion and judgement need to be exercised in its application.

The forecast balance sheet

Whereas the forecast profit and loss account will indicate the impact of planning decisions on the firm's level of financial return, the forecast balance sheet will help the financial manager assess the impact of planning decisions on the firm's **financial condition** and level of **financial risk.**

The preparation of a forecast, or budget, balance sheet for MJM Enterprises, as at 30 June, is illustrated in Example 7. It has been prepared with reference to the information contained in MJM's cash budget and forecast profit and loss account. Again, for practice, you should attempt to prepare MJM's forecast balance sheet before reviewing the example.

In preparing the forecast, or pro forma, balance sheet you should assume the following:

- the net book value of fixed assets as at 31 December was £450,000;
- called up share capital amounts to £500,000; and
- the balance on the profit and loss account at 31 December was £371,000.

Example 7 —MJM Enterprises—forecast balance sheet as at 30 June

MJM Enterprises
Forecast Balance Sheet as at 30 June

	£000
Fixed assets	470
Current assets	
Stocks	330

Debtors	600
Cash and investments	221
	1,151
Current liabilities	
Creditors	390
Taxation	90
Dividends	90
Net current assets	*581*
Total assets less current liabilities	*1,051*
Capital and reserves	
Called up share capital	500
Profit and loss account	551
	1,051

The relevant data has been derived as follows:

Fixed assets

	£000
Opening book value	450
Additions	60
Disposals	(30)
Depreciation	(10)
Closing book value	470

As indicated in the profit and loss account, there is no profit or loss involved in the disposal of fixed assets—the disposal proceeds of £30,000 equal the net book value.

Current assets

- *Stock.* This is the closing stock as determined for the forecast profit and loss account.
- *Debtors.* Closing debtors represent 50 per cent of May's credit sales (£200,000) plus 100 per cent of June's credit sales (£400,000).
- *Cash and investments.* These consist of the forecast cash balance in the cash budget of £221,000.

Current liabilities

- *Creditors.* Closing creditors consist of 20 per cent owed in respect of May's purchases (£60,000), plus 100 per cent of the purchases relating to July (£330,000).
- *Taxes and dividends.* These are as determined in the forecast profit and loss account.

Capital and reserves

- *Profit and loss account.* This is equal to the accumulated balance of £371,000 as at 31 December, plus the retained earnings of £180,000.

An alternative method of preparing a forecast balance sheet, would be to base it on ratio calculations where relevant. For example, the calculation of stock, debtor, and creditor balances would be based on relevant, or desired, turnover or days ratios. Other items would have to be calculated or estimated independently of sales.

A prime example is the cash balance in a forecast balance sheet. The determination of the cash balance, whether it is positive or negative, will be influenced by multiple variables, such as the level of operating profit, taxation, dividends, loan interest and principal payments, and so forth.

The cash balance cannot therefore be calculated as a straight percentage of sales. In the absence of a detailed cash budget, the cash balance in a forecast balance sheet, using this approach, will essentially be the balancing or 'plug' figure. Clearly if it is positive, it will appear as a current asset, if negative (indicating a need for short-term financing) it will appear as a current liability.

Other items would also be calculated independently of sales. For example, fixed asset values would be determined with reference to the firm's depreciation policy, and any amounts owing on term loans would be determined in accordance with the terms and conditions of the loan.

This approach to constructing a forecast balance sheet is more discretionary and judgemental than the application of a straight per cent-of-sales approach and is likely to be used in the absence of a cash budget. The approach may be used to quickly produce a preliminary statement, before the construction of a more detailed cash budget, in order to reveal an approximate indication of the forecast short-term financing position.

It is an attractively simple approach but, like the per cent-of-sales approach in the profit and loss account, it essentially makes the same limiting assumptions. That is, past relationships between variables will continue in the future, relationships are essentially linear, and any desired or target ratios (e.g. a target debtor collection period) which have been used to compile the forecast are realistic and can in fact be achieved in practice.

Cash flow statements

In addition to the cash budget, preparing a forecast cash flow statement will also provide valuable insights into the liquidity condition of a company. A cash flow statement will present a different, not a competing, perspective on a company's ability to generate cash, and on how it manages its cash resources.

The cash budget and the cash flow statement are complementary, they examine a company's cash flow generation from two different angles. For example, compared to a cash budget, a cash flow statement shows more clearly the effects on cash flows of the firm's operating, investing and financing activities. A financial manager is likely to prepare both statements in order to gain the necessary understanding of a company's

liquidity and cash flow condition.

A cash flow statement will provide a direct link between a company's profit and loss account and balance sheets, by seeking to measure the flows of cash into and out of a business during an accounting period.

The essential purpose of a cash flow statement is to reveal how much, and from what sources, cash is being generated by a business over a period, and how it is being used. Together with the cash budget it will assist the financial manager, and other interested parties, in assessing how efficiently cash flows are being managed. It will also provide an indication of the company's potential for generating cash to fund future growth and development.

Remember from Chapter 1 that financial management is very much concerned with the generation and management of value-enhancing cash flows and that cash flow management involves the effective management of both cash inflows and cash outflows.

Recall that a company's cash flows will arise as a result of:

1 **Operating activities.** These are the cash flows that arise from normal trading activities, such as the cash received from customers for goods/services sold and the cash paid for trade supplies and operating expenses.
2 **Investing activities.** These cash flows arise from non-trading, investment-related activities such as cash actually received from the disposal of assets and investments and, conversely, cash actually paid to purchase assets and investments.
3 **Financing activities.** Again these are cash flows that arise as a result of non-trading activities. In this case they are the cash inflows connected with raising new capital such as issuing new ordinary shares or long-term debt and the cash outflows associated with, for example, repayments of loans and finance leases.

Cash flow statements are particularly important because, like the cash budget, they deal with flows of money and, as we know, it is more frequently a lack of cash that causes a business to fail rather than a lack of profits.

In Chapter 1 we defined cash flow as follows:

Cash flow=operating profit+depreciation ± other non-cash items

and free cash flow (FCF) as:

Free   cash   flow   (FCF)=cash   flow—(investment expenditures+dividends+taxes)

Free cash flow	
Operating profit	This is the starting point for determining free cash flow.
+Depreciation	As depreciation is not a cash expense it must be added back to the operating profit figure together with any other non-cash expenses which have been deducted in arriving at operating profit.
±Increase	An increase in stocks represents additional cash tied

(decrease) in stocks	up or invested in stocks and is treated as a cash outflow $(-)$.
	Conversely a decrease in stocks represents less cash invested in stocks and is treated as a cash inflow $(+)$.
± Increase (decrease) in debtors	Similarly an increase in debtors represents additional cash tied up in debtor balances, and is treated as a cash outflow.
	Conversely a decrease in debtors represents a cash inflow.
± Increase (decrease) in creditors	An increase in creditors represents a source of cash and a decrease in creditors a use of cash.
=*Net cash inflow from operating activities*	
− Net interest paid	This is the difference between interest received and interest paid during the accounting period.
− Tax paid	This is the amount of tax *actually paid* over to the tax authorities during the period.
− Capital expenditure	The net cash used to purchase fixed assets, that is cash expenditure less any cash receipts from fixed asset disposals.
− Equity dividends paid	This is the amount of cash paid out in the form of dividend distributions to the company's equity shareholders.
=*Free cash flow (FCF)*	Represents the cash available for discretionary purposes.

Figure 16.3 Determination of free cash flow

To find a company's free cash flow (FCF) for a defined period of time we have to draw on the information contained in the profit and loss account for the period and in the opening and closing balance sheets for the same period.

The profit and loss account will show whether or not the business is making money, the balance sheet will indicate the financial strength of the business at a point in time. Neither statement by itself will reveal the volume of cash actually flowing into a company and what has happened to this cash.

One way of determining a company's cash flow is by the method set out below. In accounting terms it is referred to as the *indirect method,* where certain adjustments are made to the operating profit reported in the profit and loss account. Figure 16.3 on page 565 represents the series of items which have to be taken into account in arriving at a company's free cash flow (FCF).

A company which is not generating a sufficient flow of cash may soon encounter liquidity problems, that is, it may not have sufficient liquid funds to pay its creditors on

time. Ultimately if a weak cash flow condition persists, the company may be forced into liquidation.

It can be seen that free cash flow (FCF) is determined by taking selected figures from the profit and loss account for an accounting period and figures from the opening and closing balance sheets for the same period.

The preparation of a simplified forecast cash flow statement is presented in Example 8. A cash flow statement is less time-consuming to prepare than a cash budget, but correspondingly it does not provide the same detailed profile or analysis of cash flows over the budget period. For example, from a summarised cash flow statement it is not possible to view expected cash flow 'peaks' and 'troughs'—an essential requisite of financial planning.

It should be made clear that companies are required to produce an historic cash flow statement as part of their annual report and accounts in accordance with Financial Reporting Standard (FRS) 1.

However, the objective here is to demonstrate the essential approach involved in calculating free cash flow (FCF), and the usefulness of a cash flow statement as a financial planning tool, rather than to become preoccupied with financial accounting complexities and technicalities.

Example 8 —MJM Enterprises—forecast cash flow statement

We can illustrate the preparation of a forecast cash flow statement with reference to the forecast profit and loss account and balance sheets of MJM Enterprises.

MJM Enterprises
Forecast Cash Flow Statement
for the six-month period January to June

	£000
Operating profit	340
Depreciation	10
Increase in stocks	(90)
Increase in debtors	(56)
	204
Increase in creditors	92
Net cash inflow from operating activities	296
Investment income	20
Taxation	(88)
Capital expenditure (net)	(30)
	231
Dividends	(35)
Free cash flow	196
Changes in cash during the period	
Opening cash balance	25
Free cash flow for period	196

Closing cash balance   <u>221</u>

The cash flow statement indicates that the company is forecast to generate a substantial free cash flow, primarily from its operating activities. This is a healthy sign and is an aspect of the company's liquidity which may not have been so readily apparent from the cash budget.

The cash flow statement also reveals more clearly how the company's decisions and plans will impact on the structure of its short-term (current) assets and liabilities. The investment in the current assets of stocks and debtors is shown to increase by £146,000. However, this will be partly financed by the increase in creditors of £92,000, resulting in an increased investment in net working capital of £54,000.

The company is planning to grow and, as we will see in the following chapters, growth invariably requires additional investment in working capital. The cash flow statement indicates that the company will (if everything goes according to plan) be able to finance the additional investment in working capital from its operating cash flows.

Overall the cash flow statement suggests that the company is inherently a cash generator, is able to finance its commitments, and has potential for generating cash to fund future growth and development.

Basis of preparation

The cash flow statement has been prepared following the format in Figure 16.3. Starting with the forecast operating profit of £340,000, the depreciation figure of £10,000 is added back as it is not a cash flow item.

The investments in the current assets of stock and debtors have increased over the previous year, by £90,000 (£330,000 closing−£240,000 opening) and £56,000 (£600,000 closing—£544,000 opening) respectively. These are treated as cash outflows and are deducted from operating profit. The increases represent extra cash being invested in these assets.

The opening debtors figure of £544,000 has been determined as December's credit sales of £384,000 plus half of November's credit sales, that is, £160,000.

Creditors have increased by £92,000, (£390,000 closing−£298,000 opening) but as this represents a cash inflow, it is added to operating profit.

The opening creditors figure of £298,000 has been determined as December's purchases of £240,000 plus 20 per cent of November's purchases, that is, £58,000.

The results of these transactions is a net cash inflow from operating activities of £296,000.

The company is also expecting to receive interest from investments of £20,000. The income earned on investments is not part of the normal operating or trading activities of the company, rather it arises as a result of the company's investing activities. Conversely any interest to be paid on bank overdrafts or loans would be deducted from the net cash inflow. Where there are both interest payments and receipts, only the net figure would be included.

MJM is planning to purchase, and dispose of, fixed assets. The net effect is an anticipated net capital expenditure of £30,000 (£60,000−£30,000).

During the period the company is due to pay taxes of £55,000 to the relevant authorities, and dividends of £35,000 to its shareholders. Note that the actual taxation and dividend payments relate to the previous year. They would be shown under current liabilities in the balance sheet at the end of the previous financial year, indicating that they are due to be paid shortly after the balance sheet date.

A company generally has up to nine months after the end of its accounting period to pay its corporation tax. Thus corporation tax calculated as due on the taxable profits for the accounting year ended 31 December should be paid on or before 1 October of the following year.

Similarly with dividends. The board of directors will determine the amount of the dividend to be paid and declare this for shareholders' approval at the annual general meeting (AGM), which is usually held several months after the relevant year end. If approved, the dividend will be paid shortly after the AGM. A dividend is only a debt when it is declared and due for payment.

After making all these adjustments, the free cash flow amounts to a positive figure of £196,000. Note that the cash balance shown in the forecast balance sheet has increased by this amount.

This is an essential check in preparing cash flow statements, the net cash flow should be equal to the change in the cash balance shown in the opening and closing balance sheets.

The evaluation of forecast financial statements

Like all business forecasts and predictions, once prepared the forecast financial statements should be tested for their soundness. They should stand up to rigorous scrutiny in terms of the validity of the assumptions, and the quality of the data on which they are based.

The interpretation of the forecast statements will be aided by the calculation of appropriate financial ratios. The firm's management will wish to consider if they indicate

acceptable levels of risk and return. As we have explained, risk analysis techniques, such as scenario and sensitivity analysis, can be used to assess the inherent riskiness of the forecasts and predictions.

Forecast financial statements are in essence financial models, and can quickly and easily be prepared on computer, using any of the proprietary spreadsheet packages, such as Excel or Lotus. For a discussion of the strengths and limitations of computer-based financial modelling see Chapter 15.

Once the forecasts have been carefully scrutinised, and managers are satisfied that they are sound, they can then be used as a basis for action and planning where indicated. For example, the forecasts may reveal a fall in profits, or show that required production or sales levels can only be achieved with additional investment in assets. By producing the forecasts, managers are then in a position to initiate advance action (s) to correct any imbalances or inadequacies in the forecast levels of returns, risk, financing and investment. When the financial forecasts have been agreed by management, they would then serve as performance benchmarks against which actual performance would be compared.

COMPUTERISED FINANCIAL PLANNING

The role of planning models was analysed in Chapter 15 and you may have already appreciated that in building a cash budget, together with other forecast financial statements, we are in fact building a financial planning model of the firm.

With the continuing advances in low-cost computing technology it is likely that, in all but the very smallest of organisations, financial planning models, particularly the cash budget, will be computer based. If anything, the limiting factor today for small organisations is more likely to be an absence of the necessary financial skills rather than an absence of computing technology.

With the aid of proprietary computer software packages, it is a relatively simple process for the financial manager or treasurer to create a number of alternative 'what if' financial scenarios. These can then be used to evaluate the effects on budgeted cash flows, profits, and asset structures, of changes in key budget variables such as sales volumes, sales mix, selling prices, and operating costs.

Creating a range of alternative scenarios will assist in financial decision-making by providing the financial manager with an overall assessment of the variability (risk) of cash flows associated with each alternative.

The final decision(s) on which alternative(s) will be chosen will be influenced by experience, professional judgement, and management's attitude to risk.

RECAP

Short-term financial management: Short-term financial management emphasises financial decision-making, planning and control at the operational level of managing the firm's short-term (current) assets, liabilities and cash flows.

Short-term financial management is guided by the same sound financial management principles and concepts as strategic financial management—specifying returns in terms of cash flows, evaluating their timings and risk, and assessing their impact on the firm's value—only the timeframe is in terms of days, weeks, or months rather than years.

Short-term financial planning and control: This involves the preparation of detailed short-term cash plans, profit plans, and a forecast balance sheet.

Cash (or liquidity) planning enables management to examine the expected short-term cash flow effects of business decisions and to take appropriate actions, such as making advance arrangements for the short-term investing or borrowing of cash.

The objective of **profit planning** is to show, by producing a forecast profit and loss account, the effects of planning decisions on the firm's expected level of financial returns and profitability over the planning period. The forecast balance sheet will reveal the expected impact of planning decisions on the structure of the firm's assets, liabilities, and level of financial risk.

The cash budget: This is a primary tool in short-term cash planning as it reveals, for the planning period ahead, the company's expected cash flow 'peaks' and 'troughs'. This enables the financial manager to put into action effective plans to meet the firm's short-term investment or financing needs.

Cash flow statement: A cash flow statement provides valuable insights into the liquidity condition of a company and into how a company manages its cash resources. The essential purpose of a forecast cash flow statement is to reveal how much, and from what sources, cash is being generated by a company, and where it is being used. It sho ws the effects on cash flows of a company's operating, investing, and financing activities.

Forecast financial ratios: A range of key financial ratios will be determined based on the forecast financial statements. These will be tested for compatibility and consistency with the firm's overall financial strategy and objectives. Validated ratios will serve as specific targets and benchmarks against which actual performance will be compared.

Risk analysis: Risk analysis techniques such as **scenario analysis, sensitivity analysis** and **simulation** can be used to assess the overall riskiness of the firm's financial forecasts.

Computerised financial modelling: The use of computers greatly facilitates financial planning by expediting the preparation of forecast financial statements. Computer software packages allow the financial manager the flexibility to quickly and easily test the cash flow, profit, investment and financing effects of alternative decisions and plans, including the application of relevant **risk analysis** techniques.

REVIEW QUESTIONS

Concept review questions

1 What are the key characteristics of short-term financial management?

2 Explain the connection between short-term financial management and the goal of shareholder wealth maximisation.

3 (a) Outline the role of short-term financial planning, (b) Identify and briefly explain the two key elements in short-term financial planning.

4 (a) What is the objective of the cash budget? (b) Discuss two techniques for dealing with risk and uncertainty in the cash budget, (c) What would be the likely effects on a cash budget of the following?

    (i)   Extending the period of credit allowed to the firm's customers.
    (ii) A decision to increase raw material and finished goods stock levels.
    (iii) A sudden increase, or decrease, in sales levels.
    (iv) Extending the period of credit taken from suppliers.
    (v) High seasonal variations in sales.

5 (a) If the cash budget reveals that a firm is expected to have excess cash available for a number of months during the budget period, what investment opportunities are open to it? What criteria should be used to select suitable investments?
(b) Should the cash budget reveal an expected cash deficit over a number of months, what would be the appropriate sources of financing?

6 Explain how a computer-based financial planning model is of use to the financial manager.

Practice questions

7 **Cash budget.** Jennifer's Rock Solid Music Centre sells a wide range of music and entertainment media. Jennifer is concerned about her cash management and has asked for your help in preparing a cash budget for the next six months, July to December. She has supplied you with the following information.
Sales are forecast at £36,000 per month for July, August and September, £42,000 for October, £55,000 for November, £70,000 for December and £24,000 for the following January. Eighty per cent of sales are for cash and the remaining 20 per cent are sold on one month's credit. Actual sales for June were £32,000.
Purchases are equal to 60 per cent of sales and are bought in one month prior to sale. Ten per cent of purchases are for cash, 50 per cent are paid for in the month following delivery and the remaining 40 per cent are paid for one month later.
Grant aid of £3,000 is due to be received in July.
Wages are estimated at 10 per cent of total monthly sales and are paid in the month to which they relate.
Rents, rates, insurance and other overheads (including depreciation of £500) are estimated at £7,500 per month.
Advertising and promotion expenses are budgeted at 5 per cent of total monthly sales and are paid in the following month.
Jennifer has personal drawings in cash of £2,000 per month.
Taxes of £3,000 and £4,000 are due to be paid in July and October, respectively.
Jennifer expects her cash balance to be £3,000 overdrawn on the first of July. Her

bank manager has agreed an overdraft of £8,000 which is due for review in December.

Required:

(a) Prepare and interpret a cash budget for Jennifer's Rock Solid Music Centre for the six-month period July to December.

(b) How might sensitivity analysis be applied as a means of evaluating risk in this case?

8 **Forecast cash flow statement.** Avionics Ltd manufactures and supplies electronic components to the aircraft industry. The company's forecast profit and loss account together with a forecast balance sheet for the year ahead and the balance sheet for the year just ended are presented below.

Avionics Ltd
Forecast Profit and Loss Account for year ahead

	£m
Sales	7.23
Cost of sales	3.83
Gross profit	*3.40*
Operating expenses	1.73
Depreciation	0.65
Operating profit	*1.02*
Interest	0.07
	0.95
Taxation	0.28
Profit after tax	*0.67*
Dividends	0.10
Retained profits for the year	*0.57*

Avionics Ltd	*Forecast £m*	*Previous £m*
Balance Sheet as at year end		
Fixed assets		
Tangible assets	*2.60*	*3.25*
Current assets		
Stocks	0.63	0.50
Debtors	1.09	0.87
Cash	1.13	0.06
	2.85	1.43
Current liabilities		
Creditors and accruals	0.61	0.49
Taxation	0.28	0.22

Dividends	0.10	0.08
Net current assets	1.86	0.64
Total assets less current liabilities	4.46	3.89
Non-current liabilities		
Term loan	0.50	0.50
	3.96	3.39
Capital and reserves		
Called up share capital	2.50	2.50
Profit and loss account	1.46	0.89
	3.96	3.39

Required:
Using the above information prepare a forecast cash flow statement for Avionics and comment on your findings.

Test questions

9 **Forecasting,** (a) Explain briefly why forecasting is a very important part of the planning and control process, and (b) what information should be considered when producing a sales forecast.

10 **Forecast financial statements.** As a preliminary financial planning exercise for Icarus Publications you have been asked, making any assumptions you consider relevant, to prepare, for the coming financial year, a forecast profit and loss account and balance sheet. The financial statements for the financial year just ended are as follows:

Icarus Publications

Profit and Loss Account for year ended 31 December	*Actual £m*
Sales	44.44
Cost of sales	28.89
Gross profit	15.55
Operating expenses	6.67
Depreciation	1.38
Operating profit	7.50
Interest	0.06
Profit before tax	7.44
Taxation	2.23
Profit after tax	5.21
Dividends	1.04
Retained profits for the year	4.17

Icarus Publications	*Actual £m*
Balance Sheet as at 31 December	
Fixed assets	5.55
Current assets	
Stocks	3.21
Debtors	5.56
Cash	0.44
	9.21
Current liabilities	
Creditors	5.06
Taxation	2.23
Dividends	1.04
Net current assets	0.88
Total assets less current liabilities	6.43
Non-current liabilities	
Term loan	0.50
	5.93
Capital and reserves	
Called up share capital	2.53
Profit and loss account	3.40
	5.93

You have also been informed of the following:

1. Sales for the coming year have been estimated at £50 million. All sales are on credit.
2. Depreciation is calculated on a straight line basis. The balance sheet value of fixed assets at the beginning of the year was £6.93 million.
3. The interest rate on the term loan is fixed and no repayments of principal are planned during the year.
4. No changes in dividend policy or taxation rates are envisaged.
5. Assume a 360 day year.

11 **Cash budget.** International Golf Ltd operates a large warehouse selling golf equipment direct to the public by mail order and to small retail outlets. The cash position of the company has caused some concern in recent months. At the beginning of December there was an overdraft at the bank of £56,000. The following data concerning income and expenses has been collected in respect of the forthcoming six months:

	December *£000*	*January* *£000*	*February* *£000*	*March* *£000*	*April* *£000*	*May* *£000*
Expected sales	120	150	170	220	250	280

Purchases	156	180	195	160	150	160
Advertising	15	18	20	25	30	30
Rent	40				40	
Rates		30				
Wages	16	16	18	18	20	20
Sundry expenses	20	24	24	26	26	26

The company also intends to purchase and pay for new motor vans in February at a cost of £24,000 and to pay taxation due on 1 March of £30,000.

Sales to the public are on a cash basis and sales to retailers are on two months' credit. Approximately 40 per cent of sales are made to the public. Debtors at the beginning of December are £110,000, 70 per cent of which are in respect of November sales.

Purchases are on one month's credit and, at the beginning of December, the trade creditors were £140,000. The purchases made in December, January and February are considered necessary to stock up for the sales demand from March onwards. All other expenses are paid in the month in which they are incurred. Sundry expenses include a charge of £8,000 per month in respect of depreciation.

Required:

(a) Explain the benefits to a company of preparing a cash flow forecast.

(b) Identify and discuss the costs to a company associated with:

(i) holding too much cash; and
(ii) holding too little cash.

(c) Prepare a cash flow forecast for International Golf Ltd for the six months to 31 May which shows the cash balance at the end of each month.

(d) State what problems International Golf Ltd is likely to face during the next six months and how these might be dealt with.

12 **Cash forecasting—risk analysis.** Assume you are the financial manager about to prepare your company's cashflow forecast for the next two years. You have been provided with forecasts about product volumes, selling prices and costs.

Requirement:

Describe the main characteristics of the following techniques, as applied to cashflow forecasting, AND explain how they might be used to aid decision-making. You should also comment on the main differences between the two methods and on their respective shortcomings:

• Monte Carlo simulation;
• sensitivity analysis.

13 **Financial planning.** Pulfer Ltd is a small company that has been operating for five years. It now employs 40 people, and turnover during the last financial year was £875,000. The board of directors has been asked by the company's bank to provide

medium-term financial plans for each of the next three years and to clarify the company's financial objectives.

The board has decided that the primary financial objectives should be to achieve a return on capital employed (defined as earnings before interest and tax related to shareholders' equity) of 20 per cent per year for each of the first two years, rising to 25 per cent per year in year three, and also to increase dividends per share by 10 per cent per year. The current dividend per share is 2.5 pence.

Statistical analysis by one of the company's managers has produced the following relationships for the last two financial years:

Cost of goods sold	75% of sales
Other expenses (excluding interest)	£5,000+18% of sales
Cash (at year end) minimum	1% of sales

Debtors (at year end)	£10,000+20% of sales
Stock (at year end)	£12,000+25% of sales
Creditors (at year end)	35% of sales

Net fixed assets are currently £410,000, and cash £9,000. Sales, at current prices, are expected to increase by 15 per cent per year for two years and by either 15 per cent or 25 per cent in year three depending upon how quickly the economy recovers from a recession.

Existing machinery can only satisfy a demand of up to £1.1 million per year (current prices), and the purchase of new machinery at a cost of £200,000 (current prices) would be necessary to satisfy higher levels of demand.

The company's current capital structure is:

	£000
Ordinary shares (50 pence par value)	200
Reserves	149
12% bank loan	180
	529

No overdraft finance is currently used, but a £50,000 facility exists for short-term financing. The current overdraft interest rate is 10 per cent per year, and interest on any new longer-term debt would be 11 per cent per year.

Other information:

(i) Corporation tax is at the rate of 25 per cent.
(ii) If external finance is required, debt will be used wherever possible as the existing shareholders, who are mainly directors, do not have the funds to subscribe to further equity capital. Any new equity that was necessary would

be sought from venture capital organisations,

(iii) Restrictive covenants on the existing bank loan limit the current ratio to a minimum of 1.3 to 1, and gearing (total loans to shareholders' equity) to a maximum of 80 per cent,

(iv) Cash is kept in a non-interest-bearing current account.

Required:

As a consultant to Pulfer you have been asked to use the above information to produce *pro forma* profit and loss accounts and a schedule of funding requirements for the next three years. This should be incorporated into a report for the board of directors which also

(a) highlights your major findings, and

(b) discusses any concerns that you have about

(i) the financial relationships used by the company as the basis for its forecasts,

and

(ii) the company's financial objectives.

Inflation may be ignored in your forecasts. Depreciation/capital allowances may be assumed to equal the cash flows required for the replacement of existing fixed assets.

Interest may be assumed to be paid or received at the year end. State clearly any other assumptions that you make.

FURTHER READING

General

The following text is one of the very few specialised books on short-term financial management and offers a more extensive treatment of the topics we have explored in this chapter, and which we will explore in chapters to follow:

• *Short-Term Financial Management: Text and Cases*. Hill, N.C. and Sartoris, W.L., Prentice-Hall, 1995.

Financial planning and modelling

The following texts referred to in Chapter 15 are also relevant in our current context of short-term financial planning.

• *Financial Planning—Profit Improvement through Modelling* . Asch, D. and Kaye, R.G. 2nd edition, CIMA/Kogan Page, 1996.

• *Financial Modelling for Business Decisions* . Kefford, B., CIMA/Kogan Page, 1995.

For readers wishing to develop their practical computing skills a helpful book on the use of spreadsheets for computerised financial modelling is:

- *Mastering Spreadsheet Budgets and Forecasts—A Practical Guide* . Secrett, M., Pitman Publishing, 1997.

  While a slightly more advanced text is:

Decision Making with Computers: The Spreadsheet and Beyond . Edwards, J.S. and Finlay, P.N., Pitman Publishing, 1997.

17
SHORT-TERM FINANCIAL DECISION-MAKING (1)

This chapter examines the application of short-term financial decision-making to the management of working capital, which is the management of the firm's *short-term* assets and liabilities. It deals in particular with the management of the short-term asset of stocks. The chapter which follows deals with the management of the short-term assets of debtors and cash. In this chapter the following aspects of short-term financial management are covered:

working capital policies and practices;
the management of stock.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 explain the nature and importance of working capital management;
2 explain and calculate the operating cycle;
3 understand the relationship between asset investment and asset turnover;
4 understand the risk-return relationship in working capital management;
5 compare and contrast the various types of working capital policy;
6 explain various systems of stock management;
7 calculate and manipulate the economic order quantity (EOQ) model.

OVERVIEW

In this and subsequent chapters we explain the operation of the firm's short-term financial policies in relation to the management of the firm's working capital, to the investment and financing of its current assets.

In a financial accounting context our focus is on the section of the balance sheet related to current assets and current liabilities. The difference between current assets and current liabilities is the firm's investment in *net working capital.* Short-term financial, or working capital, policies are directed towards managing the firm's overall investment in net working capital. Like any investment, the firm's investment in net working capital must earn a rate of return commensurate with the risk and add to the market value of the firm.

This area of financial management is alternatively called *working capital management,* and the terms 'short-term financial management' and 'working capital management' tend to be used interchangeably.

For the financial manager, working capital management means developing and implementing policies which govern and guide the management of the firm's short-term assets and liabilities. For example, working capital policies will be framed which govern and guide managers' decisions and actions in relation to:

- the level of stocks that the firm should carry (Chapter 17);
- the credit terms that should to be extended to the firm's customers (Chapter 18); and
- the borrowing of short-term funds (Chapter 19).

If you remember our original Coffee Ventures business start-up scenario, in addition to needing capital to acquire fixed assets, the business will also need capital to finance its activities on a day-to-day basis. This is its working capital requirement. Working capital management policies and practices will differ between firms and the industries in which they operate. Coffee Ventures' working capital management, for example, will differ significantly from that of a food manufacturing company, or a food retailing company.

WORKING CAPITAL—AN OPERATIONAL NECESSITY

Working capital is an operational necessity. A firm needs to invest in short-term current assets such as stocks (raw materials, work-in-progress and finished product) and also needs debtors to allow it to perform its day-to-day operations. This investment in current assets is for the short term, as raw materials will be bought, converted into finished product, and sold to customers who ultimately will pay.

For many businesses this cycle will be completed within a short timeframe, and will be repeated many times over during the year. For others, such as mature whisky distillers, which we shall examine later, this cycle may become considerably extended.

The investment in current assets requires to be financed and a primary source of this financing is the firm's current liabilities, particularly the credit received from suppliers.

WORKING CAPITAL MANAGEMENT AND SHAREHOLDER VALUE

In relation to shareholder value, the firm's investment in working capital should produce cash returns that add to the market value of the firm and thus to the wealth of its shareholders. However, excessive investment in working capital will depress returns, by increasing the opportunity costs of having funds unnecessarily tied up in current assets.

Alternatively, insufficient investment in working capital increases the firm's risk of financial distress or insolvency by not having sufficient funds available to pay creditors when the bills become due. A constant preoccupation of the financial manager will be trying to establish in working capital management the *risk-return trade-off* which maximises the market value of the firm.

It is worth re-emphasising that while working capital management accentuates short-

term financial decisions and policies, these will, however, be framed in the context of the firm's overall corporate strategy, with the aim of realising its strategic objectives and the primary goal of maximising shareholder value.

THE DERIVATION OF WORKING CAPITAL

The concept of working capital was introduced when we studied financial analysis, where we reviewed its role in assessing a firm's liquidity. Recall that a firm's working capital is found by subtracting its current liabilities from its current assets:

> Current assets−Current liabilities=Working capital
> CA−CL=WC

> Technically the difference between current assets and current liabilities is a firm's ***net working capital,*** or ***net current assets,*** assuming current assets exceed current liabilities. However, in practice, the difference between current assets and current liabilities is often simply referred to as working capital.

We can define working capital, also known as *circulating capital,* as the investment which a business needs to make in its day-to-day operations. It is the level of investment necessary to:

1 carry adequate ***stocks;***
2 allow trade credit to ***debtors;***
3 pay ***creditors*** (without difficulty).

Effective working capital management involves financial decision-making, planning and control activities related to each of the above three elements of working capital.

Sufficient working capital is needed, not only to be able to pay bills on time (e.g. wages and suppliers), but also to be able to carry sufficient stocks and also to allow debtors a period of credit to pay what they owe. Working capital is thus the kind of capital required to finance a firm on a day-to-day basis.

Recall that working capital is also a key measure of business **liquidity.** The more working capital a firm has, the less risk there is of the firm not being able to pay its creditors. Conversely the less working capital a firm has, the greater the risk of not being able to pay creditors when payment becomes due.

Having an adequate level of working capital is therefore vitally important for the survival of any business. Like the oil required to keep a motor car engine continually working smoothly and efficiently, working capital is needed to keep the business engine constantly lubricated. If the oil dries up, the engine will seize and fail!

THE COMPONENTS OF WORKING CAPITAL

Working capital (or net working capital) consists of current assets minus current liabilities. The key components of working capital are summarised as follows:

Stocks

These consist of the stocks of raw materials, work-in-progress and finished goods, together with stocks of consumables and spare parts. Non-manufacturing concerns will not carry raw material and work-in-progress stocks.

Debtors

Debtors represent the money owed at any point in time to the firm in respect of goods and services which it has supplied on credit to its customers. Debtors will also include any prepayments in respect of goods or services (e.g. prepayments of rents and insurance).

Investments

These will include short-term, easily liquidated, investments such as **marketable securities.** Marketable securities are short-term maturity investments which are easily liquidated and on which interest is earned. More explicitly marketable securities are *financial assets* on which a company can earn a rate of return by investing temporarily surplus cash and which are readily and quickly convertible back into cash with minimal risk of loss to their value, for example Treasury bills (Tbs) and certificates of deposit (CDs).

Marketable securities are freely traded in the *money markets,* which were discussed in Chapter 3. Thus we are excluding bonds and equities, which are also marketable securities freely traded in the *capital markets,* as they are not considered appropriate as a short-term investment due to the significant risk of loss in value.

However, the returns from marketable securities can also vary (for example, if interest rates change), and trading them in the money markets will involve transaction costs. These are points we shall examine more closely in the next chapter when we review cash management models. As with all investments, short-term or long-term, the financial manager will have to weigh up the relevant costs and benefits of each.

As an example of short-term investments, Reuters Group plc, a leading financial information and media services organisation, showed £1,019m as short-term investments under current assets in its balance sheet as at 31 December 1996. This included £242m invested in the form of certificates of deposit, £594m in term deposits with UK financial institutions, and £39m in overseas term deposits.

Cash

This will include cash in hand, cash held in a current bank account, and cash held in demand deposit accounts with banks and other financial institutions. Cash plus marketable securities collectively represent a firm's **liquid assets.**

The management of cash involves ensuring prompt receipt of cash from customers and timely payment to creditors for goods and services supplied. Temporary cash surpluses will be invested in short-term interest-earning securities. Temporary cash deficits will be

covered by short-term borrowings, such as a bank overdraft.

Current liabilities

These represent the amounts actually owed at any point in time by the firm and technically due to be paid within one year of the balance sheet date. They will include amounts due to trade creditors for goods and services supplied, interest and principal due on any short-term borrowings, and payments due in respect of taxes, dividends, and so forth.

This and the following chapter will concentrate on analysing the various current asset elements of working capital, Chapter 19 will explore the management of current liabilities.

We will deal with the management of current assets by taking each component in turn, in the order in which they conventionally appear in the balance sheet—**stocks, debtors, investments,** and **cash**—which is also the order of liquidity and of risk.

Remember that liquidity is a measure of how quickly and easily an asset can be converted into cash without significant loss or discount to its value. The easier it is to convert an asset into cash, without losing value, the less risky it is.

Of the three types of current assets, stocks usually take longest to turn into cash, particularly if goods are sold to customers on credit, therefore stocks are a more risky investment than debtors, or cash. For a manufacturing concern stocks will include raw materials and work-in-progress, which will have to be converted into finished product before they can be sold, probably on credit, to customers.

THE KEY TASKS IN WORKING CAPITAL MANAGEMENT

Bearing in mind that the overall goal of the firm is the maximisation of shareholder wealth, for the financial manager the objective of working capital management is to help achieve this goal. To this end there are two key tasks involved in the management of working capital.

One is the key task of achieving a **balance** in investment: not to over- or under-invest funds in working capital. Excessive investment in working capital is a wasteful and unproductive use of resources: insufficient investment in working capital risks costly disruptions to operations and possible insolvency. The key task for the financial manager is to determine the level of working capital which balances risk and return and maximises shareholder wealth.

The other key task is managing **the rate of asset turnover,** which, as we discovered in Chapter 9—financial analysis, is an indicator of how efficiently a company utilises its assets: the higher the rate of an asset's turnover the less money needs to be invested in the asset. We will look more closely at each of these two key tasks.

A question of balance

The level of investment in working capital needs to be sufficient to permit the firm to

operate smoothly and efficiently. To invest more than this level represents money unnecessarily tied up in idle current assets, money that could be used more profitably elsewhere in the business.

Over-investment (or over-capitalisation) in working capital, that is, having a level of working capital which exceeds operational requirements, is a wasteful and inefficient use of funds. For example, carrying excess inventory or stock levels which may have to be sold later at a substantial discount to dispose of them, such as in an end of season sale for a clothing retailer, will tie up cash unnecessarily, reduce profits and cash flows and ultimately the market value of the firm.

On the other hand, **under-investment** (or under-capitalisation) in working capital, that is having a level of working capital which is below operational requirements, can hamper and frustrate daily operations. For example, under-investment can lead to production disruptions due to raw material shortages, and to customer dissatisfaction through insufficient finished products being available to fulfil customer orders on time. All of which will result in reduced profits and cash flows through increased operating costs and/or lost sales.

As discussed in relation to financial analysis in Chapter 9, a firm in this condition is essentially *overtrading*—it is trading at a higher level of activity than it has the capital resources to support. The inherent danger of overtrading is the risk of illiquidity or insolvency, that is, the risk of the firm not being able to pay its creditors when the bills become due.

Over-investing in working capital, while it may reduce the firm's illiquidity risk, simultaneously reduces profits and therefore shareholder wealth. Conversely, underinvesting in working capital, while it may increase the risk of not being able to pay creditors, increases profits through reducing the cost of funds tied up in current assets. Thus too much working capital reduces risk and return: too little working capital increases risk and return. Clearly the task for the financial manager is to try and achieve the level of working capital investment which secures the appropriate balance between **risk and return.**

A question of turnover

The second key task in managing working capital is managing the **rate of asset turnover** of the various current assets, stocks, debtors and cash.

We have already encountered asset turnover ratios in financial analysis in Chapter 9, where the stock turnover ratio and the debtor days ratio were used as indicators of operational efficiency. We essentially concluded that the more frequently assets are turned over (replaced), the less the investment required. For example, the more frequently a company can turn over its stocks, the less it will have to physically carry. Similarly with debtors, the quicker it can obtain payment from debtors, the less funds will be tied up in debtor balances.

The concept of asset turnover in relation to investment in current assets is illustrated in Figure 17.1. The figure shows the relationship between the level of investment and asset turnover for three scenarios. Scenario 1 assumes the total amount required of £100,000 is invested at the start of the six-month period, and gradually diminishes over time to reach

zero by the end of month 6, when it is subsequently replaced—immediately and in full. Thus assets are turned over only once during the period.

Figure 17.1 Rate of current asset turnover
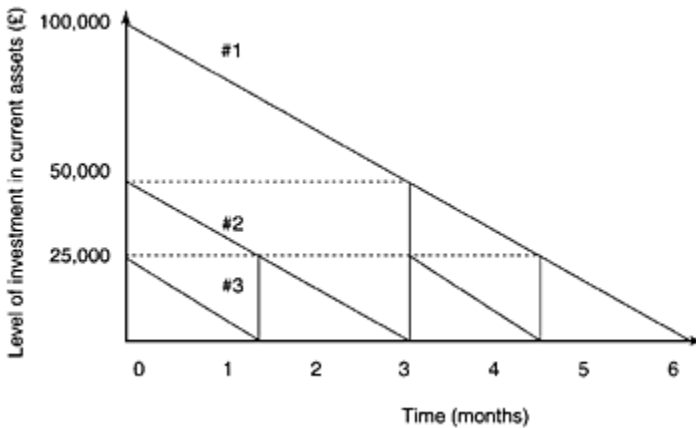
Scenario 2 shows that by doubling asset turnover during the same period only half the investment of Scenario 1 (i.e. £50,000) is required. Similarly with Scenario 3, by increasing asset turnover to 4 times over the six-month period the level of investment required is reduced to one quarter of the original, that is, £25,000.

There is a clear inverse relationship between asset turnover and the level of investment: **the higher the rate of turnover, the lower the investment required.** The task of the financial manager will be to try and minimise investment in working capital by maximising the turnover rate of current assets, without impairing operational efficiency.

We can illustrate the concept specifically with reference to the stock turnover ratio. Assuming, in the context of Figure 17.1, that for the firm in question the £100,000 represents its cost of sales for the six-month period, then in Scenario 1 the total £100,000 of goods for resale would be purchased on the 1 January and gradually drawn down as the goods are sold over the period. At the end of the six-month period, on the 30 June, the entire stock would be replenished and another £100,000 invested. The stock turnover in this case would be determined as 1:

$$\text{Scenario 1} = \frac{\text{Cost of sales}}{\text{Investment in stock}} = \frac{\pounds100{,}000}{\pounds100{,}000} = 1$$

In the other two scenarios the stock turnover ratio would be calculated as:

$$\text{Scenario 2} = \frac{\text{Cost of sales}}{\text{Investment in stock}} = \frac{\pounds100{,}000}{\pounds50{,}000} = 2$$

$$\text{Scenario 3} = \frac{\text{Cost of Sales}}{\text{Investment in stock}} = \frac{£100,000}{£25,000} = 4$$

Similar turnover ratios can be calculated in relation to managing the investment of funds in debtors and cash.

CONSTRAINTS AND TENSIONS IN WORKING CAPITAL MANAGEMENT

The financial manager will be trying to secure the balance and rate asset of turnover which will achieve the optimum investment in working capital from a purely financial perspective. However, in practice there will be competing demands, constraints and tensions at play in determining what the optimum investment should be. Various internal departmental or functional managers, for example, will have their own views as to the optimum level of working capital investment.

Marketing and sales managers will be preoccupied with meeting customer expectations and demands about product ranges, choices, delivery times, credit terms and so forth. They will also be acutely aware of the competitive pressures to meet customer needs and maintain satisfaction levels. This means that these managers will generally prefer to have the size and range of stocks on hand in order to satisfy customer needs with minimum delay, and will prefer to offer as generous credit terms as possible. These demands will create pressures to carry high stock and debtor levels.

Production and operations managers in contrast will tend to be primarily concerned with maximising production runs, minimising machine downtime, disruptions and product changeovers, and with ensuring that there are sufficient raw materials and work-in-progress stocks to keep operations running smoothly. Such demands will also create pressures to carry high stock levels.

Competing marketing, operational, and financial demands, and the internal tensions which they create, will in practice need to be reconciled so that a feasible working capital strategy is determined. The financial manager will therefore need to be aware of such constraints, demands and tensions in seeking to achieve the optimal financial investment in working capital.

WORKING CAPITAL RATIOS

In financial analysis we used *asset turnover ratios,* such as stock turnover and debtors days ratios, to assess a firm's operating efficiency, and working capital ratios such as the *current and acid test ratios* to assess a firm's liquidity. Liquidity and efficiency are intimately connected, as the foregoing example in Figure 17.1 has illustrated. Inefficient use of current assets can be a direct cause of liquidity problems for the firm.

For example, both the stock turnover and debtors days ratios indicate the degree of efficiency with which these two current assets are being managed. A low stock turnover

ratio and a high debtor days ratio would probably suggest that cash is being unnecessarily tied up in these assets and consequently is not available to pay creditors, thus directly increasing the risk of illiquidity.

Working capital ratios are key management tools and good financial management practice will dictate that **target working capital ratios,** consistent with the firm's overall business strategy, will be set. The financial manager will closely monitor working capital ratios for any early warning signs of potential liquidity problems, with any significant departures from the targets warranting prompt investigation.

THE OPERATING CYCLE

The management of working capital is a very dynamic process. Unlike fixed assets, the values and volumes of current assets change on a day-by-day, hour-by-hour basis. Working capital will be continually circulating through the business in the form of an **operating cycle.**

For a manufacturing company, the operating cycle is the length of time it takes, usually expressed in terms of days, to complete the cycle of the firm's manufacturing, distribution, and selling operations. It is the time which elapses from when raw materials are delivered, until the cash for the finished goods made from the same materials is received from customers.

In other words, the operating cycle is the time it takes to convert raw materials into finished product, for the finished product to be sold to customers and for the appropriate customer payment to be collected. The time interval between placing the order with a supplier and the physical receipt of goods is not part of the operating cycle.

For example, if it takes on average 60 days from the time when raw materials are delivered until the finished product made from those materials is sold (alternatively known as the *inventory days* period) and if customers then take a further 40 days on average to pay, the length of the operating cycle is 100 days (60 inventory days plus 40 debtor days).

In a manufacturing environment, such as motor car manufacture, the operating cycle will be a considerably extended process compared with, for example, a retail clothing store, or a service business such as a hotel.

The operating cycle should not be confused with the **cash cycle**—also called the *cash conversion cycle*—which is defined in terms of the time period between when the firm pays for raw materials and the customer pays for the sale of finished goods. The cash cycle includes the period of credit normally allowed by suppliers and is therefore equal to the operating cycle minus the average period taken by the firm to pay its suppliers as shown below.

 1 **Operating cycle=Inventory days+Debtor days**
 2 **Cash cycle=Operating cycle−Creditor days**

Continuing with our example above where the operating cycle is 100 days, if the firm received an average of 30 days credit from its suppliers then the cash cycle would be equal to 70 days (operating cycle of 100 days minus 30 creditor days). We shall examine the cash cycle more closely when we review the management of cash in the next chapter.

The more extended the operating cycle, the greater the investment in working capital required and consequently the longer the cash cycle. The goal of the financial manager will be to minimise the length of the operating and cash cycles without detriment to the firm's operations. A model of the operating cycle is illustrated in Figure 17.2.
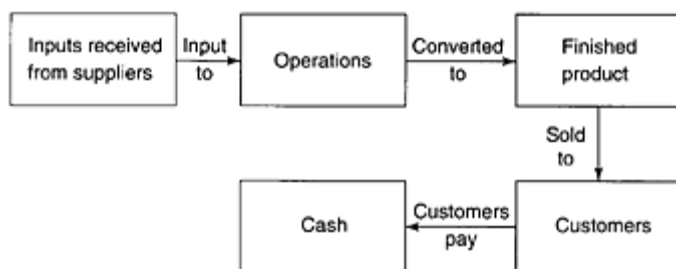
Figure 17.2 The operating cycle

Effective management of the operating cycle is of paramount importance for the survival and future development of any enterprise. Poor management of the operating cycle can lead to liquidity problems, which ultimately could cause the business to fail.

Even a profitable company can run into liquidity problems. For example, a company can experience liquidity problems if credit control is weak and cash is not being collected in an efficient and timely manner from customers, and/or if too much cash is tied up in stocks (raw materials, work-in-progress, and finished goods).

In contrast, it is possible for a company to survive—at least in the short term—and weather periodic economic storms, even if it is not making profits, by exercising good working capital management. This can be done, for example, by managing stocks and debtors efficiently and keeping the levels of both under tight control. Clearly, survival and growth in the longer term require a combination of good profitability and liquidity.

WORKING CAPITAL POLICIES

Managing working capital involves investment and financing decisions, decisions which should contribute to the maximisation of shareholder value. Investment decisions concern how much of the firm's limited resources should be invested in working capital. Financing decisions relate to how the investment in working capital is to be financed.

Table 17.1 illustrates the investment and financing of working capital of a sample of different-sized companies, selected at random, from across a range of industries. The sample is simply intended to illustrate a range of possible approaches to the management of working capital.

As Table 17.1 indicates, working capital requirements will differ between companies. An individual company's investment in working capital will be related to the type of industry in which it operates, its scale of operations, its individual business circumstances at any point in time, and the essential working capital policy each individual company adopts.

It should be noted that what may be considered an acceptable level of working capital for one industry or line of business, may be unacceptable (e.g. too high or too low) in another, as a result of different operating or business characteristics across industries. Working capital requirements are also likely to change over time in response to changes in

Table 17.1 Working capital composition and investment

Company Industry	British Petrlm Oil		Cadb. Schw. Fd pr.		Guinness Alc. bev.		Jeff'sn Smur. Pack.		Pizza Expr. Rest.		United Bisc. Fd pr.	
	£m	%	£m	%	£m	%	IR£m	%	£m	%	£m	%
Fixed assets	21,820	67	3,014	67	4,226	54	2,056	53	23	77	1,283	62
Current assets												
Stocks	3,009	9	436	10	1,876	24	287	7	3	10	210	10
Debtors	7,590	23	891	20	1,393	18	666	17	3	10	423	21
Cash and Investments	153	1	166	3	327	4	895	23	1	3	139	7
	10,752	100	1,493	100	3,587	100	1,848	100	7	100	772	100
Current liabilities	10,617		1,902		2,572		1,058		14		861	
Working capital	135		−409		1,015		790		−7		−89	
Sales (£m)	44,731		5,115		4,730		3,033		44		3,001	
Current assets to sales ratio	24%		28%		76%		61%		16%		26%	

Source: Annual Accounts.
Notes: British Petroleum: oil. Cadbury Schweppes: food producer. Guinness (a subsidiary of Diageo plc) : alcoholic beverages. Jefferson Smurfit: packing & paper. Pizza Express: restaurants. United Biscuits: food producer.

the nature of a company's operations, for example, as a company progresses from a growth to a maturity stage in its life cycle.

In the sample shown, three companies, British Petroleum (BP), Guinness (a subsidiary of Diageo plc) and Jefferson Smurfit, have a positive working capital, while the other three have a negative working capital. For each company, Table 17.1 shows the monetary investment in fixed and current assets and the respective proportion each category of asset represents of the value of total assets (fixed assets plus current assets).

For example, in the case of British Petroleum (BP)—one of the largest companies in the UK and Europe in terms of market value—the investment in fixed assets (£21,820m) represents 67 per cent of the investment in total assets (£21,820m fixed assets+£10,752 current assets). As for the investment in individual current assets, stocks valued at £3,009m represent 9 per cent of total asset investment, debtors 23 per cent and cash 1 per cent.

Table 17.1 also reveals the current asset to sales ratios for each company, which is calculated as total current assets expressed as a percentage of sales. This is analogous to a current asset turnover ratio. For example, *Pizza* Express has a current assets to sales ratio of 16 per cent [(£7m/£44m)×100], or a current asset turnover of 6.3 times (£44m/£7m). The significance of this ratio will become apparent shortly when we analyse the various types of working capital policy which a company can adopt.

It is important to be aware that for our sample of firms, as in all firms, the balance sheet figures for assets and liabilities are stated as at a particular point in time. Remember that a balance sheet is like a financial snapshot of a business. It simply presents the financial status of a firm, in terms of its assets and liabilities, at a particular moment in time, that is, at the balance sheet date.

In a dynamic business, current assets and current liabilities will be continually changing, and the balances as shown at the balance sheet date may not be typical of the pattern throughout the accounting period. The components of working capital may be significantly different shortly before, or shortly after, the balance sheet date. They may, for example, be influenced by seasonal factors, or exceptional business conditions. Accepting the values and composition of working capital items at one particular point in time has its limitations.

Types of working capital policy

Broadly there are three distinct types of working capital policy which a company can adopt, an **aggressive policy,** a **moderate policy** or a **conservative policy.** The type of policy relates to the firm's general approach to the investing and financing of its working capital needs. Aggressive and conservative policies tend to represent the opposite ends of a spectrum of working capital policy options, with one somewhere in between the two variously described as a balanced or moderate policy. Clearly there can be degrees of aggressiveness, conservatism, and moderation in terms of describing working capital policies.

The policies differ in their attitudes to both the investment in, and the financing of, current assets. The more conservative in attitude the policy, the greater the level of investment in current assets and the greater the firm's reliance on long-term capital (in the form of debt or equity) to finance the investment in current assets. Conversely, the more aggressive the working capital policy, the lower the level of investment in current assets, and the less is the firm's reliance on long-term capital to finance current assets.

You will notice that three of the companies shown, Cadbury Schweppes, Pizza Express and United Biscuits, actually have a 'negative' working capital. However, having a negative working capital does not necessarily indicate impending disaster, in that the firm is at risk of not being able to pay its debts.

Both Cadbury Schweppes and United Biscuits are two leading international food manufacturing companies, with Cadbury Schweppes in particular being a long-established FTSE 100 company. In contrast Pizza Express, at the time of writing, is a much smaller but a rapidly growing company in the restaurant business with over 120 restaurants in the UK and Ireland.

The working capital figures as presented are a reflection of each respective company's

working capital policy. When a firm has a positive working capital this indicates that long-term liabilities in the form of equity and loans are being used to partially finance current assets.

Financing current assets from current liabilities, particularly in the form of interest-free credit from suppliers, is a less expensive source of financing than equity or long-term debt capital. Even short-term borrowings in the form of bank loans and overdrafts tend to be a less costly source of financing than long-term debt or equity.

We have seen from Table 17.1 that different companies operate different working capital policies. We have also noted that the type of working capital policy operated will be dictated by such factors as the growth rate of the company, its size, the nature of its industry, whether it is manufacturing or non-manufacturing and, as we are about to discover, by the *risk attitude* of the firm's management.

Figure 17.3 illustrates the financing of working capital. It is analogous to the horizontal arrangement of a balance sheet. The left, investment side of the diagram shows the firm's
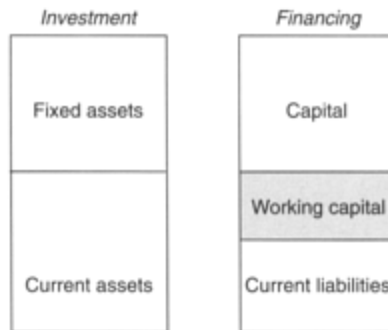
Figure 17.3 The financing of working capital

total assets, fixed and current; these are the resources in which it has invested its funds and their structure reflects the effects of the firm's investment decisions.

The right, financing side of the diagram shows how these assets have been financed, thus it reflects the effects of the firm's financing decisions. The right side shows the sources of financing which are essentially a combination of long-term capital and current liabilities.

The financing side of Figure 17.3 highlights in the shaded area the difference between current assets and current liabilities, that is, the firm's working capital. In this case the amount invested in current assets exceeds the amount of financing from current liabilities and the excess of current assets is financed from long-term capital.

This is essentially the financing policies of BP, Guinness and Jefferson Smurfit as shown in Table 17.1, where current assets exceed current liabilities implying that the current assets are partially financed with long-term capital.

We will now proceed to examine in more depth the characteristics of the various types of working capital policy which a firm can adopt. We will look at the investment, financing, and risk-return implications of each type of policy, beginning with the conservative policy.

A conservative working capital policy

Investment

As far as investment is concerned a conservative working capital policy is the 'play-it-safe' philosophy. At its most conservative, the policy will attempt to provide sufficient long-term financing to cover all anticipated eventualities.

A conservative policy implies relatively high investment in current assets in relation to sales: the current assets to sales ratio will be comparatively high and asset turnover ratios correspondingly low. Notice from Table 17.1 the comparatively high current assets to sales ratios for Guinness (a subsidiary of Diageo plc) and Jefferson Smurfit. Both these companies consistently have substantial investments in working capital.

In a conservative approach stock and cash levels will generally be kept high to avoid stockout and cashout (illiquidity) costs. There is also likely to be a sizeable investment in short-term bank deposits and other short-term liquid investments. Notice the extremely high level, almost 50 per cent, of current assets in the form of cash and short-term investments in Jefferson Smurfit's balance sheet.

Financing

At one extreme a company can finance all its current asset requirements with long-term funds, including its peak temporary requirements as illustrated in Figure 17.4. In operating a conservative policy short-term funding may only be called upon as a fall-back or emergency source of funding: any short-term surpluses would be invested in easily liquidated short-term investments.
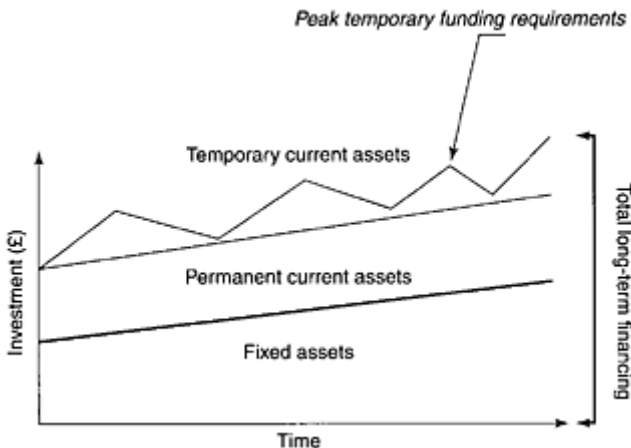
Figure 17.4 Conservative working capital policy

Notice that the investment in current assets is divided into **permanent current assets** and **temporary current assets.** The investment in permanent current assets represents the core, or minimum, level of investment in current assets required on a continual basis.

In addition to permanent current assets the business may need to invest in temporary current assets, to accommodate fluctuations in its business cycle.

The requirement for temporary current assets will vary throughout the year in line with, for instance, the seasonal cycle of the business. For example, bookshops and toy stores will need to carry additional stocks leading up to their peak seasonal period at Christmas. This will require an additional, temporary investment in working capital. Alternatively working capital requirements may vary due to temporary changes in the nature of business conditions.

At its most extreme the conservative working capital policy assumes, somewhat unrealistically, the absence of any **spontaneous funding** from current liabilities such as trade creditors; this is the position depicted in Figure 17.4. Spontaneous funding is the type of funding which occurs virtually automatically when a company acquires goods and services from its suppliers on credit. For example, when purchasing raw materials for production these will usually be provided on a period of credit, such as 30 days, by the supplier. The supplier is in effect providing spontaneous, short-term (30 day) finance for the company.

Risk and return

As the conservative policy relies on long-term financing this also makes it a more expensive policy to follow than one which allows for an element of short-term financing. However, it is also the **low risk** working capital policy as the company is not dependent upon access to short-term funds and is not therefore exposed to the volatility of short-term interest rates or to unexpected changes in general economic conditions.

The more a company relies on borrowing funds short term, the greater its risk exposure to sudden changes in macroeconomic circumstances such as government changes in monetary policy. Changes in government policy could introduce more stringent credit and lending restrictions on financial institutions together with an increase in interest rates.

Such factors could present a company which is dependent on short-term debt to finance working capital with considerable difficulties when, for example, the short-term debt is due to be renewed or 'rolled over' with the lender. Renewal may only be possible under more penal and expensive conditions such as those which typically apply in the middle of an economic recession.

In contrast, long-term financing, although generally more expensive, is more certain and stable with regard to the term of the finance, its costs and its conditions. The company pays a price for certainty and stability in its sources of finance, there is a cost-certainty trade-off. Long-term sources of finance such as equity and long-term loans are more certain and stable and consequently they tend to be more expensive.

With long-term financing a company also has more *flexibility* in respect of the payment of dividends on equity finance. If a company is experiencing financial difficulties, dividends may be frozen, cut, or perhaps suspended entirely, until the firm recovers. In view of our discussion on dividend policy in Chapter 14, this is unlikely to please shareholders, but is presumably preferable to a liquidation of the company. With short-term financing, where interest and principal repayments are obligatory and contractual, the directors of the company have less room to manoeuvre.

Moreover, short-term finance is frequently repayable on demand by the lender, and

renewal or 'roll over' of short-term financing is by no means guaranteed. In fact, on occasions, it may only be possible at the expense of accepting higher interest rates and tougher borrowing conditions. All these factors increase the *variability* associated with short-term finance and thus increase the firm's risk of experiencing liquidity difficulties.

Avoiding, or at least minimising, dependency on short-term financing, which the conservative policy implies, reduces the firm's risk. However, the policy increases costs and thus reduces returns due to the greater investment in the volume of current assets held, combined with the high dependency on the more expensive long-term sources of finance. Thus the net effect of a conservative working capital policy is lower than moderate returns for a company but also lower than moderate risk of illiquidity or insolvency.

An aggressive working capital policy

A company which adopts an aggressive working capital policy—also known as the 'lean and mean' approach—operates at the opposite end of the working capital policy spectrum. In this case all aspects of policy management are the reverse of the conservative policy. An aggressive policy relies on minimum investment in current assets and is highly dependent on access to short-term financing.

Investment

With an aggressive policy total investment in current assets will be kept to a minimum. The current assets to sales ratio will be much lower and the current asset turnover rates much higher in comparison to a conservative policy. Notice, for example, from Table 17.1 the very low current assets to sales ratio for Pizza Express. At the time of writing this company was growing extremely fast and was clearly taking an aggressive approach to the financing of its working capital.
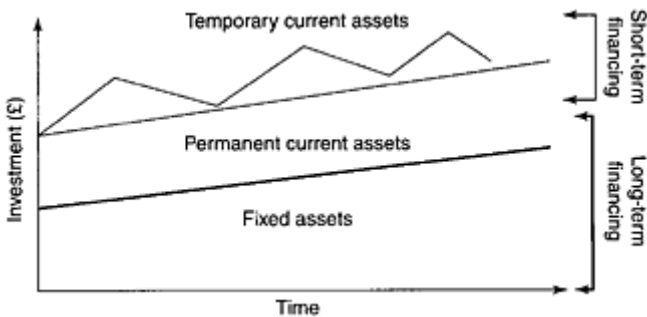
Figure 17.5 Aggressive working capital policy

Financing

In terms of financing a company following an aggressive working capital policy will use long-term finance to fund its investment in permanent fixed assets and also a substantial part of its permanent current assets. Short-term financing will be used to fund

temporary current asset needs and also part of the permanent current asset requirement. This is the policy illustrated in Figure 17.5.

Risk and return

Compared with the conservative and moderate policies (see below), an aggressive policy will achieve higher returns but will also carry higher risk due to its higher dependency on short-term finance. As we have mentioned, short-term credit and borrowing arrangements require regular 'roll over' or renewal with lenders and a company may encounter difficulties renewing short-term credit facilities in times of economic stringency.

A moderate working capital policy

A moderate or balanced working policy falls midway between the aggressive and conservative policies. With a moderate policy the level of investment in current assets is neither lean nor excessive. Following a moderate policy, long-term funds are used to finance the investment in fixed assets and the permanent component of current asset investment. Temporary, or seasonal, current assets are financed by short-term sources of finance. The moderate policy is illustrated in Figure 17.6.
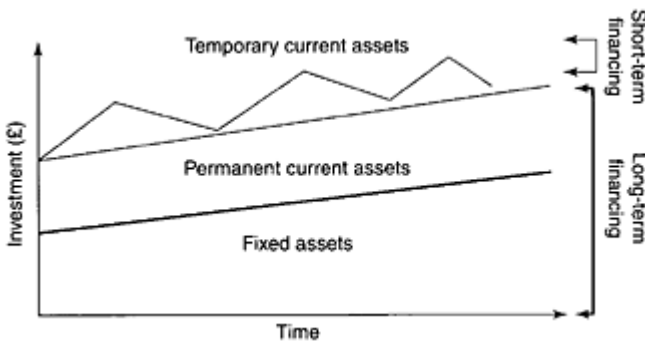
Figure 17.6 Moderate working capital policy

As would be expected, the moderate policy is less risky than the aggressive, but more risky than the conservative policy. The company only resorts to short-term financing when seasonal and other temporary demands require it. For example, arranging bank overdrafts to finance the peak seasonal working capital needs at Christmas time for bookshops and toy stores. Returns under a moderate policy are correspondingly higher than under a conservative policy but lower than under an aggressive policy.

The maturity matching principle

According to the maturity matching principle the financial manager should match the maturity term of the asset with the same maturity term of finance used to acquire the asset. In other words long-term assets are financed with long-term sources of finance and

short-term assets are financed with short-term sources of finance.

The maturity matching principle is also variously referred to as the **self-liquidating or hedging principle.** In finance a hedging strategy is one that is used to minimise risk, thus the notion of 'hedging one's bets'. It is relevant here because following the hedging principle minimises the risk of the firm not being able to pay its financial obligations as they mature.

The maturity matching or hedging principle is followed in the moderate working capital policy, where short-term finance is only used to fund the temporary portion of current asset investment. For example, a tourist gift shop may arrange a bank overdraft in order to purchase additional seasonal stocks of goods for resale. When the seasonal increase in stocks is converted into additional sales during the tourist season, the additional cash flows will 'self-liquidate' the bank overdraft.

Summary—working capital policies

Whichever working capital policy a firm tends to adopt there is always a trade-off between risk and return, and, as we know, the risk-return relationship is a key determinant of a firm's value.

A balanced or moderate working capital policy follows the maturity matching or hedging principle and will produce moderate risk and moderate returns. A conservative policy will produce lower risk and lower returns than a moderate policy and conversely, an aggressive policy will produce above moderate returns but consequently will carry higher than moderate risk.

While a broad classification of working capital policies has been presented to simplify the analysis, there are many variations on a theme in terms of a firm adopting any particular working capital policy. For example, a firm may adopt a policy which could be described as moderately conservative or moderately aggressive.
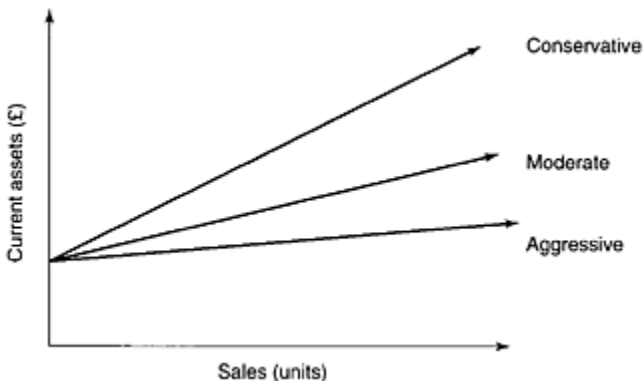
Figure 17.7 Working capital policies

Moreover, it is entirely possible for a firm to adopt a conservative policy in relation to the level of its investment in working capital, while simultaneously being aggressive in

relation to its financing. While numerous permutations are possible, the objective for the financial manager should be to implement the working capital policy which maximises the market value of the firm and the wealth of its shareholders.

Figure 17.7 illustrates the different approaches to working capital financing policy in terms of their respective current assets to sales or output ratios. The conservative policy is characterised by a relatively high level of current assets to sales ratio and the aggressive by a comparatively low current assets to sales ratio.

KEY LEARNING POINTS

A**n aggressive working capital policy relies on minimum investment in current assets and is highly dependent on ready access to short-term financing. It is a relatively high risk high return policy.**

A **conservative working capital policy implies high investment in current assets and relies extensively on long-term financing. It is a relatively low risk low return policy.**

A **moderate working capital policy follows the maturity matching principle and will produce moderate risk and moderate returns.**

EXERCISE 1 —ASSESSMENT OF WORKING CAPITAL POLICIES

The financial manager of Quantum Industries, a large chemical manufacturing company, is currently drafting the company's financial plan for the coming year, starting on the first of January. The financial plan reveals that the firm will need the funding requirements as set out below.

The financial manager estimates that the average funding requirement for the year will be as follows:

	£m
Fixed Assets	20
Current Assets:	
Permanent	5
Seasonal	3
	28

The financial manager estimates that a peak seasonal current asset investment of £6m will occur in June. Of the permanent current asset investment 40 per cent would be financed by short-term funds if an aggressive strategy was adopted.

If the cost of short-term finance is forecast at 7 per cent per year and long-term finance at 15 per cent per year, calculate the

comparative costs of adopting a conservative or an aggressive working capital policy for the year ahead. Ignore any spontaneous sources of finance.

Briefly discuss the risks of each policy.

THE OPTIMAL INVESTMENT IN CURRENT ASSETS

Having reviewed the investment in current assets in relation to the type of working capital policy adopted we will now consider the theoretical concept of an optimal level of investment in current assets. In theory the optimal level of investment in current assets is the level which minimises total working capital costs, as illustrated in Figure 17.8. The total costs of investing in current assets consist **of ordering costs** and **carrying costs.**

1 *Ordering costs.* These are the costs of actually procuring current assets. They include the costs of processing (that is, placing, receiving, checking and recording) an order for a current asset, such as ordering the replenishment of stock and cash balances.
   Ordering costs include staff, administration overheads and transportation costs, and in the case of stock the costs of setup for a production run. They also include *stockout costs,* such as the cost of lost sales or disruptions to production, as a consequence of running out of stock or cash items. Ordering costs are usually expressed as £s per order.
2 *Carrying costs.* These include costs such as storing, handling, insuring, damage, deterioration and theft of current assets. They also include *financing costs,* which is the *opportunity cost* of tying up money in current assets, measured in terms of the required rate of return on the best alternative investment of equal risk.
   Carrying costs represent the *variable* or incremental costs of carrying an item in stock and are typically stated as £s per unit per period.

Ordering costs increase as the number of orders increases and carrying costs increase as the volume of current assets held increases. You will notice from Figure 17.8 that there is an inverse relationship or a trade-off between ordering costs and carrying costs: as ordering costs go down, carrying costs go up.

The objective is to achieve a balance between these two types of costs which will minimise the total cost of investing in current assets; this occurs at the optimum point as shown in Figure 17.8.

This is the optimal level of working capital as defined in purely cost or financial terms. In practice there will be other factors such as competitive and market pressures, and the availability of supplies, which will influence the final decision about the most appropriate level of working capital investment for an individual firm.

We now conclude our general review of working capital management and move on to consider the management of the individual components of working capital. We will begin with an examination of the management of stocks.
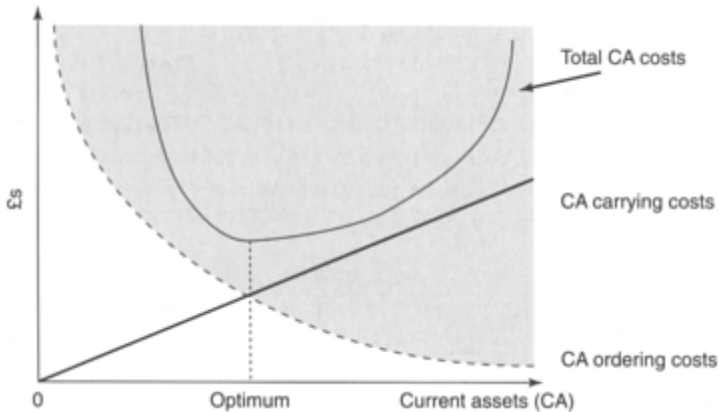
Figure 17.8 Optimal level of working capital

THE MANAGEMENT OF STOCKS

For many companies, particularly manufacturing companies, the investment in stocks can account for a sizeable proportion of a company's investment in total assets, as Table 17.1 previously illustrated. For a company wishing to maximise shareholder value this investment needs to be managed effectively.

Notice from Table 17.1 that for Guinness, stocks comprise 24 per cent of total asset investment. This is significantly above that of the other companies, which are typically around 10 per cent. As Guinness is a manufacturer of alcoholic beverages its stocks include substantial inventories of maturing whisky and other spirits, which account for approximately 81 per cent of total stock values.

The actual investment in stocks will be determined by a range of factors such as the nature of the firm's business (e.g. mature whisky distilling in the case of Guinness), the size and scale of its operations, the working capital policy being followed, but the key determinant of the level of stocks will be the firm's forecast level of sales.

Stocks will be carried in anticipation of future sales. Usually stocks will be carried for a relatively short period of time, such as perhaps a few days or months before being sold. However, in some industries stocks may have to be carried for years before they can be sold. Such is the case with mature whisky distillers, wineries, and some mature cheese producers.

OF WHISKIES, WINES AND CHEESES

Companies that are involved in the production of mature whiskies, wines and cheeses have to carry stocks for years, sometimes many years, before they are ready for selling. If a distillery for example plans to expand its sales of branded whiskies then it will have to

invest in casking increasing levels of whisky for several years beforehand. The increased casking stocks will have to be carried for a number of years until they mature and are ready for sale. Increased casking needs to take place in anticipation of the increases in sales planned for many years ahead.

Clearly a company's investment in stocks should not be so high that it poses an illiquidity or insolvency risk to the company, or so low that sales and cash flows are lost (perhaps permanently) as a result of insufficient stocks to fulfil customer orders. Adequate investment in stocks or inventories is essential to avoid, or at least minimise, the following:

1 *Stockout costs.* These are the costs that arise from the loss of sales, profits and customer goodwill when insufficient finished goods are available to meet customer needs. They also involve costly delays and disruptions to production as a result of insufficient raw material or work-in-progress stocks being available when required.
2 *Stockholding costs.* These are the direct costs of carrying and managing stocks. The greater the volume of stocks held, the greater the costs of storage space, insurance and financing. There are also greater potential costs from pilferage, wastage, deterioration and obsolescence.
3 *Purchasing and supply costs.* These include the costs of purchasing and supply personnel, order processing and progressing. Excess purchasing and supply costs can occur as a result of inefficient ordering and stock control systems and procedures. For example, stocks may have to be replaced more frequently than planned and maybe at a higher price.

Types of stock

As we have mentioned, the level of investment in stocks and in stock management systems (e.g. sophisticated computerised systems of stock control) will vary according to the size and type of business and perhaps also the time of year if there are strong seasonal factors involved. For a retail business stocks will consist mainly of finished goods for resale to customers.

Stock management in a manufacturing business is more complex than a retail business in the sense that it involves the effective management of a range of different types of stocks as follows:

Raw materials

These are the essential materials needed to initiate the production cycle. They may be purchased direct from outside suppliers or received from another internal business unit or division. The task will be to ensure that essential raw materials are always available in the quantities and specifications required for production.

Work-in-progress (WIP)

Work-in-progress stocks represent partly completed or semi-finished goods. In manufacturing concerns production will typically involve a series of intermediate operations before the finished product is completed. The output (finished product) of one section or department will be the input (raw material) for another. Each stage of production will require adequate supplies of work-in-progress to avoid delays and disruptions to production.

Finished goods

These are the finished items at the end of the production cycle and remain in stock until they are sold to customers.

Consumables and spare parts

Most businesses will carry a range of miscellaneous stocks not directly related to the manufacture of the product, but necessary to support the day-to-day operations of the business. These will include consumable items such as catering supplies, cleaning materials, fuel and stationery, together with stocks of maintenance materials and machine spare parts. By way of example Table 17.2 illustrates the analysis of stockholdings for Cadbury Schweppes and Guinness as at the end of December 1996.

Table 17.2 Analysis of stockholdings

Category	Cadbury Schweppes		Guinness	
	£m	*%*	*£m*	*%*
Raw materials and consumables	154	35	131	7
Work in progress	33	8	16	1
Stocks of maturing whisky and other spirits	–	–	1,516	81
Finished goods and goods for resale	249	57	204	11
Total	*436*	*100*	*1,867*	*100*

Source: Annual Accounts

Stock turnover ratios

Stock valuations

It may be helpful to remember that the value of the investment in stocks as shown in a company's accounts depends on the stock valuation policies which the company adopts, and there are a number of alternative policies available. Stock valuation policies have to be disclosed in a company's annual report and accounts. Moreover, stock valuations can have a significant impact on a company's profits as reported in their annual accounts:

essentially the higher the stock values, the higher the reported profit.

Profit figures can be inflated by the adoption of dubious stock valuation policies (e.g. Waterford Glass and Powerscreen plc). This is one more reason for emphasising cash flows in financial management rather than accounting profits.

Recall from our study of financial analysis that stock turnover ratios are key indicators of the efficiency with which the investment in stocks is being managed. As we have previously discussed, the more frequently a company is able to turn over or replace its stock, the less the investment required.

To facilitate good stock management **target turnover ratios** should be determined for each category of stock, raw materials, work-in-progress and finished goods. Regular control reports should then be provided which compare target and actual ratios, enabling managers to take appropriate corrective action where required.

Many computerised stock management systems provide daily management reports on stock movements and turnover levels. Exception reports will indicate, for example, which stock items are moving quicker or slower than anticipated, where stockouts are occurring and where action needs to be taken to correct stock ordering or holding policies. For example, the stock turnover ratios for Cadbury Schweppes for the two years 1996–1997 are set out in Table 17.3.

As Table 17.3 indicates, the stock turnover for Cadbury Schweppes, from continuing operations, has remained fairly stable over the two-year period.

Table 17.3 Stock turnover ratios

	Cadbury Schweppes	
	1997 £m	*1996 £m*
(1) Cost of sales	1,983	2,105
(2) Average stock[a]	428	436
(3) Stock turnover ratio (1)÷(2)	4.6 times	4.8 times
(4) Stock (inventory) days[b]	79	76

Notes: [a] Average stock=(opening stock+closing stock)÷2. [b]Stock or inventory days represents the average number of days stockholding and is calculated as 365÷stock turnover ratio, assuming a 365-day operating year.

Stock management systems

The objective of stock or inventory management systems is to determine the minimum investment required (or in the case of JIT below, to achieve a zero investment) consistent with efficient business operations.

Of the many different stock management systems available we will consider four of the most commonly used:

1 **the ABC system;**
2 **the economic order quantity (EOQ) model;**
3 **materials requirement planning (MRP); and**
4 **the just-in-time (JIT) system.**

We will begin with the simplest system, the ABC classification.

The ABC system

This is the least sophisticated of the four systems which we will discuss. Using the ABC system management will classify stock items according to their value and control requirements. Usually category A is reserved for the high value items that require close monitoring and control.

You may have heard of the 80:20 rule where typically 20 per cent of the stock *volume* accounts for 80 per cent of its *value.* Category B items rank next in terms of value and control requirements and finally category C represents the lowest value items which require the lowest level of monitoring and control.

In terms of the ABC classification, the stock of manufacturing companies is typically made up as presented in Table 17.4. Table 17.4 indicates that on average, for a manufacturing company, Category A items account for 15 per cent of the volume or quantity of stocks held but represent 70 per cent of their value. Category C items, in contrast, account for over half the volume but only about 10 per cent of the value.

The key benefit of the ABC system is that the analysis directs management's attention to the items which are of the highest value and therefore require the closest monitoring and control. The classification makes for a more effective and efficient use of stock management resources.

Management can introduce a stock control system in line with the needs of the classification. For example the system might require that category A lines are controlled on a perpetual stock system, which involves continual checking, probably on a daily basis. Category B items would demand less frequent checking, perhaps once a week, and category C items less frequent still, maybe once a month.

Table 17.4 ABC stock classification system

Category	Volume of items (%)	Value (%)
A	15	70
B	30	20
C	55	10

The economic order quantity (EOQ) model

This is perhaps the classic stock control technique. The economic order quantity (EOQ) model is a more sophisticated approach to stock management than the ABC system. It can, however, be used in conjunction with the ABC system so that together they yield a fairly sophisticated stock control model, especially for category A and B items.

The purpose of the EOQ model is, as its name implies, to determine the most economic quantity to order, that is the quantity that minimises total costs. The stock ordering cycle illustrated in Figure 17.9 represents a simplified stock pattern or ordering cycle for a single item of stock. The model assumes that stock levels are consumed at a constant rate over a defined period of time and are allowed to run down to zero (no safety stocks are

carried) before being immediately and fully replenished. The average stock holding in units over the period is shown by the broken horizontal line and is calculated as Q/2, where Q denotes the order quantity in units.

Figure 17.9 Basic EOQ stock ordering cycle
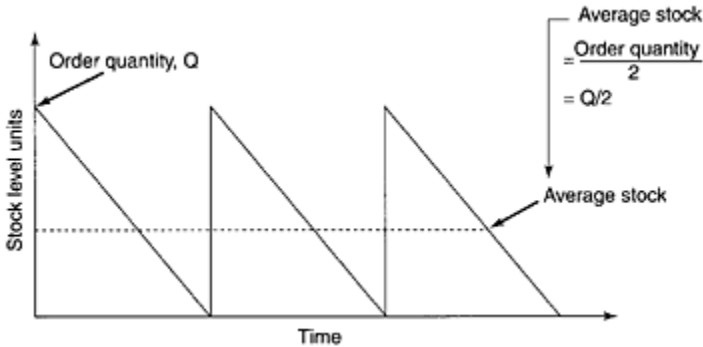
The costs involved in the EOQ model are similar to those we analysed in relation to the costs of investing in total current assets, that is **ordering costs, carrying costs** and **total costs.** Ordering costs increase as the number of orders increases and carrying costs increase as the quantity of stock held increases.

You will notice in Figure 17.10 the inverse relationship or trade-off between ordering costs and carrying costs: as ordering costs come down carrying costs go up. The objective is to achieve a balance between these two types of costs which will minimise the total cost of investing in stocks. We will now analyse more closely each type of cost.

Ordering costs

These are the costs of procuring an item of stock. They are the costs of processing (placing, receiving, checking and recording) an order. They also include staff, administration overheads and transportation costs, and for a manufacturing company the setup costs for a production run. Ordering costs are usually expressed as £s per order.

Carrying costs

These include costs such as storage, insurance, damage and deterioration, theft and obsolescence. They also include **financing costs,** which is the *opportunity cost* of tying up cash in stocks measured in terms of the required rate of return on the best alternative investment. Carrying costs represent the *variable* or incremental costs of carrying an item in stock and are typically expressed as £s per unit per period. Table 17.5 is indicative of average stock carrying costs. They will vary between firms and between industries and are expressed as a percentage (approximate) of stock value.

Clearly the largest item of stock carrying costs is the cost of financing, where on average the cost of financing an item of stock is equal to 12–15 per cent of its value.

In Table 17.2, for example, the valuation of stocks of maturing whisky and other spirits held by Guinness at the end of 1996 included financing costs of £563m.

Total cost

This is the sum of ordering costs and carrying costs: it is the cost which the model is trying to minimise. The relationship between ordering costs, carrying costs and total cost can be illustrated graphically as in Figure 17.10.

Table 17.5 Stock carrying costs

Stock carrying costs	*Stock value (%)*
Cost of capital tied up	12–15
Obsolescence	5
Storage and handling	3
Pilferage	1
Damage/wastage	1
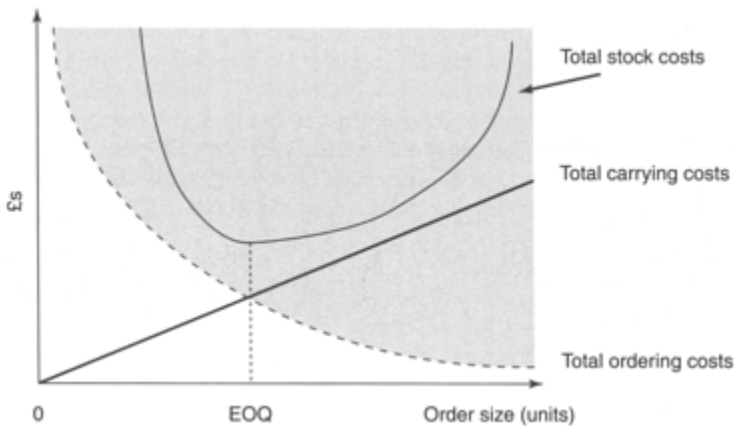
Figure 17.10 Graphical derivation of EOQ

Derivation of EOQ

Our objective is to determine the most economic quantity to order, that is the quantity which minimises total costs. This is shown as the EOQ point in Figure 17.10. We can derive the economic order quantity (EOQ) by analysing ordering costs and carrying costs. Ordering costs Total ordering costs are calculated by multiplying the cost per order, O, by the number of orders, where the number of orders equals the usage or demand over the period, U, divided by the order quantity, Q, thus:

Total ordering costs$=O\times(U/Q)$

Carrying costs Total carrying costs are calculated by multiplying the carrying cost per unit of stock per period, C, by the firm's average stock, where average stock equals order quantity, Q, divided by 2. Thus total carrying costs become:

Total carrying costs=C×(Q/2)

Notice the relationship between order quantity, Q, ordering costs and carrying costs: as the order quantity, Q, increases, the ordering costs will decrease while the carrying costs increase.
Total cost Total cost is the sum of total ordering costs and total carrying costs.

Total cost (TC)=(O×U/Q)+(C×Q/2)

EOQ formula The economic order quantity can be determined mathematically from the total cost equation above as follows: [1]

$$EOQ = \sqrt{\frac{2 \times U \times O}{C}}$$

where,

U = usage or demand in units over the period
O = ordering cost per order
C = carrying cost per unit over the period

We can illustrate the application of EOQ with an example.

Example 1 —Economic order quantity (EOQ)
   Quantum Industries, a large chemical manufacturing company, estimates that it will need 12,000 units of Raw Material X over the next year. Purchasing have estimated the cost of placing an order at £30 and the cost of carrying one unit of Raw Material X for a year at £50. The economic order quantity, EOQ, would be computed as follows:

U=12,000
O=£30
C=£50

$$EOQ = \sqrt{\frac{2 \times 12,000 \times 30}{50}}$$
$$= \sqrt{14,400}$$
$$= 120 \text{ units}$$

The order size for Raw Material X which will minimise total costs is 120 units. This means that the company will have to place 100 orders

during the year. The ordering frequency is directly related to the ordering and carrying costs.

The total cost of carrying this item in stock each year is given by:

Total cost $(TC)=(O \times U/Q)+(C \times Q/2)$

$=£30 \times (12,000/120)+£50 \times (120/2)$

$=£3,000+£3,000$

$=£6,000$

Notice that total ordering costs equal total carrying costs when the economic quantity is ordered. In Figure 17.10 it is the point where the total ordering cost and the total carrying cost lines intersect.

EXERCISE 2 —ECONOMIC ORDER QUANTITY

The manager of Quantum Sports, a large sports and leisure wear store, estimates that the store will sell 5,000 pair of a new running shoe over the next year. If the cost of placing an order is £12.00 and the cost of carrying one pair of shoes in stock for a year is estimated at £10, calculate: (a) the economic order quantity, (b) the number of orders to be placed during the year and (c) the total cost of stocking the shoes for the year.

Assumptions of EOQ

The underlying assumptions of the EOQ include the following.

Accuracy of demand forecasts The model assumes that demand can be forecast with accuracy. If demand or usage estimates cannot be accurately forecast then safety or buffer stocks may need to be carried. There is the added complication in forecasting of derived demand, where the demand for one item is derived from the demand for another. For example in motor car manufacture the demand for individual components such as engine parts, seats and electric components is derived from the demand for the number motor car units.

Constant demand In addition to assuming accurate forecasting of demand, the model also assumes that demand or usage will be constant throughout the period. Clearly demand or usage may not be constant throughout the period. There may, for example, be sizeable seasonal fluctuations.

Constant costs and prices The EOQ model also assumes a constant unit price for each item, it implies that quantity discounts for bulk orders are not applicable. The model also assumes that ordering and carrying costs are constant. However, it is possible to modify the model to reflect changing costs and prices, as we shall see later.

The reorder point

Having determined the economic quantity to order we also need to know when to order it. The reorder point is the level to which the stock of an item is allowed to fall before a replenishment or top-up order is placed. The reorder point takes into account the **lead time,** that is the time interval between placing an order with a supplier and its receipt into stock.

The reorder point (RP) or reorder stock level is derived as follows:

$$RP = LT \times D$$

where,

RP	=	reorder point
LT	=	lead time in days
D	=	daily demand or usage

Example 2 —Reorder point

According to the stock control department of Quantum Industries, it takes two days from ordering for a delivery of Raw Material X to be received. We can, using the information in

Example 1, calculate the reorder point as follows:

$$RP = LT \times D$$
$$= 2 \times (12{,}000/365)$$
$$= 66 \text{ units (to nearest whole unit)}$$

When the stock level of Raw Material X reaches 66 units a new order will be placed and will be delivered just when the stock level reaches zero, assuming constant daily usage. The daily usage is determined by dividing the annual usage of 12,000 by 365, assuming 365 working days.

We can refine the reorder calculation to include an allowance for **safety stock.** As its name implies, safety stock is the margin of extra stock carried to avoid stockouts, which could be caused by extended lead times or variations in daily usage. A safety stock is carried to cover such contingencies and can be determined by statistical methods and/or experience. The reorder point (RP), including an allowance for safety stock (SS) is determined as:

$$RP = (LT \times D) + SS$$

Figure 17.11 illustrates the basic EOQ stock ordering cycle modified to include a constant level of safety stock.

Figure 17.11 EOQ stock order cycle, including safety stock

Example 3 —Reorder point including safety stock
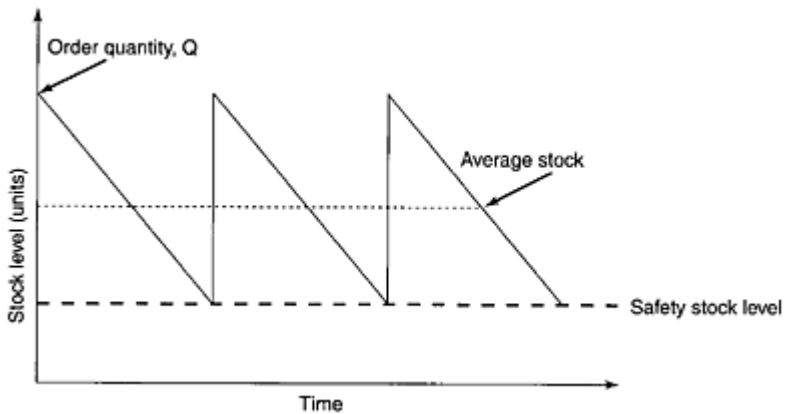
Example 3 —Reorder point including safety stock

If the management of Quantum Industries decides that it is necessary to hold a safety stock of 40 units of Raw Material X, the reorder point is given by:

$$RP=(LT\times D)+SS$$
$$=[2\times(12,000/365)]+40$$
$$\approx 106 \text{ units}$$

Raw Material X will be reordered when its stock level falls to 106 units.

Suppose the actual lead time was three days and that daily usage during the lead period was greater than usual at 40 units per day, what would be the stock level when the new order of Raw Material X is delivered?

$$\text{Stock level (SL)}=RP-(LT\times D)$$
$$=106-(3\times40)$$
$$=-14 \text{ units}$$

In this instance the actual lead time (3 days) and daily usage (40 units) are greater than planned, resulting in a stockout of 14 units.

EXERCISE 3 —REORDER POINT

For Quantum Sports (see Exercise 2) it normally takes 3 days from ordering replacement stock for it to be delivered to the store. Calculate the reorder point. Assuming the manager wishes to carry a safety stock equivalent to two days sales, recalculate the reorder point to allow for this safety stock.

Materials requirement planning (MRP)

Materials requirement planning (MRP) is another manufacturing planning and control system (MPCS) which aims to improve the efficiency of a company's manufacturing operations. As far as the specific aspect of stock management is concerned, MRP begins at the end, with the desired level of finished product(s).

Once management has decided (after reviewing sales projections and taking into account existing stock levels) on the total volume of stocks to be produced, MRP requires a complete, accurate and detailed specification of all the materials and components required, usually in the form of a *bill of materials,* for every single product which the company manufactures.

The bill of materials is like a detailed recipe of how each product is to be made; it forms the basis for all the production scheduling, planning and control requirements. It will determine when essential raw materials and component parts should be delivered, giving precise quantities, specifications and timings, thus reducing stock investment.

Although MRP systems have been around, in one form or another, for more than 25 years, today they tend to be sophisticated computerised systems which include modelling and simulation enhancements. While many companies have developed their own computerised MRP systems, there are proprietary computer packages available for the task.

The key benefit of MRP is that the process requires managers to carry out a very detailed scrutiny of manufacturing operations which usually results in more efficient production and improved stock management. In fact it is said that MRP can produce stock reductions in the order of 30–40 per cent. One of the drawbacks of MRP is that it is critically dependent on accurate forecasts of stock requirements and unfortunately forecasts do have a habit of being wrong.

In relation to the economic order quantity (EOQ) model, both JIT and MRP approaches incorporate EOQ concepts, although with some necessary modifications.

Just-in-time (JIT) system

The just-in-time (JIT) approach to stock management was developed at the Toyota motor company in Japan and began to be adopted as a management practice by Western companies in the 1980s. However, JIT is more than a stock management system. It is a management approach aimed at improving the efficiency of production and operations systems in general.

The key benefits advanced in favour of JIT, in addition to reductions in stock investment, are: speedier production processes, improved product/service quality, reduced lead times in fulfilling customer orders and reductions in bureaucracy and paperwork. Most companies operating JIT will use on-line computerised systems.

For a company the JIT approach essentially shifts the onus of stock carrying from the company to its suppliers. The company carries minimum stocks on hand (ideally zero stock), relying on its suppliers to deliver goods just at the time they are required for production or sale: hence the name just-in-time. Usually a JIT arrangement with suppliers is not cost free, suppliers will normally demand a price for this facility and this will be a matter for negotiation depending on the relative power balance between the two parties.

The JIT system is also applied throughout the company's own internal production processes, so that work-in-progress stocks and materials handling procedures within the company are kept to a minimum.

For example, if the output of Department A forms the input for Department B, then the manager of Department A will be responsible for ensuring that its output conforms to proper specifications and arrives 'just-in-time' when it is needed in Department B, thus minimising work-in-progress stocks. The manager of Department B would similarly be responsible for informing Department A of any operation scheduling or other changes.

Clearly a JIT process requires a great degree of coordination, cooperation, discipline and integration between the company's internal operations, its suppliers and its customers. If essential supplies do not arrive when programmed in the system there are no safety stocks to fall back on and operations are disrupted, and this can lead to costly delays and dissatisfied customers.

Alternatively if supplies arrive but do not meet the quality specifications then operations will similarly be disrupted. This is why a JIT stock management system usually operates in the context of a **total quality management (TQM) system.** JIT and TQM are intimately connected.

TQM is an approach to product and service quality which extends throughout an organisation and beyond to its suppliers and customers. All the company's activities, manufacturing, sales and marketing, administration and the finance function too, are required to conform to the company's quality ethos.

There have been mixed reports on the efficacy of adopting JIT systems: it does not work for every organisation. It has worked well in the motor car industry, the business environment in Japan in which it was developed, where virtually all the large manufacturers in Europe and the United States have adopted it.

Many of the large motor manufacturers such as General Motors and Ford have claimed that they have been able to reduce their investments in stocks by hundreds of millions of dollars. Other industries such as chemical and pharmaceutical manufacturers have found JIT a less attractive system and have been rather slower to implement it.

Reasons often given when JIT has not proved suitable include: a company and its key suppliers being located far apart; poor layout of existing factories, warehouses and other facilities which would be too costly to modify or improve.

Close cooperation or long-term partnership arrangements between a company, its essential suppliers and its customers is imperative if a JIT system is to operate successfully: it essentially requires a radical rethink of business relationships and a

change of organisational culture.

Modern business is intensely competitive and some firms have found JIT to be a useful tool for improving competitiveness and responsiveness to customer needs. The JIT philosophy forces managers to confront production problems and deal with them as and when they arise. Action needs to be taken immediately to keep operations on track. In contrast the 'just-in-case' philosophy, where safety and buffer stocks are carried, can allow managers to overlook difficulties and problems, at least temporarily.

Supply chain management (SCM)

Supply chain management (SCM) is a modern management concept, the goal of which is to improve the efficiency and effectiveness of a company's entire supply chain operations. The supply chain runs from raw material suppliers at one end, right through all the intermediate processing stages, to the customer at the other.

The focus of SCM, or *logistics management* as it is often called, is on adding value and eliminating inefficiencies at each stage of a company's supply chain. This will include, for example, the optimisation of stock or inventory movements; planning for peak activity periods; and the optimisation of transport and distribution systems.

The process seeks to ensure that the right materials, supplies and personnel are in the right place at the right time. The emphasis of SCM on adding value at each intermediate stage, has given rise to the term **value chain.** Supply chain or value chain management emphasises the strategic value-adding and financial role of a company's entire logistics management process.

Outsourcing

Outsourcing of stocks and supplies is a practice which has grown in popularity in recent years as a means of improving efficiency and adding value in the management of the supply chain. Instead of making its own components or supplying its own services inhouse a company arranges to contract them from an external source.

Outsourcing thus reduces the investment needed in working capital. However, stock and working capital reduction may not be the primary motivation for outsourcing; it may in fact be more of an incidental benefit.

Deciding to outsource usually has more to do with **strategic business considerations** such as focusing management time and resources on developing the key or core business activities. Thus products and services which are not central, or are in a supportive role, to the core business operations are contracted out, perhaps to a smaller firm which specialises in the product or service and therefore is able to supply it more cost-effectively.

One of the key business themes of the 1990s is for companies to become 'lean and focused', shedding any activities which are considered a distraction from, or peripheral to, the fundamental strategic focus and direction of the company.

Outsourcing has also been a common feature of management in the public sector where support services such as catering, cleaning, financial services, and security, which had previously been supplied internally, have been contracted out to specialist provider firms.

For example, Capita plc is a very successful UK company which has developed a substantial business providing outsourced specialist financial services (e.g. payroll and payments) to local authorities and other public sector bodies and agencies.

RECAP

Working capital: Working capital is the capital needed to finance a firm's day-to-day operational activities. It can be defined as current (short-term) assets minus current (short-term) liabilities. Adequate working capital is vital in maintaining a company's liquidity.

Working capital management: Working capital management is concerned with the management of the firm's short-term assets (stocks, debtors and cash), short-term liabilities (creditors and borrowings), and short-term cash flows. Its goal is to secure the optimum investment in working capital consistent with the overall financial goal of shareholder wealth maximisation. Excessive investment in working capital ties up vital cash resources: inadequate investment in working capital risks insolvency.

Key tasks: The two key tasks for the financial manager in working capital management are achieving: (1) the optimum **balance of investment** in working capital, and (2) the optimum **rate of current asset turnover.** Working capital management is facilitated through the use of **target working capital ratios.**

Operating cycle: This is the number of days from delivery of raw materials until receipt of cash from customers. It is equal to the total of inventory days plus debtor days.

Working capital policies: These describe the firm's working capital investment and financing policies. They can be classified as **aggressive, conservative** or **moderate** and are distinguished in terms of their respective *risk and return* characteristics. A conservative working capital policy is low-risk low-return and an aggressive policy is high-risk high-return; where risk is defined in this context as the probability of the firm becoming insolvent.

The maturity matching principle: Also known as the **self-liquidating or hedging principle** this relates to the practice of matching the maturity term of an asset with the same maturity term of finance used to acquire the asset. The maturity matching or hedging principle is followed in the moderate or balanced working capital policy where short-term finance is used to fund temporary increases in current assets.

The optimal investment in current assets: This is defined as the level of investment which minimises total investment costs. The total costs of investing in current assets consist **of ordering costs** and **carrying costs.**

Stock management: Stocks are a key current asset. Stock management comprises the principles and practices followed to secure the effective and efficient management of the firm's total investment in its stock holdings. Specific stock management systems such as **the ABC system,** the **economic order quantity (EOQ) model, materials requirement planning (MRP)** and the **just-in-time (JIT) system** are available to facilitate good stock management practice. Companies

can also reduce their investment in stocks through appropriate **supply chain management.**

The EOQ stock model: The purpose of the economic order quantity EOQ model is to determine the most economic quantity of a stock item to order, that is the quantity that minimises total costs. The basic EOQ formula is given as:

$$EOQ = \sqrt{\frac{2 \times U \times O}{C}}$$

The basic EOQ model assumes that demand forecasts are accurate and that demand, ordering costs, carrying costs and unit prices are constant.

APPENDIX I EOQ MODEL INCORPORATING QUANTITY DISCOUNTS

We have seen that one of the underlying assumptions of the basic EOQ model is that unit price and quantity ordered are independent, that is a uniform unit price is charged irrespective of the quantity ordered. In reality, quantity discounts for bulk orders can usually be negotiated and we can modify the basic EOQ model to reflect this practice.

Example 4 —EOQ model with quantity discounts

Quantum Industries in its manufacturing process also requires 20,000 units of Raw Material Y each year. It costs £30 to place an order and stores management in this case have estimated the carrying cost per unit per year at 10 per cent of the unit price.

Arising from recent negotiations with the supplier of Raw Material Y the following price list has been agreed.

Raw Material Y

Order quantity	Unit price
≤1,999	£5.00
2,000–2,999	£4.50
≥3,000	£4.00

We can work through this example systematically in a sequence of steps as follows:

Step 1

Determine the EOQ using the most beneficial price quoted.

$$EOQ = \sqrt{\frac{2 \times U \times O}{C}}$$

$$= \sqrt{\frac{2 \times 20{,}000 \times £30}{£4.00 \times 0.10}}$$

$$= \sqrt{\frac{1{,}200{,}000}{£0.40}}$$

$$\approx 1{,}732 \text{ units}$$

Clearly it is not possible to order 1,732 units at a price of £4.00 per unit. If we had found on our first attempt that the order quantity was viable then this is the quantity which would be ordered and the procedure would end.

Step 2

As the order quantity in Step 1 is not viable then the next step is to calculate the EOQ using the next lowest price of £4.50 per unit.

$$= \sqrt{\frac{2 \times 20{,}000 \times £30}{£4.50 \times 0.10}}$$

$$= \sqrt{\frac{1{,}200{,}000}{£0.45}}$$

$$\approx 1{,}633 \text{ units}$$

Again it is not possible to purchase this quantity at a unit price of £4.50.

Step 3

The procedure set out in Step 2 above is repeated until a viable order level is determined. In this case we move on to the next lowest unit price of £5.00.

$$= \sqrt{\frac{2 \times 20{,}000 \times £30}{£5.00 \times 0.10}}$$

$$= \sqrt{\frac{1{,}200{,}000}{£0.50}}$$

$$\approx 1{,}549 \text{ units}$$

This order quantity is possible at this price.

Step 4

Next we must determine the total cost of stocking the item at the first feasible order quantity found. This includes ordering costs, carrying costs and purchasing costs. It is necessary to include purchasing costs as these will vary according to the quantities ordered.

Total cost (TC)=(O×U/Q)+(C×Q/2)+PC
where,
PC=Purchasing costs=Total quantity purchased×purchase price
Therefore,
TC=£30×(20,000/1,549)+[(£5.00×0.10)×(1,549/2)]
+(20,000×£5.00)
=£390 (rounded) +£390 (rounded) +£100,000
=£100,780

As it is possible to achieve a better purchasing price by ordering more than the first feasible order, the next stage is to determine the total costs at the lower prices quoted. Therefore:

Step 5

(a) Total cost at £4.50 per unit

TC=£30×(20,000/2,000)+[(£4.50×0.10)×(2,000/2)]
+(20,000×£4.50)
=£300+£450+£90,000
=£90.750

(b) Total cost at £4.00 per unit

TC=£30×(20,000/3,000)+[(£4.00×0.10)×(3,000/2)]
+(20,000×£4.00)
=£210 (rounded)+£600+£80,000
=*£80,810*

Thus the order quantity which minimises *total* costs in this case is 3,000 units.

Notice that in this instance the reduction in total cost (20,000 units at £1 each) is primarily due to significant purchasing discount offered. The cheaper purchasing costs are the most significant factor in this case.

Where quantity discounts are offered by a supplier, the general

> principle is to order the quantity that is nearest the EOQ which yields the highest discount.

REVIEW QUESTIONS

Concept review questions

1 (a) What do you understand by the term *working capital?* (b) Briefly explain how effective working capital management contributes to shareholder value.
2 What are the two key tasks involved in the management of working capital?
3 Explain the operating cycle. How does it affect the level of investment in working capital?
4 Summarise the key characteristics of the conservative, aggressive, and moderate working capital policies.
5 Explain what is meant by the *optimal level* of investment in current assets.
6 What are the underlying assumptions of the basic EOQ model?
7 How can outsourcing contribute to effective working capital management?

Practice questions

8 **Stock turnover.** From the information set out below, calculate the stock turnover ratio and average inventory days for Harry's Bar and Restaurant for both the current and previous years:

	Current year (£)	*Previous year (£)*
Opening stock	36,634	31,246
Closing stock	54,982	36,634
Cost of sales	1,099,660	1,132,980

Assume a 360 day year.
Based on your findings, what comments would you make to Harry?
9 **The operating cycle.** On average it takes 10 days for raw materials to be delivered to the Brandon Clothing Company from the time of ordering. When received at the factory raw materials are usually held in the warehouse for 5 days before being issued to production.
The conversion process from raw material to finished article takes approximately 7 days and finished stocks are usually held in store for 4 days before being shipped to customers. Delivery to customers is normally completed in 3 days and the average period of credit taken by customers from receipt of goods is 40 days. Calculate the length of the operating cycle.
10 **EOQ and Reorder point,** (a) The City Bakery uses 10,800 kilogrammes of dried fruit ingredients per year. If ordering costs are £10 per order and the carrying cost is

£5 per kilogramme per year, calculate the economic order quantity,
 (b) If it takes 3 days from order to delivery, calculate:

(i) The reorder point. Assume a 360 day year.
(ii) The reorder point assuming a safety stock of 2 days.

Test questions

11 **EOQ.** You have been given the following information relating to an item sold by
 Paragon Computer Products:

1) Annual demand	50,000 units
2) Ordering cost per order	£40
3) Carrying cost per item per year	£8
4) Purchase price per unit	£4.50

 Calculate:

(a) the economic order quantity (EOQ), and the number of orders;
(b) the total amount to be paid for each order;
(c) the minimum total cost of carrying this item in stock each year;
(d) the total cost of ordering and carrying this item in stock, if the company were
       to place either 50 or 100 orders each year; and
(e) the reorder point, assuming a lead time of 2 days and a 365 day year.
(f) the level of safety stock, if management has determined a reorder level of 410
       units.

12 **Stock management.** The financial controller of Mexet plc is reviewing the
 company's stock management procedures. Stock has gradually increased to 25 per
 cent of the company's total assets and, with finance costs at 14 per cent per annum,
 currently costs the company £4.5 million per year, including all ordering and
 holding costs.
 Demand for the company's major product is not subject to seasonal fluctuations.
 The product requires £6 million of standard semi-finished goods annually which
 are purchased in equal quantities from three separate suppliers at a cost of £20 per
 unit. Three suppliers are used to prevent problems that could result from industrial
 disputes in a single supplier.
 Stock costs £2 per unit per year to hold, including insurance costs and financing
 costs, and each order made costs £100 fixed cost and £0.10 per unit variable cost.
 There is a lead time of one month between the placing of an order and delivery of
 the goods. Demand fluctuation for the company's finished products results in the
 following probability distribution of monthly stock usage.

Usage per month	19,400	23,000	25,000	27,000	30,000
Probability	0.10	0.22	0.36	0.20	0.12

The cost per unit of running out of stock is estimated to be £0.4.
Required:

(a) Calculate the economic order quantity for the semi-finished goods.
(b) Determine what level of safety stock should be kept for these goods.
(c) Calculate the change in annual stock management costs that would result if the goods were bought from only one supplier. Assume that no quantity discounts are available.
(d) The financial controller feels that JIT (just in time) stock management might be useful for the company, but the three suppliers will only agree to this in return for an increase in unit price.
Explain the possible advantages and disadvantages of JIT, and briefly discuss whether or not Mexet should introduce it.

13 **Stock management.** Whirlygig plc manufactures and markets automatic dish-washing machines. Among the components which it purchases each year from external suppliers for assembly into the finished article are window units, of which it uses 20,000 units per annum.
It is considering buying in larger amounts in order to claim quantity discounts. This will lower the number of orders placed but raise the administrative and other costs of placing and receiving orders. Details of actual and expected ordering and carrying costs are given in the table below:

	Actual	Proposed
O=Ordering cost per order	£31.25	£120
P=Purchase price per item	£6.25	£6.00
I=(annual) Inventory holding cost (as a percentage of the purchase price)	20%	20%

To implement the new arrangements will require reorganisation costs estimated at £10,000 which can be wholly claimed as a business expense for tax purposes in the tax year before the system comes into operation. The rate of corporate tax is 33%, payable with a one-year delay.
Required:
(a) Determine the change in the economic order quantity (EOQ) caused by the new system.

Note: EOQ is given by $Q = \sqrt{\dfrac{2 \times D \times O}{I \times P}}$

where D=demand, or usage.
(b) Calculate the payback period for the proposal and comment on your results.
(c) Briefly discuss the suitability of the payback method for evaluating investments of this nature.

Practical project

Obtain a copy of the annual reports and accounts for a company of your choice for the past two or three years. In addition, survey the financial media for current information relevant to your company.

You should then:

1 Analyse the structure of the company's current assets and current liabilities and calculate any ratios you consider relevant to your analysis for each of the years given in the accounts. Has there been any notable changes in structures or ratios over the period of your analysis?
2 Can you identify the company's working capital policy?
3 Has there been any discernible change in the company's working capital policy over the years analysed? If there has, can you state the reason(s)?
4 Briefly discuss any difficulties you encounter in performing your analysis.

Keep your reports and analysis for future reference.

NOTE

1 The EOQ is derived from $TC=(O \times U/Q)+(C \times Q/2)$ by using calculus.

FURTHER READING

General

For a more extensive treatment of the topics we have covered so far in short-term financial management see:
• *Short-Term Financial Management: Text and Cases*. Hill, N.C. and Sartoris, W.L., Prentice-Hall, 1995.

Stock and supply chain management

More detailed treatment of stock and supply chain management systems will be found in most textbooks on operations or production management, for example:
• *Operations Management* . Slack, N., Chambers, S., Harland, C. and Johnston, R. Pitman Publishing, 1995.
• *New Wave Manufacturing Strategies* . Edited by Storey, J., Paul Chapman Publishing, 1994.

An interesting and award-winning case study on supply and distribution systems re-

engineering is:

- *NIKE: Pan-European Logistics Reengineered* . Deloitte & Touche Consulting Group, 1996. Management Consultancies Association, Case Study Award 1996. See 'How Nike did it'. *Management Consultancy ,* February 1997.

A review of recent developments in stock and supply chain management systems is provided in *The Financial Times,* Information Technology Survey, 1 October 1997.

Outsourcing

- 'Outsourcing—how organisations need to prepare in order to realise the full potential benefits'. Stacey, M., *Management Accounting ,* May 1998.

18
SHORT-TERM FINANCIAL DECISION-MAKING (2)

> This chapter continues with our analysis of short-term financial decision-making. It deals with financial decisions relating to the management of the short-term assets of debtors and cash. The following topics are covered:
>
> the management of debtors;
> the management of cash.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 discuss the characteristics and operation of a firm's credit management policy;
2 evaluate changes in credit policy;
3 explain and apply cash management models;
4 explain and determine the cash cycle.

OVERVIEW

The previous chapter introduced the topic of working capital management and examined the management of the key working capital component of stock. In this chapter we continue our theme of working capital management by specifically exploring the management of the remaining two main categories of current assets, **debtors** and **cash.**

As with the management of stocks, the financial manager will need to balance the opportunity costs of investing in the assets of debtors and cash against the costs of lost sales and illiquidity.

THE MANAGEMENT OF DEBTORS

A firm will accumulate debtor or accounts receivable balances when it sells goods or services to its customers on credit. These type of debtors are generally referred to as **trade debtors** to distinguish them from other items that are included in the debtors figure which normally appears on a company's balance sheet. These other items would typically

include prepayments, accrued income, recoverable taxation and so forth, but these are not our concern here. We are primarily concerned with the management of trade debtors.

Most firms, even retail firms, will have some proportion of their sales on credit. A vast proportion of retail sales today are generated by the use of in-house store cards and other credit cards. The large high street retailers issue their own store cards and operate internal divisions or even separate finance companies to process and control customer credit arrangements.

As Table 18.1 indicates, the investment in debtors for many firms constitutes the largest single element of current asset investment. Clearly the efficient and effective management of this investment is vital to sustain a firm's sound financial health.

Table 18.1 Current asset composition

Company Industry	British Petrlm Oil		Cadb. Schw. Fd pr.		Guinness Alc. Bev.		Jeff'sn Smur. Pack.		Pizza Expr. Rest.		United Bisc. Fd pr	
	£m	%	£m	%	£m	%	IR£m	%	£m	%	£m	%
Fixed assets	21,820	67	3,014	67	4,226	54	2,056	53	23	77	1,283	62
Current assets												
Stocks	3,009	9	436	10	1,867	24	287	7	3	10	210	10
Debtors	7,590	23	891	20	1,393	18	666	17	3	10	423	21
Cash and investments	153	1	166	3	327	4	895	23	1	3	139	7
	10,752	100	1,493	100	3,587	100	1,848	100	7	100	772	100
Current liabilities	10,617		1,902		2,572		1,058		14		861	
Working capital	135		−409		1,015		790		−7		−89	

Source: Annual Accounts.

Notes: British Petroleum: oil. Cadbury Schweppes: food producer. Guinness (a subsidiary of Diageo plc): alcoholic beverages. Jefferson Smurfit: packing & paper. Pizza Express: restaurants. United Biscuits: food producer.

Factors influencing investment in debtors

The level of investment in debtors will be influenced by many variables such as:

1 the individual firm's line of business (e.g. retail or manufacturing);
2 the ratio of credit sales to total sales;
3 the sales growth rate;
4 the credit policies of the firm's competitors;
5 the individual firm's credit policies.

From the financial manager's perspective the first four of these variables are non-

controllable, only item 5, the determination of the firm's credit policies is within the financial manager's control.

An increase in debtor levels as a result of changes in any of these variables has to be financed, either by internally generated funds or externally with borrowed money on which interest and other charges will be paid. The money used to finance debtors cannot be used elsewhere in the firm.

The greater a firm's investment in debtors, the greater the risk of default by customers and the greater the opportunity cost of funds tied up. A combination of higher risk and higher costs will depress the value of the firm. As we noted with the management of stocks, the financial manager will have to balance the costs and risks of investing in debtors.

In today's intensely competitive business environment, granting credit facilities to customers is used as a key competitive and marketing tool. Such tactics as offering 'interest-free credit' and 'repayment holidays' are widely used by retail firms to stimulate sales, gather marketing intelligence on customers and build customer loyalty.

The formulation of the firm's credit and collection policies will also be influenced by the competing demands of the financial, marketing and operational managers. The financial manager's primary concern will be to minimise the firm's investment in debtors in order to minimise opportunity costs and the risk of default.

In contrast, the attitude of marketing and sales managers will generally be in favour of relaxed credit policies as a means of obtaining and maintaining customers and of increasing the firm's market position. These competing demands and tensions will have to be reconciled in formulating a definitive credit policy.

Debtor days ratio

Recall from our study of financial analysis that the debtor days or collection period ratio is a key indicator of the efficiency with which the investment in debtors is being managed. As we have previously discussed, the quicker a company is able to collect payments from its customers, the less cash will be tied up in debtor balances.

To facilitate good debtor management **target ratios** should be determined. Regular control reports, such as the aged debtors report (see Table 18.4 on p. 626) should be provided which compare target and actual ratios, enabling managers to take appropriate corrective action where required.

Many computerised debtor management systems provide daily management reports on collections and overdue accounts. Exception reports will indicate, for example, which customers are slow to pay, where payments are overdue and where action needs to be taken to collect outstanding debts.

For example, the debtor days (collection period) ratios for Cadbury Schweppes for the two years 1997 and 1996 are set out in Table 18.2. The average debtors collection period appears to have fallen by 10 days over the two-year period.

Table 18.2 Debtor days

	Cadbury Schweppes	
	1996 £m	*1997 £m*
(1) Sales	4,194	4,173
(2) Trade Debtors[3]	643	522
(3) Debtor days[b]	56	46

Notes: [a] Source: Annual Accounts. [b] Debtor days represents the average number of days credit allowed to customers and is calculated as: (Debtors÷Credit Sales) ×365.

CREDIT MANAGEMENT

When a company grants credit to its customers it incurs the risk of non-payment. Credit management, or more precisely **credit risk management,** refers to the systems, procedures and controls which a company has in place to ensure the efficient collection of customer payments and minimise the risk of non-payment.

Credit risk management will form a key part of a company's overall risk management strategy. Weak credit risk management is a primary cause of many business (particularly small business) failures. Many small businesses, for example, have neither the resources nor the expertise to operate a sound credit risk management system.

Credit policy

The management of debtors or accounts receivable essentially begins with the decision whether to grant credit to a customer, and if so how much and on what terms. It is consequently the logical starting point for our examination of **credit policy.** We use the term credit policy to include all the company's systems and procedures governing the determination of:

1 **Credit selection.** This is the process of selecting the customers who will be granted credit and determining their individual *credit limits.* Usually a set of criteria or checklists will be available to perform the initial credit screening.
2 **Credit standards.** These will specify the minimum acceptable standards *of financial viability* and *creditworthiness* which a customer must reach before credit is allowed. It is essentially an assessment of a potential customer's *credit quality.*
3 **Credit terms.** These will set out the *credit period* allowed and any *discount terms* for early payment.
4 **Collection policy.** This refers to the company's systems and procedures for collecting payment from customers when it becomes due.

Credit policy needs to be operated in a balanced way. If it is operated too aggressively sales and profits will be lost. If it is operated too leniently then the risk of non-payment

and bad debts increases.

We will review these four elements of credit policy beginning with credit selection.

Credit selection

Credit selection or screening is the initial stage in the operation of an effective credit management system. The process of credit selection and analysis is essentially an exercise in **risk assessment,** that is, in assessing the probability of customer non-payment.

Sound credit selection procedures help to reduce customer default risk by eliminating unsuitable applicants at the outset, and thus avoiding the costly process of chasing slow payments and incurring bad debts later. The old adage 'prevention is better than cure' is appropriate here.

A common approach to customer credit selection and analysis is the use of the **'Five Cs'** of credit as an initial screening and risk assessment device.

The 'Five Cs' of credit

Applying the 'Five Cs' involves a review of a potential customer's **capacity, capital, character, collateral** and **conditions** as follows:

1 **Capacity.** This is an assessment of the potential customer's ability to repay the debt. The assessment would include a financial analysis of the customer's accounts with a particular emphasis on liquidity and borrowings. Information is also likely to be sought from sources such as bankers and other suppliers relating to the customer's payment record elsewhere.
2 **Capital.** How substantial are the potential customer's capital resources? What is the customer's capital structure?
3 **Character.** This is a particularly important aspect of the overall credit review. It relates to an assessment of the personal character, honesty and integrity of the customer(s) and their willingness to comply with credit terms and conditions. Character references may be sought from bankers, business contacts and associates. Are there any outstanding legal judgments against the customer(s)?
4 **Collateral.** This relates to an evaluation of the assets which the customer has available as security for the debt if required.
5 **Conditions.** The decision to grant credit to a customer could be influenced by current economic and business conditions generally, or by special business conditions relating to the applicant or to the firm itself. For example, if the applicant for credit is a small business and there is an economic recession in the country, the risk of small business failure in such circumstances is considerably increased. Alternatively, if the firm itself is finding sales for some of its products slow it may take a more relaxed view to granting credit to a potential customer.

How this credit review is carried out will depend upon the size and resources of the firm. In a large firm, the financial manager may have a specialist credit control department responsible for credit analysis, and with an experienced credit manager responsible for making the final decision. Alternatively, in a small firm the financial manager may

perform some or all of the analysis and make the final decision.

The extent of an individual credit review will also depend upon the order size and the probability of repeat business. In each case, the depth of the credit review should be assessed in terms of its relevant costs and benefits.

A key question in the credit risk assessment will be where to obtain the necessary credit information.

Where to obtain credit information

Credit information is available from a range of sources, internal and external, although they will vary in their respective usefulness. The following are some of the more traditional credit information sources. They include quantitative and qualitative information.

Trade and bank references Normally an applicant will be required to complete an application form and be asked to give several trade references and at least one bank reference. These will be followed up as a matter of routine but sometimes their efficacy is questionable as credit applicants tend to furnish trade references which will show them in their most favourable light.

Bank references also need to be interpreted with care. They can be of limited value as they are often very general and issued in the form of a standardised and carefully phrased letter. Bank managers may not be very forthcoming with specific customer information and are likely to be reticent about any particular difficulties one of their customers may be having.

Financial accounts A credit applicant's financial history should be investigated. A fundamental source of information will be a set of annual accounts covering a period of several years. For limited companies, published annual accounts are available for inspection at the Registrar of Companies. Although they will be historic, they are still an essential source of financial information. At least a basic financial analysis covering trends in profitability, liquidity, gearing and 'Z' scores should be performed.

Business contacts and associates Business contacts and associates of the firm's own managers may be able to provide insights into the creditworthiness of a potential new customer. In particular the firm's own sales and marketing staff should be continually gathering information on existing customers and potential new customers. Sales staff can also be asked to visit a new customer's place of business and report their findings.

Company's internal records If the applicant is an existing customer applying for a higher credit limit, or a former customer reapplying, then the company's own sales ledger will be a primary information source. The customer's account and past payment record will be reviewed.

In a group of companies, it is possible that the applicant is already a customer of another group unit or division, or has previously traded with another group member.

Credit agencies Information on a potential customer's credit standing can be obtained from specialist credit agencies of which Dun and Bradstreet is probably the most well known. Dun and Bradstreet offers its clients the facility of an almost instantaneous decision on a potential customer's credit risk.

These agencies regularly publish listings of credit ratings for companies and other non-incorporated businesses. Today credit listings and other information can be ordered via

the Internet and supplied on CD ROM. Credit agencies will also carry out specialised investigative work and provide detailed individual credit assessments if required.

The information from the above sources will be collated and analysed. While each individual information source has its limitations, taken together they will provide the credit manager with an overall picture of a potential customer's creditworthiness. In many cases the decision whether to extend credit and how much of an initial credit limit to allow will be a straightforward matter, but in other cases the credit manager's experience and professional judgement will play a significant role.

Credit scoring

Credit scoring is a credit analysis technique used extensively by banks, credit card companies, finance companies and other financial institutions involved in making consumer credit decisions.

A consumer credit scoring system typically operates as follows. The company identifies a range of key financial and other variables and each is given a relative weighting or ranking. For example, home ownership, salary/income range, bank reference and other credit references are normally identified as four of a range of key evaluation variables.

The customer completes a detailed application form which is assessed by a member of the credit selection staff. Based on the application assessment, the customer is awarded an initial points score (possibly out of 100) for each variable and this is in turn is assigned a relative weighting as shown in Table 18.3.

Table 18.3 Credit scoring

	Points score	*Weighting*	*Weighted score*
1 Home owner	90	0.20	18
2 Salary/income range	75	0.20	15
3 Bank reference	80	0.15	12
4 Credit reference	60	0.15	9
5—	—	—	—
6—	—	—	—
		1.00	—

The decision whether to extend credit will depend on a single figure—the total weighted score—with at least a minimum total weighted score (e.g. 70) having to be attained before any credit will be extended. Usually a predetermined range of scores will have been set (e.g. 70–75, 76–80, 81–85) and this will dictate the credit terms and conditions offered. The higher the range into which the customer's weighted score falls, the more favourable the credit arrangements.

You may notice a certain similarity between this technique and the various 'Z' score techniques we encountered in financial analysis which are used to predict corporate failure.

Credit scoring as outlined above is not generally applicable to commercial credit analysis as the same degree of standardisation and uniformity does not exist among

commercial firms as among general consumers.

Companies involved in granting consumer credit normally deal with high volumes of applications which need to be processed quickly, so a standardised, computerised and highly automated credit analysis and rating technique is essential. A credit scoring model helps to fulfil these operational requirements.

Credit standards

The second element in formulating credit policy is the setting of appropriate credit standards. Normally a customer must meet certain minimum standards in terms of financial stability and strength before the granting of credit will be considered. If credit standards are set too high then sales and profits will be lost. Conversely if they are set too low there is an increased risk of loss through bad debts as financially weak customers may be accepted.

Credit standards also have a direct effect on the level of investment in debtors overall. A relaxation of credit standards will allow debtor balances to increase as customers who would have been previously rejected are now granted credit. As we discovered with managing the investment in stocks, a higher investment in a current asset means higher carrying and opportunity costs. Imposing more rigid credit standards will have the opposite effect.

Credit terms

Credit terms refer to the period of credit allowed to a customer before payment becomes due. They also include any discount terms which may be offered as an incentive for prompt payment and to reduce the risk of non-payment.

Credit terms are frequently standard throughout an industry or trade. For example, credit terms in the confectionery trade are frequently quoted as '2/10 net 30'. Which translated means that the customer can deduct a 2 per cent cash discount from the bill if payment is made within 10 days, otherwise the full amount should be paid within 30 days.

The cost of discount

Clearly there is a direct cash cost of offering discount and a 2 per cent discount may appear deceptively cheap until its cost is annualised. For example, the approximate annual cost of offering the above discount terms would be:

$$\text{Cost of discount} = 2\% \times (365/20) = 36.5\%$$

The company is offering 2 per cent to receive the customer's cash 20 days early and this would be repeated 18.25 (365/20) times per year.

A more accurate method of calculating the cost of discount can be expressed as follows: where,

$$\frac{D}{1-D} \times \left[\frac{365}{(CP-DP)}\right]$$

where,

  D = discount offered (in decimal format)
  CP = credit period (days)
  DP = discount period (days)

This method is illustrated in Example 1.

Example 1 —Cost of cash discount

 Quantum Industries offers customers a 2 per cent cash discount for payment within 10 days otherwise the customer pays the full amount of the invoice in 30 days. The annual cost of the discount would be determined as follows:

$$\frac{0.02}{1-0.02} \times \frac{365}{30-10}$$

$$= \frac{0.02}{0.98} \times \frac{365}{20}$$

$$= 0.0204 \times 18.25$$

$$= 37.23\%$$

For each £100 invoiced, the company would receive £98, if the customer deducts the 2 per cent discount and pays within 10 days. The cost of obtaining the £98 twenty days early is £2 (£2/£98 =2.04%) and this would occur 18.25 (365/20) times per year.

EXERCISE 1 —COST OF DISCOUNT

 Calculate the cost of the following discount terms for NewPort Transport, *3* per cent for payment within 7 days otherwise 40 days net.

An even more accurate determination of the cost of discount is to calculate the ***effective annual interest rate (EAIR),*** which is the true rate of interest per year. It takes into account the nominal interest rate, r, and the frequency of compounding, m: recall these terms from our examination of the future value of money in Chapter 5, where

compounding occurs more frequently than once a year.

$$EAIR=(1+r/m)^m-1$$

Applying it to Example 1:

$$EAIR=(1+0.0204)^{18.25}-1$$
$$=0.4456$$
$$=44.56\%$$

You will notice that the effective annual interest rate is considerably higher than the rate calculated in Example 1, this is because the EAIR is based on compound rather than simple interest.

Both figures represent a high opportunity cost to the customer if discount is not taken. From the customer's point of view taking cash discount is worthwhile. Not to take it implies paying interest at the rate of the annualised cost of the discount.

For the customer, forgoing discount can be an expensive way of borrowing short-term funds, as the cost of commercial borrowing is unlikely to be as high as 37 or 45 per cent per year. In practice the tendency is for many customers, particularly large powerful customers, to pay after the discount period but still deduct the discount! We will examine discount terms from the buyer's, rather than the seller's, perspective later.

From the company's point of view, the discount rate offered will have to exceed the costs of borrowing to the customer, otherwise debtor levels will increase.

Modifying credit terms

In deciding whether to modify the company's existing credit terms, the financial manager has to evaluate the likely *incremental* effects on the company's profitability and cash flows. These may arise from expected changes in sales, customer payment patterns, bad debts and the investment in debtors. For example, some of the issues to be considered include: will the discount policy stimulate sales? If so, by how much? Will it prevent loss of sales to competitors?

The same incremental approach applies in evaluating any changes in the credit period. For example, should the credit period be increased to 40 days, or reduced to 25 days? It is the incremental or differential effects on revenues and costs which have to be evaluated.

Example 2 demonstrates the approach to evaluating changes in credit terms.

> ### *Example 2 —Modifying credit terms*
>
> MicroTronics, a computer components company, is considering the introduction of an early settlement discount for its customers. The company's current credit terms are 30 days net and on average customers settle within this period. The marketing manager considers that to introduce a cash discount would increase the company's sales and market share.
>
> MicroTronics is considering offering a cash discount of 2 per cent for payment within 10 days. Credit sales are currently £15m and the marketing

team has estimated that these would increase by 5 per cent if a 2 per cent discount was offered. Variable costs are estimated at 60 per cent of sales.

Marketing surveys indicate that 70 per cent of customers would avail themselves of the discount. It is estimated that the average collection period would be reduced to 20 days and bad debts would also be reduced from 2 per cent to 1.5 per cent of sales. The company's opportunity cost of capital is currently 15 per cent.

To determine if the proposal is worthwhile and value enhancing, we need to assess the effect on the company's existing profits and cash flows by comparing the estimated incremental income with the estimated incremental costs.

Incremental income

The effects of the proposal should be to increase income by: (1) increasing profits from sales, (2) reducing the opportunity cost of investing in debtors and (3) reducing the cost of bad debts. We will analyse each of these in turn.

(1) Incremental profit contribution

			£
Increase in sales	=£15m	×0.05	=750,000
Increase in variable costs	=£0.75m	×0.60	=450,000
Increase in profit contribution	=		300,000

(2)   Investment in debtors

Average existing investment[a]

$£15m × (30/365)$ = 1,232,877

Average proposed investment $(£15m×1.05)×(20/365)$ = 863,014

Reduction	369,863
Cost saving in investment	= 369,863 ×0.15 = 55,479

(3) Bad debts

Existing cost: £15m×0.02	=	300,000
Proposal cost: (£15m×1.05)×0.015	=	236,250
Saving	=	63,750
Total Incremental Income		419,229

[a]The average collection period under existing arrangements is 30 days.

Incremental costs

Costs will increase due to the cost of the cash discount itself.

Cost of cash discount

[(£15m×1.05)×0.70]   × 0.02   =220,500

Incremental profit   **198,729**

As the proposal is expected to yield a net annual increase of almost £200,000 in the company's profits (ignoring tax) it will add to the value of the company and should therefore be accepted. The value of the proposal can be determined using NPV principles.

NPV approach The NPV of the proposal can be calculated by comparing incremental cash inflows with the incremental cash outflows. In this example they would be:

Annual cash inflows	£
Incremental profit contribution	300,000
Bad debt reduction	63,750
	363,750
Annual cash outflows	
Cash discount	220,500
Net cash flow	143,250

The proposal is expected to yield an annual increase in pre-tax cash flows of £143,250. The approximate value of this cash flow to the company can be calculated as a perpetuity using the 15 per cent cost of capital and assuming a tax rate of 30 per cent:

$$\frac{£143,250 \times (1-0.30)}{0.15} = £668,500$$

Remember it is only the after-tax cash flows which are relevant to the company. In addition, there is the one-off benefit of the reduction in the average amount of cash tied up in debtors. This will provide the company with a non-recurring initial cash inflow of £369,863, therefore the total value of the proposal is £1,038,363 (£668,500+£369,863). The market value of the company would be expected to increase by this amount. As the project is clearly wealth enhancing it should be implemented.

The procedure outlined in Example 2 can be applied to the evaluation of changes in any aspect of the company's credit policy.

Collection policy

Collection policy is the final element in overall credit policy and refers to the systems and

procedures which a company has in place to secure payment from its customers when payment becomes due.

The policy will set out the follow-up and late payment chasing procedures, such as the letters and telephone calls, which will come into operation when a customer's account becomes overdue. It is only when payment has been obtained from a customer that a sale is complete. There is a saying among accountants that 'a sale is not a sale until it is paid for'.

Collection policy is a critical part of the overall credit management process. An effective collection policy is essential to control the investment in debtors and also to reduce the risk of financial loss and illiquidity through slow payment. Yet if the collection policy is too stringent it may antagonise customers and they may seek alternative suppliers.

Collection procedures

It is a business reality that there will be late payers in every customer base. When a payment is regarded as late a range of procedures and tactics can be adopted to obtain payment.

The actual payment collection stage can often be quite tricky and requires a certain range of interpersonal skills on the part of collection staff. The company may not wish to offend a customer and destroy otherwise harmonious customer relations, particularly if the customer is large. However, the company needs to protect its cash flow and will have to instigate collection procedures when a payment is regarded as overdue. Typical payment collection procedures will include:

Letters and telephone calls Normally a written reminder will be issued when a customer's payment is late. This may be accompanied at the time, or followed up at a later stage, by a telephone call direct to the customer if the customer is a sole trader or to the customer's accounts department if the customer is a company. If payment is still not forthcoming then sterner reminders and telephone calls will be required.

Personal visits In some companies the sales staff may be responsible for regularly collecting payment when they call to take fresh orders. In other cases where a visit is not part of a sales routine then a special personal visit to the customer by a member of the sales or accounts staff is usually productive.

Collection agencies If the company's internal attempts to obtain payment prove unsuccessful then the account may be passed over to a collection agency, although this tends to be a high cost method in terms of the fees normally charged by such agencies. In some companies the entire credit collection process has been outsourced to collection agencies.

Legal action This is usually taken as a last resort to recover outstanding debts when all other efforts have failed. Sometimes a solicitor's letter which threatens legal action and sets out the consequences of nonpayment is sufficient to secure payment.

In other circumstances, depending on the size and type of the debt and assuming the customer has the assets available to pay the whole debt or a substantial proportion of it, legal action may be initiated in either the county court or the high court.

Court action is expensive and there is no guarantee of recovering the debt. Moreover, legal action runs the risk of forcing the customer into bankruptcy or liquidation with the

result that the possibility of any future business will be lost.

The **costs of collection** also have to be borne in mind. The amount of the debt and the possibility of recovery have to weighed against the costs of pursuing recovery through the courts. In some instances it may be a case of 'throwing good money after bad'.

Credit management reports

Clearly having up-to-date information on customers' payment positions is vital for effective credit management. An **aged debtors report** is probably the most traditional type of credit control report. It is a report which is produced as a standard feature of most sales ledger computer software packages. As the name suggests, an aged debtors report will show the total amount owing by customers analysed over defined periods of time. It essentially shows how much is owed by whom and for how long the debt is outstanding, as shown in Table 18.4.

Table 18.4 Aged debtors summary report

	ABC Ltd: aged debtors summary report as at...				
	Period outstanding				
	<30 days	*31–60 days*	*61–90 days*	*>90 days*	*Total*
Amount due (£000s)	£450	£200	£80	£25	£755
Total value (%)	60	26	11	3	100
Number of accounts	389	137	42	11	579
%	67	24	7	2	100

Table 18.4 illustrates a summary level aged debtors report. This will be supported by more detailed listings showing the analysis of balances on individual debtor accounts enabling the credit manager to instigate appropriate action. The more advanced computerised credit management systems as operated by major companies will produce more sophisticated management reports and information.

Credit insurance

It is possible for companies to insure against the risk of financial loss due to bad debts. This is particularly valuable where individual debtor accounts are large, although credit insurers tend to be selective in the accounts they will accept for insurance.

Credit insurance can be obtained through credit insurance companies such as Trade Indemnity, the leading UK credit insurance company. These companies will also provide specialist advice, particularly for companies seeking short-term credit insurance arrangements for exports. Short-term export credit insurance is also available from NCM Credit Insurance Limited. Longer-term credit insurance for exports can be arranged through the government's Export Credit Guarantee Department (ECGD).

The perennial late payment problem

In the UK and Ireland the problem of late payment (particularly for small businesses which tend to be at the mercy of their large customers) is a perennial and sizeable one.

For small and medium-sized enterprises (SMEs) in the UK the most common terms of trade are 30 days, but the actual average payment period is around 50 days.

In 1992 the Confederation of British Industry (CBI) introduced a prompt payment code and despite having approximately seven hundred signatories the problem of late payment persists. As a consequence of continuing pressure, especially from the small business community, the UK government in 1996 introduced a requirement for UK companies to publish their supplier payment policies and performance in their annual reports.

A British Standard for late payers, BS7890, was also introduced in 1996. The standard is voluntary, but companies which sign up to it can be fined up to £5,000 if they fail to comply with its terms.

At the time of writing the late payment problem still continues. However, the UK government has introduced the 'Late Payment of Commercial Debts Act', which became law on 1 November 1998, and gives creditors (in the first instance it only applies to small businesses) a statutory right to charge interest on overdue accounts. This is a right which is allowed in most other EU countries, although it apparently operates with varying degrees of effectiveness. In the UK interest is chargeable at base rate plus 8 per cent.

Evaluating changes in credit policy

We have previously mentioned that in considering changes in any aspect of credit policy, such as credit standards, credit period or discount terms, the financial manager has to evaluate the incremental or differential effects on the company's profitability and cash flows. Changes to any aspect of credit policy should only be implemented if they increase the company's cash flows and add to shareholder value.

Evaluation of credit management

Credit management is a necessary but expensive business function and therefore should be evaluated on a cost-benefit basis. The credit management function should justify itself to the business in terms of providing a value for money service.

It is fashionable today to outsource the credit management function, or at least some major elements of it such as debt collection. However, this has to be weighed against any negative impact outsourcing may have on customer relations. Credit management costs can be reduced through operating standardised, computerised systems and procedures and through information sharing.

The level of bad debts and the timeframe within which customers pay are two indicators which could be used to assess the performance of the credit management department. Clearly if the level of bad debts is disproportionately high and if there is a significant discrepancy between the policy credit period and the average credit period actually taken by customers, this would tend to indicate weak credit management and warrant remedial action.

Factoring and invoice discounting

Factoring and invoice discounting are two alternative methods of financing debtors

offered by subsidiaries of the major banks and other specialist finance companies. Both methods can improve a company's cash flow by freeing cash normally tied up in debtors.

Under either arrangement a company will normally receive, from the finance company or factor (a factor is an agent or middleman), a prepayment of 70 to 85 per cent of the invoiced amount within one or two working days of the sale. The balance of 30 to 15 per cent, less commissions, is recovered by the company when the customer pays.

The main advantage of either arrangement is readily apparent. Instead of having to wait 30 days or more the company receives the bulk of its cash within a few working days: cash flow is immediately improved. However, the service comes at a price, financing charges, commissions and fees can be expensive.

The essential distinction between the two methods is the extent to which the external party becomes involved in the management of the company's sales ledger. Under a factoring arrangement the management of the company's entire sales ledger function will be 'outsourced' to a factor. The factor will typically be responsible for managing the sales ledger, providing credit insurance and collecting payment from the customer.

With invoice discounting the company manages its own sales ledger and payment collection procedures. The company sends copies of the invoices to the discounter and receives the prepayment within a few days. A factor's involvement is therefore visible to customers and this may have a negative impact on customer relations: invoice discounting in contrast can be provided confidentially.

Factoring and invoice discounting is available in two forms technically referred to as *recourse* and ***non-recourse.*** With non-recourse factoring and discounting bad debt cover is provided, thus even if the customer is unable to pay, the company will still receive payment from the factor or invoice discounter.

Factoring is usually suitable for businesses with an annual turnover exceeding £10,000. Invoice discounting is normally only suitable for businesses with an annual turnover of £1 million or more.

We shall return to an evaluation of factoring and invoice discounting when we examine alternative sources of short- and medium-term finance in the next chapter. In the meantime we will progress to review the management of the most vital current asset, namely cash.

THE MANAGEMENT OF CASH

LOADS OF MONEY

By 1997, after a six-year period of continuous economic growth, the three major motor manufacturers in the US, General Motors (GM), Ford, and Chrysler, had accumulated enormous stocks of cash. General Motors (GM) had cash reserves of nearly $12bn (£7.5bn), Ford had around $9bn, and Chrysler almost $6bn.

The directors of the companies argued that such substantial

amounts of cash were needed to sustain investment and development programmes in the event of a future economic downturn.

The question is whether hoarding cash like this is good for shareholder value. Chrysler seemed to be the only one of the three able to consistently earn a rate of return higher than its 11–12 per cent cost of capital. For 1996 the rate of return on capital earned by both Ford and GM was around 7 per cent. When returns from investing in operations are evidently so low, investing even more cash would only depress overall returns even further.

Market analysts have contended that the real answer to improving returns lies in a radical business rethink by management and a restructuring of the operations of all three companies. This would essentially mean a restructuring of the US operations for GM, and of the European and Latin American activities for Ford.

With such substantial reserves of cash, managers are less pressed to take the tough decisions which many observers maintain are required to improve performance. Managers may prefer to follow the low risk course and invest only in those projects which they consider as relatively low risk (in case higher risk ventures fail and they lose their jobs). As long as they continue with these policies, their cash mountains will continue to grow.

We have previously described cash flow as the lifeblood of a business, as without a healthy cash flow a business will soon cease to function. In this section we will study the management of the firm's most liquid and least risky asset—cash, the effective management of which is vital in maintaining corporate liquidity and value. The management of cash lies at the heart of liquidity management and is consequently an integral and vital part of the financial manager's or corporate treasurer's role.

Cash is taken to include cash in hand, plus current and demand deposit bank account balances. In addition, a firm may have surplus cash invested in marketable securities, which are easily liquidated, short-term maturity investments on which interest is earned. As we noted in the previous chapter, cash plus marketable securities collectively represent a firm's liquid assets.

Similar to the management of other current assets (stocks and debtors), the two key tasks for the financial manager are to attain the optimal *balance* and *rate of turnover* of cash which maximises the market value of the firm. The cash balance should be sufficient to satisfy the firm's operational needs and avoid the risk of financial distress or illiquidity. On the other hand, it should not be so excessive that it depresses returns, as investing in cash is likely to yield lower returns than investing in fixed assets.

Motives for holding cash

We can see in Table 18.5 the variations in cash and short-term investment balances held by our sample of companies. All of the companies shown hold some proportion of their

total assets in the form of cash and near-cash items. Why do their cash balances vary?

Why, for example, does a company like Jefferson Smurfit, reportedly the leading paper-based packaging group in the world, hold such substantial cash and marketable security balances? Balances which on average account for 23 to 24 per cent of the company's total assets. Of the IR£894m shown as cash and investments, IR£727m (81%) was held in the form of cash at bank and in hand, and IR£167m (19%) was held in the form of investments. Compare this policy with that of BP, Cadbury Schweppes, Guinness (a subsidiary of Diageo plc) and Pizza Express, which have less than 5 per cent of their total assets in the form of cash.

Table 18.5 Current asset composition

Company Industry	British Petrlm. Oil		Cadb. Schw. Fd pr.		Guinness Alc. bev.		Jeff'sn Smur. Pack		Pizza Expr. Rest		United Bisc. Fd pr.	
	£m	%	£m	%	£m	%	IR£m	%	£m	%	£m	%
Fixed assets	21,820	67	3,014	67	4,226	54	2,056	53	23	77	1,283	62
Current assets												
Stocks	3,009	9	436	10	1,867	24	287	7	3	10	210	10
Debtors	7,590	23	891	20	1,393	18	666	17	3	10	423	21
Cash and investments	153	1	166	3	327	4	895	23	1	3	139	7
	10,752	100	1,493	100	3,587	100	1,848	100	7	100	772	100
Current liabilities	10,617		1,902		2,572		1,058		14		861	
Working capital	135		−409		1,015		790		−7		−89	

Source: Annual Accounts.

Notes: British Petroleum: oil. Cadbury Schweppes: food producer. Guinness (a subsidiary of Diageoplc): alcoholic beverages. Jefferson Smurfit: packing & paper. Pizza Express: restaurants. United Biscuits: food producer.

Similar to stocks and debtors, the volume of cash and marketable securities held by companies will be influenced by many variables such as growth rates, competitive conditions (domestic and international), and the firm's overall working capital policy, whether it is aggressive, conservative or moderate. The level of investment in the other, less liquid, working capital components, such as stocks and debtors, will have a direct impact on the actual cash balances held. The higher are stock and debtor levels, the greater will be the strain on the cash balance.

While individual circumstances and policies may differ, companies generally have three main motives for holding some proportion of their assets in the form of cash and near-cash items. These motives can typically be categorised as **transactions, precautionary** and **speculative.**

Transactions motive

The primary motive for holding cash is to allow the firm to complete its normal day-to-day business trading transactions. Such transactions will involve both payments and receipts of cash and as the two are unlikely to continually match, a certain minimum level of cash is required on hand to cover day-to-day planned operational requirements. Examples include paying creditors and other operating expenses such as salaries and wages, transport, taxes and dividends.

Cash to satisfy the transactions or trading motive will usually be held in the form of cash on hand and current bank accounts.

Precautionary motive

In addition to the transactions or trading motive, a firm will probably hold cash to cover unexpected and emergency circumstances, such as emergency repairs and maintenance, industrial stoppages and strikes, and changes in the general economy.

The precautionary motive is analogous to holding *safety stock* levels in the management of stocks and in fact is often referred to as the safety motive. Cash to satisfy the precautionary or safety motive will usually be held in the form of easily realisable liquid assets, alternatively, the firm may have ready access to short-term borrowing facilities.

Speculative motive

Cash is often held for speculative or strategic motives, that is, to take advantage of unplanned or speculative wealth enhancing business opportunities which may arise in the future. Examples include the speculative buying of raw materials or foreign currencies in anticipation of price or rate increases.

Alternatively a company may hoard cash for strategic reasons such as the acquisition of another company, or in the case of US motor manufacturers—referred to in the 'Loads of Money' vignette—which tend to hoard huge cash reserves in order to weather future economic recessions. Cash held for speculative or strategic reasons is likely to be held in the form of marketable securities and other easily liquidated short-term investments.

Some companies such as Tomkins Plc, a UK industrial conglomerate, perceive cash as a *'strategic asset'*. Tomkins has consistently held substantial cash, at one point in excess of £394m, as a strategic asset, despite pressures from the financial markets to return the cash to its shareholders.

In 1997 Tomkins acquired Stant Corporation, a US car components manufacturer, for $606m (£372m). Tomkins' board believed that the availability of ready cash had been crucial in securing the deal. In the words of G.Hutchings, Tomkins' executive chairman: 'We were able to move quickly and they [the key shareholders] could see the cash in our bank.' Even after completion of the Stant acquisition Tomkins had liquid assets of approximately £500m and was adamant that the company would retain them for future *strategic purposes.*

Sources and uses of cash

We will examine the sources of short- and medium-term finance in the next chapter, but for now we will briefly summarise the effects on a firm's cash position of a range of business activities. Some of the firm's activities will act as a source of cash, others will absorb cash.

Sources of cash

The following activities will act as a source of cash:

Long-term sources

- increasing equity—perhaps through a rights issue;
- increasing debt—perhaps through raising a long-term loan or debenture.

Short-term sources

- reducing current assets (stock or debtors)—perhaps through a stock clearance sale or reducing the credit period allowed to customers;
- reducing fixed assets—selling surplus land or buildings;
- increasing current liabilities—taking longer to pay trade creditors or increasing short-term borrowings.

Uses of cash

The following activities will absorb or use cash:

- reducing equity—for example through a share repurchase or share buyback scheme;
- reducing debt—for example repaying loans (short- or long-term);
- increasing current assets (stock or debtors)—purchasing additional stocks or increasing the credit period allowed to customers;
- increasing fixed assets—purchasing additional buildings or equipment.

You will no doubt have recognised the similarities in the two lists of activities, one is the opposite side of the coin from the other. For example increasing assets will absorb cash and reducing assets will provide cash.

We will now proceed to briefly review the short-term investment options open to a company in situations where sources of cash exceed uses, and conversely review the short-term financing options available when uses exceed sources.

The process of planning for short-term investments and financing will be greatly facilitated through the preparation of a cash budget, which was discussed in Chapter 16.

Short-term investment opportunities

In cases where a company is in the fortunate position of generating cash surpluses, then, after allowing for an appropriate 'safety margin', excess cash can be invested on a short-

term basis. In the current context short-term usually means for a period of up to one year ahead. Short-term investment opportunities were briefly reviewed in Chapter 16 and would typically include: *short-term interest-earning deposits, marketable securities,* and possibly *payments in advance.*

Short-term investment criteria

Short-term investment criteria were similarly reviewed in Chapter 16. Recall that short-term investment decisions would be guided by the context of the projected or forecast cash surpluses and by the investment criteria of: *liquidity, maturity, risk and return, cost,* and *taxation.*

Short-term financing

Sources of short-term financing were also briefly reviewed in Chapter 16 and include trade credit and bank overdrafts and short-term loans, which may be secured or unsecured. Sources of short- and medium-term business finance are explored more fully in the next chapter.

Determining cash requirements

Having reviewed the motives commonly advanced for holding cash, how does the financial manager or treasurer determine the optimal volume of cash for an individual company to hold? The optimal cash volume, from the financial manager's point of view, is the one which balances risk with return and is consistent with the overall goal of maximising shareholder value.

Determining the optimal cash requirement will inevitably have a subjective as well as a more scientific, quantitative dimension. Cash flows are generally more erratic and less predictable than stock and debtor flows, and therefore are more difficult to model.

While quantitative cash management models have been developed to assist the financial manager or corporate treasurer, these will have to be supplemented by experience, judgement, and a professional 'feel' for what is the most appropriate balance at any point in time.

Cash turnover ratio

This ratio is used to indicate how efficiently a business is using its current asset of cash. It is measured similar to stock turnover.

$$\frac{\text{Sales for period}}{\text{Average cash balance*}} = \text{times}$$

*(Opening cash+closing cash balance)/2.

As in the case of stock turnover, a high cash turnover ratio *usually* suggests an efficient use of the firm's current asset of cash. However, too low a cash balance may increase the

risk of financial distress or illiquidity.

A target cash turnover ratio, based on an assessment of the company's financial plan, should be determined.

Cash management models

In this section we will look at a popular quantitative cash management model which will assist in determining optimal cash needs, the **Baumol model.** Appendix I presents a more sophisticated model—the Miller-Orr cash management model.

The Baumol model

The Baumol model, developed by William Baumol in 1952, is similar to the Economic Order Quantity (EOQ) model we studied in relation to stock management. The Baumol model treats cash held for *transactional* purposes as an inventory or stock item. The firm's 'stock' of marketable securities is not included, it will be drawn on to top up transactional cash balances when required. Alternatively, it will be used as a repository for surplus transactional cash balances.

A diagram of the Baumol model is presented in Figure 18.1. You will appreciate the similarity to the basic EOQ model for stock. It assumes an initial stock of cash is drawn on at a constant rate until it is fully consumed, at which point it is replenished immediately, and in full. The Baumol model therefore makes essentially the same assumptions as the EOQ model, that is, certainty of demand and constancy of demand.
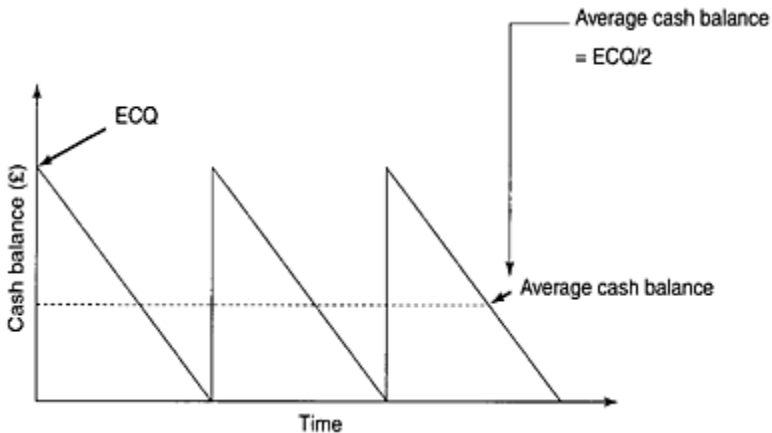
Figure 18.1 Baumol cash management model

The model thus assumes, the rather simplistic scenario, that cash flows into and out of a business at constant predictable rates. Such would be the case if, for example, all transactional cash inflows to the business, including any withdrawals from marketable securities, occurred say on the first of the month. This initial 'stock' of cash is then consumed at a constant daily rate during the month only to be replenished in full and immediately on the first of the next month. This is the scenario illustrated in Figure 18.1.

The model can also be defined in the following mathematical terms:

$$\text{ECQ} = \sqrt{\frac{2 \times U \times C}{R}}$$

where,

ECQ = optimal cash conversion or ordering quantity
U   = usage or demand over the planning period
C   = conversion cost of marketable securities
R   = opportunity cost of holding cash

Some of these terms require further explanation.
ECQ This is the most economic amount of cash to convert or 'order' from the firm's repository of marketable securities to replenish the cash balance when it reaches zero. Like the EOQ for stock, it is the value which minimises the total cost (TC) of controlling cash. Total cost in this case is the sum of *total conversion costs* plus *total opportunity costs,* thus:

Total cost (TC)=conversion costs+opportunity costs

Conversion cost This is analogous to the ordering cost for the EOQ model; it is the cost of converting marketable securities into cash. It includes all the administration costs of ordering, receiving and recording a marketable securities transfer. The model assumes *a fixed cost per conversion* irrespective of the sum of money involved. Total conversion costs equals cost per conversion multiplied by the number of conversions.

Opportunity cost When funds are withdrawn from marketable securities and converted into cash, the opportunity cost is the rate of return forgone on those interest-earning funds. Alternatively it is the interest cost of borrowing short-term funds to provide a cash balance. Total opportunity costs, expressed in £s, equals the opportunity cost (interest rate in decimal form) multiplied by the *average cash balance.* The average cash balance equals the ECQ divided by two.

How the model actually works is illustrated in Example 3.

Example 3* —*The Baumol cash model
Quantum Industries, a chemical manufacturing company, estimates its total cash requirement for the coming financial year at £5m. The treasurer estimates the cost of converting marketable securities into cash at £50 and the average annual rate of return on marketable securities is currently 7 per cent.
The treasurer wishes to determine: (1) the optimum amount of cash

to convert each time the cash balance reduces to zero, that is the economic conversion quantity ECQ, (2) the number of conversions required each year, (3) the average cash balance, and (4) the total cost.

Applying the ECQ equation yields:

$$ECQ = \sqrt{\frac{2 \times £5,000,000 \times £50}{0.07}}$$
$$= £84,515 \text{ (rounded)}$$

1 Thus the optimal quantity of cash to withdraw from marketable securities each time the cash balance reduces to zero is £84,515.
2 The number of conversion transactions each year equals £5,000,000/£84,515=59.2, or just over one per week.
3 The average cash balance equals ECQ/2=£84,515/2=£42,258 (rounded).
4 Total cost=(£50×59)+(£42,258×0.07)=£5,908 (rounded).

EXERCISE 2 —BAUMOL CASH MODEL

The financial manager of NewPort Transport, a transport and freight company, estimates that its total cash demand for the coming year will be £3.5m. The conversion cost is estimated at £25 per transaction and the interest rate on short-term investments is 9 per cent.

You are required to calculate the following:

(1) the optimal quantity of cash to withdraw from marketable securities each time the cash balances reduce to zero, that is, the ECQ;
(2) the number of conversion transactions each year;
(3) the average cash balance; and
(4) the total cost.

Short-term investing and borrowing

As an alternative to selling marketable securities to top up operating cash balances, a company can borrow cash short term in the form of a bank overdraft facility. This is a more flexible and cheaper form of short-term financing than fixed, short-term loans, but is likely to be a more expensive option than selling short-term securities, because of bank charges and higher interest costs on the overdraft.

Many firms, particularly small and medium-sized firms, will simply not have sufficient liquid funds to be able to operate short-term investments and will therefore be dependent

on banking arrangements to cover short-term borrowings.

In contrast, for large corporations (such as the US motor car manufacturers referred to earlier) which hold substantial volumes of short-term investments, and are able to deal readily in marketable securities, converting idle cash into an interest-earning marketable security will usually cost less than the interest which can be earned from investing in the security.

Compensating balances

Businesses may have arrangements, formal or informal, with their banks to maintain minimum balances in some accounts, in return for certain banking services. For example, the bank may agree to no charges or fees on operating current accounts, providing a business agrees to maintain certain minimum credit balances. These minimum balances are known as **compensating balances,** and they are held in the form of a compensating payment to the bank for services provided.

The advantage to the bank is the interest it can earn from investing the compensating balances given their relative certainty. The advantage to the company should be lower bank charges and fees.

The cash cycle

The management of cash flow is a very dynamic process. Cash will continually circulate through the business in the form of a cash cycle. There will be, for example, cash flowing out to pay for goods, services and expenses and cash flowing in from sales to customers.

The concept of the **cash cycle** (or the *cash conversion cycle* as it is also sometimes known) was introduced in the context of the firm's operating cycle in the previous chapter. It was defined as the operating cycle (inventory days plus debtor days) minus creditor payment days.

In other words the cash cycle represents the amount of time, usually expressed in terms of days, that cash is tied up from when the company pays for its inputs from its suppliers and in turn receives payment from its customers for the sale of the same inputs subsequently converted into finished product. Here we will examine the operation of the cash cycle in more depth.

CASH CYCLE

(Average inventory days+Average debtor days)−Average creditor days

We will illustrate the cash cycle with reference to a manufacturing concern, as it is typically a much more extended cycle in manufacturing than in retailing or service industries. Consequently we will take as our logical starting point for the cash cycle the delivery of raw materials and other essential inputs from suppliers.

Raw materials will normally be supplied on credit, which is a form of spontaneous financing that will reduce total working capital financing. The raw materials will be used in the firm's manufacturing operations to create finished goods for sale to the firm's

customers. Additional cash payments for salaries, wages and other expenses will occur during the manufacturing process. Finished product will be sold to customers, who in turn will probably receive a period of credit to pay what they owe. Finally payment will be collected from customers. The cash cycle for a manufacturing company is illustrated in Figure 18.2. The application of the cash cycle is illustrated in Example 4.
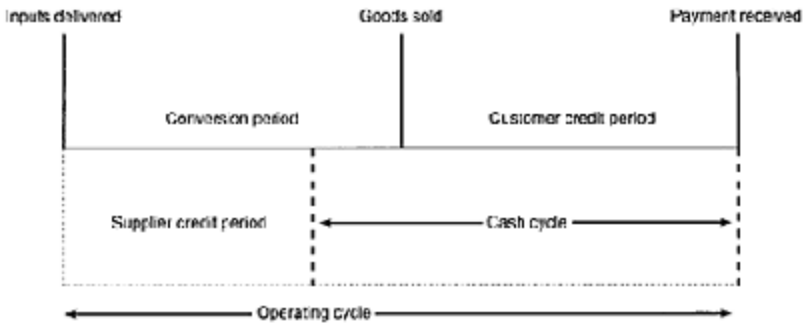
Figure 18.2 The cash cycle for a manufacturing company

Example 4 —The cash cycle

We will calculate the cash cycle for Bio-Tech Enterprises, for which we have already completed a detailed financial analysis in Chapter 9. To determine the cash cycle we need the three relevant ratios, *average inventory days, average debtor days* and *average creditor days.* The key ratios for 19×8 for Bio-Tech which we have previously calculated are reproduced below, figures are in £000s:

1 **Average inventory days**

$$\frac{\text{Average stock}}{\text{Cost of sales}} \times 365 = \frac{£205}{£1,206} \times 365 = 62 \text{ days}$$

2 **Average debtor days**

$$\frac{\text{Debtors}}{\text{Credit sales}} \times 365 = \frac{£290}{£2,320} \times 365 = 46 \text{ days}$$

3 **Average creditor days**

$$\frac{\text{Creditors}}{\text{Purchases}} \times 365 = \frac{£247}{£1,206^a} \times 365 = 75 \text{ days}$$

a Cost of sales has been used as a proxy as a purchases figure is not available for 19×8.

The cash cycle for Bio-Tech is then calculated as follows:

	Average inventory days	=	62
Plus	Average debtor days	=	46
	Operating cycle		108
Less	Average creditor days	=	75
	Cash cycle	=	**33days**

On average, 108 days elapse between the time raw materials are delivered to Bio-Tech and when payment for the finished product manufactured from those materials is received from customers. This operating cycle of 108 days is partly financed by the spontaneous financing received from suppliers, as on average Bio-Tech takes 75 days to pay its supplier accounts.

The net financing requirement is therefore for 33 days. Bio-Tech must have sufficient funds available to bridge this financing gap otherwise it cannot continue to operate. The *approximate* amount of financing required could be computed as: (cost of goods sold/365)×33 days, thus:

$$(£1,206/365)×33=£109,036$$

The company will need access to short-term financing of approximately this amount. Bio-Tech is essentially having to finance 33 days worth of sales valued at their cost price.

EXERCISE 3 —CASH CYCLE
Calculate the cash cycle for Bio-Tech Enterprises for 19×9 and compare with the cycle for 19×8. Comment on your findings.

Controlling the cash cycle

Depending on the circumstances the cash cycle will produce either a positive or a negative cash flow. A **positive cash cycle,** where the operating cycle is greater than the creditor payment period, needs to be financed. The more extended the cash cycle, the greater the financing required and the greater the risk of the firm experiencing liquidity problems.

Conversely, a **negative cash cycle,** where the operating cycle is less than the creditor payment period, yields a positive cash flow and lessens the risk of the firm encountering any liquidity problems. In such circumstances the spontaneous financing in the form of credit from suppliers more than covers operational needs. Any surplus cash can be invested on a short-term basis or alternatively applied to other areas of the firm's business.

Efficient financial management will dictate that the cash cycle is kept as short as possible without jeopardising production operations, sales or profits. In fact a **target cash**

cycle period will probably be set.

Clearly the efficiency with which the other working capital components of stocks, debtors and creditors are managed will have a direct impact on the length of the cash cycle and the firm's need for short-term financing. The shorter the inventory days and debtor days periods and the longer the creditor payments period, the shorter will be the cash cycle.

Characteristically manufacturing firms will tend to have positive cash cycles and non-manufacturing firms negative cash cycles. In many retailing firms, for example some food and clothing firms, where sales are predominantly for cash, payment will be received from customers before payment is due to suppliers for the goods sold. This will yield a negative cash cycle.

The complete cash flow cycle

The cash cycle focuses on the firm's short-term day-to-day operating activities and how they impact on the firm's cash flow. However, the complete cash flow cycle for a firm will include cash flows associated with other non-trading activities such as investing and financing. A more complete cash flow cycle is shown in Figure 18.3.
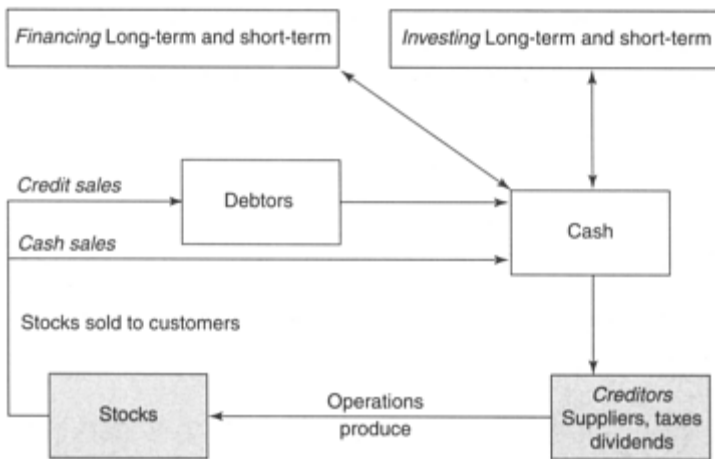
Figure 18.3 The complete cash flow cycle

Financing and investing activities both involve two-way cash flows. Investing cash outflows arise, for example, from the purchase of fixed assets and other investments (long-term and short-term). Investing cash inflows will occur when fixed assets or other investments are sold.

Financing cash inflows arise, for example, as a result of raising new loans (long-term and short-term) and equity, and financing cash outflows occur when debt service payments (principal and interest) are made.

International cash management

It is not the intention here to discuss in detail the principles and practices of international cash management, as that would require another book of similar length. Rather, the intention is simply to offer the reader an appreciation of the differences and complexities of international as compared to domestic cash management.

For large corporations, particularly multinational corporations (MNCs), which operate multiple cash and bank accounts and trade in marketable securities in many different countries and thus in many different currencies, cash management is a highly complex and specialised function. Such companies are likely to operate many hundreds of different types of bank and currency accounts worldwide, so keeping track of cash balances can be a complex affair.

The variability, that is, the risk, associated with managing international daily cash flows will also be considerably greater than with domestic cash management. There will, for example, be the added risks of dealing with different national banking and legal systems, and of incurring significant losses on exchange rate movements. In multinational companies cash management will likely fall within the responsibility of a specialised corporate treasury function, which may or may not be centralised. The advantages and disadvantages of centralised versus decentralised treasury functions were discussed in Chapter 2.

Corporate treasury departments today are highly skilled and experienced in the techniques of international cash management and will be well placed to exploit the best international interest rate opportunities for short-term investments and borrowings. Large company treasury departments have considerable expertise in operating hedging instruments and techniques, such as **forward contracts** or **currency options,** to minimise the risk of losses on foreign currency cash transactions.

A *forward contract* is a formal agreement between a buyer and a seller to buy or sell some item, such as a commodity or a currency, at a specified future date at a price agreed now. An *option* in contrast is an agreement between a buyer and a seller that offers the buyer the right, but not the obligation, to buy or sell some item, such as a commodity or a currency, at a specified future date at a price agreed now.

With a forward contract both parties are obliged to complete the agreement: with an option the parties have the right to cancel or 'opt out' of the agreement if circumstances move against them.

Multinational companies are also likely to use **netting and matching** arrangements. Where companies within a multinational group trade with each other incurring mutual debts, netting of the debts can be used to reduce cross-border cash flows. With an intra-company netting arrangement only the net amount of the debt between the companies need be paid. In fact it may happen that no cash changes hands and the transactions are simply treated as bookkeeping entries.

Matching can be used to minimise foreign currency transactions and risk exposures between member companies in a group and also with third parties. In a matching arrangement efforts are made to match as closely as possible expected payments in one currency with expected receipts in the same currency. In international cash management

both netting and matching help to reduce currency flows, the risks of exposure to exchange rate movements and the costs of international financial transactions.

On the upside there are greater opportunities open to the treasurer in a multinational company for securing lower cost financing arrangements and to earn higher rates of return on short-term investments.

RECAP

Debtor management: Debtors typically comprise a sizeable proportion of a firm's investment in total assets. It is essential to the firm's liquidity that this investment is effectively controlled.

Credit management: When a company grants credit to its customers it incurs the risk of non-payment. Credit management, or more precisely **credit risk management,** refers to the systems, procedures and controls which a company has in place to minimise the risk of non-payment.

Credit policy: Credit policy refers to the company's systems and procedures in relation to: **credit selection, credit standards, credit terms** and **collection policy.** Credit policy needs to be operated in a balanced way. If it is operated too tightly, sales and profits will be lost. If it is operated too leniently, then the risk of non-payment and bad debts increases. Changes in credit policy should be evaluated using the NPV technique.

Cash management: Cash is the essence of liquidity management. It is of paramount importance that the firm has sufficient cash available to be able to satisfy its financial obligations as and when they arise. Insufficient cash risks financial distress and corporate failure.

Cash management models: In this section we examined the Baumol model which is a quantitative cash management model that can assist in determining optimal cash needs.

The Baumol model treats cash held for *transactional* purposes as an inventory or stock item and can be expressed in the following mathematical terms:

$$ECQ = \sqrt{\frac{2 \times U \times C}{R}}$$

The ECQ is the value which minimises total cash management costs (TC), which is the sum of *total conversion costs* plus *total opportunity costs.*

Cash cycle: The cash cycle represents the amount of time, in days, that cash is tied up from when the company pays for its inputs from its suppliers and in turn receives payment from its customers for the sale of the same inputs converted into finished product.

Cash Cycle=(Average inventory days+Average debtor days)−Average creditor days

The cash cycle should be kept as short as possible without jeopardising production operations, sales or profits. In fact a **target cash cycle period** will probably be set.

APPENDIX I THE MILLER-ORR CASH MANAGEMENT MODEL

A weakness of the Baumol cash management model is its simplistic assumptions that cash flows can be accurately predicted and flow at a constant rate. While the Baumol model can serve as a useful starting point from which to develop more realistic cash management tools, and can be modified to allow for uncertainty to some extent by incorporating a 'safety stock' of transactional cash, the model clearly will not be appropriate where uncertainty and irregularity of cash flows are the order of the day.

Compared to the Baumol model, the Miller-Orr model (developed by Merton Miller and Daniel Orr in 1966) is a more sophisticated and realistic approach to cash management. It allows for random and unpredictable changes in daily cash balances, and thus overcomes the constancy and certainty of demand limitations of the Baumol model.

Based on control theory, the Miller-Orr model sets upper and lower control limits, within which the daily cash balance is allowed to fluctuate, as depicted in Figure 18.4. If, or when, the daily cash balance reaches the upper control limit, such as point A on the line UL in Figure 18.4, the treasurer or financial manager will convert cash into marketable securities in the amount (UL−TL).

The purchase of marketable securities will restore the cash balance to its target level, represented by the line TL in Figure 18.4. This target level is also frequently referred to as **the return point.**

Conversely if the daily cash balance dips to the lower control limit, such as point B on the line LL in Figure 18.4, marketable securities, in the amount (TL−LL), will be sold and converted into cash to restore the cash balance to its target level, TL.

In this illustration the lower control limit, the line LL, represents a safety stock of cash to cover emergencies and unexpected events.

Miller-Orr derived the target or optimal cash balance level mathematically in terms of a cube-root formula as follows:

$$TL = \sqrt[3]{\frac{3C\sigma^2}{4R}} + LL$$

where,

TL = target (optimal) daily cash balance
C = conversion cost of marketable securities
σ^2 = variance of daily net cash flows
LL = lower cash control limit
R = opportunity cost of holding cash (in decimal format)

To derive the target daily cash level the financial manager will clearly need to determine

the variance, σ^2, of the daily net cash flow distribution. Remember that the variance is a measure of risk, in this case it is a measure of the variability of daily net cash flows. The financial manager can determine the variance from an analysis of past data.

The upper control limit, UL, as computed by Miller-Orr, is as follows:

$$UL = 3* \sqrt[3]{\frac{3C\sigma^2}{4R}} + LL$$

Figure 18.4 Miller-Orr cash management model
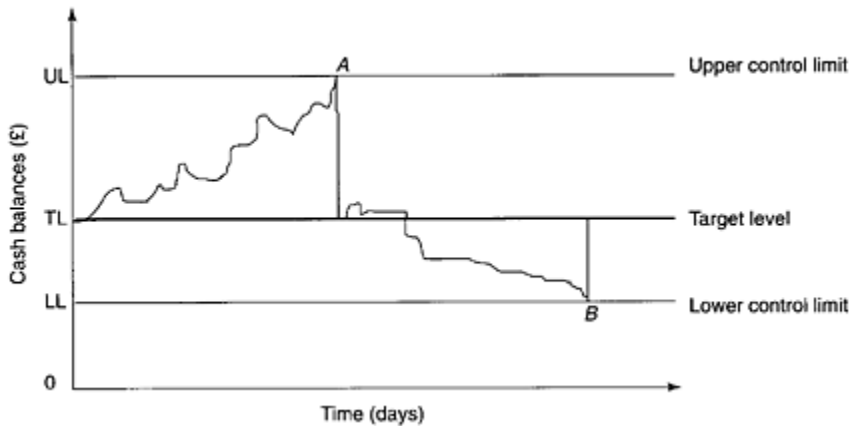
Which is expressed more simply as:

UL=3TL−2LL

Observe the connection between TL and UL, the target cash level or return point is one-third of the way between the upper limit UL and the lower limit, LL. The difference between the upper (UL) and lower (LL) cash balance limits is also known as **the spread,** which can be calculated as:

$$Spread = UL - LL = 3* \sqrt[3]{3/4[(C\sigma^2)/R]}$$

Thus the return point can be calculated as the lower limit (LL) plus one third of the spread.

The lower cash balance limit, LL, will be set more pragmatically, and it will be based on experience, judgement and management's attitude to risk.

Miller-Orr also computed the *average cash balance (ACB)* as follows:

$$ACB = \frac{4TL - LL}{3}$$

We will now use an example to illustrate how the model works.

Example 5 —The Miller-Orr cash model

The treasurer of Quantum Industries on reviewing past cash flow patterns has estimated the standard deviation, σ, of the company's cash flows to be £800. The cost of converting marketable securities into cash is £50 and the average annual rate of return on marketable securities is currently 7 per cent, or 0.00019 per cent (0.07/365) on a daily basis. Management policy is to maintain a safety margin of cash of £10,000.

The treasurer wishes to determine: (1) the target level cash balance, (2) the upper control limit, and (3) the average cash balance.

(1) The target level (TL) cash balance

Substituting into the Miller-Orr equation yields:

$$TL = \sqrt[3]{\frac{3 \times £50 \times £800^2}{4 \times 0.00019}} + £10,000$$

$$= \sqrt[3]{\frac{96,000,000}{0.00076}} + £10,000$$

$$\approx £5,017 + £10,000$$

$$\approx £15,017$$

Thus the optimal or target cash balance is approximately £15,017.

On calculators without a special $\sqrt[3]{}$ key, the cube root can be found by using the y^x key and 0.3333 as the relevant power or index, derived from $\sqrt[3]{x} = x^{1/3}$.

(2) The upper control limit (UL)

$$UL = 3TL - 2LL = (3 \times £15,017) - (2 \times £10,000) = £25,051$$

Observe that the target cash balance of £15,017 is one-third of the spread between the lower limit of £10,000 and the upper limit of £25,051.

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(3) The average cash balance (ACB)

$$ACB = \frac{4TL - LL}{3} = \frac{(4 \times £15,017) - £10,000}{3}$$

$$\approx £16,689$$

The implications of the model for the treasurer of Quantum Industries are that £10,034 (£25,051 −£15,017) should be invested in short-term marketable securities when the cash balance climbs to £25,051. Conversely the treasurer should cash in £5,017 (£15,017−£10,000) worth of marketable securities when the cash balance drops to £10,000.

REVIEW QUESTIONS

Concept review questions

1 (a) State the main factors which influence a firm's investment in debtors, (b) Why is it important that a firm's investment in debtors be controlled? (c) What are the risks of investing in debtors?

2 What are the 'Five Cs' of credit? Briefly outline the key sources of credit information.

3 Describe the key features of a credit management system.

4 Define the following terms:

  (a) aged debtors report;
  (b) cash cycle;
  (c) marketable securities.

5 What are the assumptions and limitations of the Baumol cash model?

Practice questions

6 **Debtor ratios.** From the information set out below, calculate the average debtor days for Nirvana Food Products for both the current and previous years:

	Current year (£)	Previous year (£)
Trade debtors	373,247	315,960
Credit sales	4,265,684	3,791,720

Assume a 360 day year.
Based on your findings, what comments would you make to the owner of Nirvana Food Products?

7 **Cash turnover.** From the information set out below, calculate the cash turnover ratio and the average cash holding in terms of days for Harry's Bar and Restaurant for both the current and previous years:

	Current year (£)	Previous year (£)
Opening cash	24,663	36,498

Closing cash	22,124	24,663
Sales	1,832,766	1,888,300

Assume a 360 day year.

8 **Operating and cash cycles.** Given the following information calculate the operating and cash cycles for O'Malley Enterprises for the current and previous financial year:

O'Malley Enterprises
Year

	Current	Previous
(1) Inventory days	79	76
(2) Debtor days	56	46
(3) Creditor days	42	42

9 **Miller-Orr cash model.** The financial manager of NewPort Transport, a transport and freight company, has estimated the standard deviation of the company's cash flows to be £500. The marketable securities conversion cost is estimated at £25 per transaction and the annual interest rate on short-term investments is 9 per cent. The company wishes to maintain a safety cash balance of £5,000.

You are required to calculate: (1) the target level cash balance, (2) the upper control limit, and (3) the average cash balance. Advise the financial manager of the implications of the model.

Test questions

10 **Cash cycle.** Set out below are extracts from the accounts of the Petersen Clothing Company for the current and previous financial years.

	Current Year £m	Previous Year £m
Sales	124	96
Cost of sales	74	57
Purchases	78	59
Stocks	11	7
Trade debtors	15	8
Trade creditors	15	10

Stock at the beginning of the previous year was £5m.

(a) Calculate for each year to the nearest whole number:

(i) the company's operating cycle;
(ii) the company's cash cycle;
(iii) the approximate amount of net financing required to cover the cash cycle.

(b) Discuss your findings in (a) above.

(c) Suggest ways in which Petersen might be able to reduce its cash cycle.

11 **Baumol cash model.** As a newly appointed financial assistant in Balder Enterprises you have been asked to assist the financial manager determine the Baumol cash model for the company. The financial manager estimates that the company's total cash requirement for the coming year will be £5.4m. The cost of converting marketable securities to cash is £35 per transaction and the annual interest rate on short-term investments is 8 per cent.

(a) The financial manager has asked you to calculate the following:

(1) the optimal quantity of cash to withdraw from marketable securities each time the cash balances reduces to zero, that is, the ECQ;

(2) the number of conversion transactions each year;

(3) the average cash balance;

(4) the total cost.

(b) The financial manager has also asked you to recalculate total cost assuming the number of conversion transactions during the year is limited to 2 per month. Compare this recalculated figure with your previous calculation of total cost in (a) above. Comment on your findings.

12 **Cash management models.** The treasurer of a local government department is reviewing her cash management procedures. She plans to introduce the use of cash management models and has asked you to investigate their applicability to the department. The following information is available.

• The department has agreed with its bank that it will maintain a minimum daily cash balance of £15,000. Severe financial penalties will apply if this balance is not maintained.

• A forecast of daily cash movements for the next twelve months shows a standard deviation of daily cash flows of £3,000.

• The daily interest rate is at present 0.0236 per cent and this is not expected to change for the foreseeable future.

• The transaction cost for each sale or purchase is £25.

Assume you are a newly recruited accountant in the department.
Required:
Write a report to the treasurer which discusses:

(i)   the advantages and disadvantages of cash management models over more traditional methods of cash forecasting, making specific reference to their applicability to a public sector organisation such as a local authority;

(ii) how one such model, the Miller—Orr, would operate in practice, using the information given above. Your report should include calculations of the upper and lower limits for cash balances and the return point. Assume a spread of £26,820.

You do not need to calculate the spread as this is given above, but you should explain the terms used in the Miller-Orr model.

13 **Working capital policy and cash management,** (a) The treasurer of Ripley plc is contemplating a change in financial policy. At present, Ripley's balance sheet shows that fixed assets are of equal magnitude to the amount of long-term debt and equity financing. It is proposed to take advantage of a recent fall in interest rates by replacing the long-term debt capital with an overdraft. In addition, the treasurer wants to speed up debtor collection by offering early payment discounts to customers and to slow down the rate of payment to creditors.

As his assistant, you are required to write a brief memorandum to other Board members explaining the rationales of the old and new policies and pinpointing the factors to be considered in making such a switch of policy.

(b) Bramham plc, which currently has negligible cash holdings, expects to have to make a series of cash payments (P) of £ 1.5m over the forthcoming year. These will become due at a steady rate. It has two alternative ways of meeting this liability. First, it can make periodic sales from existing holdings of short-term securities. According to Bramham's financial advisers, the most likely average percentage rate of return (i) is 12 per cent over the forthcoming year, although this estimate is highly uncertain. Whenever Bramham sells securities, it incurs a transaction fee (T) of £25, and places the proceeds on short-term deposit at 5 per cent per annum interest until needed. The following formula specifies the optimal amount of cash raised (Q) for each sale of securities:

$$Q = \sqrt{\frac{2 \times P \times T}{i}}$$

The second policy involves taking a secured loan for the full £1.5m over one year at an interest rate of 14 per cent based on the initial balance of the loan. The lender also imposes a flat arrangement fee of £5,000, which could be met out of existing balances. The sum borrowed would be in a notice deposit at 9 per cent and drawn out at no cost as and when required.

Bramham's Treasurer believes that cash balances will be run down at an even rate throughout the year.

Required:

Advise Bramham as to the most beneficial cash management policy.

Note: ignore tax and time value of money in your answer.

(c) Discuss the limitations of the model of cash management used in (b).

FURTHER READING

General

See relevant chapters in:

• *Short-Term Financial Management: Text and Cases*. Hill, N.C. and Sartoris, W.L., Prentice-Hall, 1995.

Cash management

In relation to cash management the classic articles are Baumol's, and Miller and Orr's. In addition, for a rigorous discussion of cash forecasting methods see:
• 'Daily cash forecasting: alternative models and techniques.' Miller, T. and Stone, B., *Journal of Financial and Quantitative Analysis*, 1985.

International short-term financial management

Discussions of short-term financial management in an international context can be found in:
• *International Financial Management*. Madura, J., West Publishing Company, 1995, Chapters 13–15.

REFERENCES

Baumol, W.J. 'The transactions demand for cash: an inventory theoretic approach.' *Quarterly Journal of Economics*, November 1952.

Miller, M.H. and Orr, D. 'A model of the demand for money by firms'. *Quarterly Journal of Economics*, August 1966.

19
SHORT- AND MEDIUM-TERM FINANCING

This chapter reviews the main sources of short- and medium-term business finance. The following topics are covered:

   the key factors influencing the choice of finance;
   trade credit and bank borrowing;
   bills of exchange and acceptance credits;
   commercial paper;
   leasing and hire purchase;
   debtor-based financing.

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

1 explain the key factors which influence the choice of finance;
2 identify and evaluate the main sources of short-term business finance;
3 identify and evaluate the main sources of medium-term business finance.

OVERVIEW

This chapter emphasises the firm's short- and medium-term **financing decisions.** In this connection we will primarily concern ourselves with identifying and evaluating the various sources of short- and medium-term finance available to a firm. The main sources of long-term financing were reviewed in Chapters 3 and 4.

   Inevitably in trying to classify sources of finance, particularly in relation to respective maturities, problems of terminology and definitions tend to arise. We should point out at this stage that one company's or lender's definition of short- or medium-term is not necessarily the same as another. However, this definition problem is not one over which we should agonise. By far the more important considerations for a company are to determine how much money it needs and for how long, and then to seek out appropriate matching and cost-effective sources.

   Of the three broadly different types of working capital policy we have studied, the aggressive policy is the one which is most dependent on short-term finance and the conservative policy is least dependent on short-term finance. The moderate or balanced policy follows the maturity matching principle, matching the maturity of the asset with a

similar maturity of finance.

Before proceeding to evaluate the various alternative sources of short- and medium-term finance we will review a number of key factors which the financial manager will need to consider in choosing any source of finance.

THE KEY FACTORS IN CHOOSING SOURCES OF FINANCE

In determining the **optimum mix** of short- and medium-term sources of finance (that is, the mix of financing which contributes most to shareholder value) the financial manager will need to evaluate, and balance, a range of key factors including: **duration, cost, borrowing capacity, risk, flexibility, availability,** and **terms and conditions.**

Duration

In selecting appropriate financing there is the guiding principle **of maturity matching or hedging.** This is the principle followed in a balanced or moderate working capital policy where short-term finance is used to fund temporary or seasonal increases in current assets.

According to the maturity matching principle, asset and liability maturities should be matched and finance should be raised according to the maturity of the asset(s) to be purchased. For example, fixed assets, such as land and property, should be financed from long-term sources of finance (e.g. equity or mortgage debentures). For other fixed assets, such as machinery and vehicles, medium-term leasing and hire purchase finance would be appropriate. Peak, cyclical current asset requirements should be financed from short-term sources such as a bank overdraft.

Cost

The respective costs of different sources of finance will vary over time, mainly in response to changes in prevailing interest rates. In determining the cost of borrowing the financial manager needs to consider not only the *direct costs* of interest, charges and fees but also *opportunity costs.*

For example, simply deciding to extend the creditor payment period, rather than borrow from the bank, may be cheaper in terms of direct costs by avoiding bank interest and charges. However, if the practice persists, the company's credit rating and its ability to negotiate favourable deals from suppliers may suffer. In the longer term these opportunity costs may prove more expensive than the direct costs of borrowing.

The point is that the financial manager will have to weigh up both direct and opportunity costs in the selection of financing alternatives. However, the practical difficulty is that opportunity costs are notoriously difficult to quantify.

Short-term debt is attractive because it is cheaper than long-term debt. It is both cheaper to raise and cheaper to operate, for both borrower and lender. Long-term debt such as bonds and debentures is very expensive to raise due to the high issue and risk assessment costs.

Moreover, interest rates are normally lower on short-term debt than on long-term debt. This is because from the lender's point of view lending short-term is less risky than lending long-term. With long-term lending, the lender is exposed to a greater risk of default by the borrower, and the lender will also usually seek greater compensation for deferred consumption.

The term structure of interest rates

This difference between short- and long-term interest rates is explained by the **term structure of interest rates.** This essentially means that interest rates will be related to the term to maturity of the asset.

Recall from Chapter 8, where we discussed *interest rate risk* in connection with the valuation of bonds, that because shorter-term bonds have a shorter time to maturity they are exposed to less interest rate risk (variability) than longer-term bonds. Consequently, because of their greater exposure to interest rate risk, long-term bonds include a maturity premium, that is, they require a higher rate of return to compensate for the greater level of interest rate risk.

Thus long-term bonds, under normal economic and business conditions, offer a higher return, or yield, than short-term bonds and this characteristic is demonstrated in Figure 19.1 by what is known as the **yield curve.**

Figure 19.1 Normal yield curve
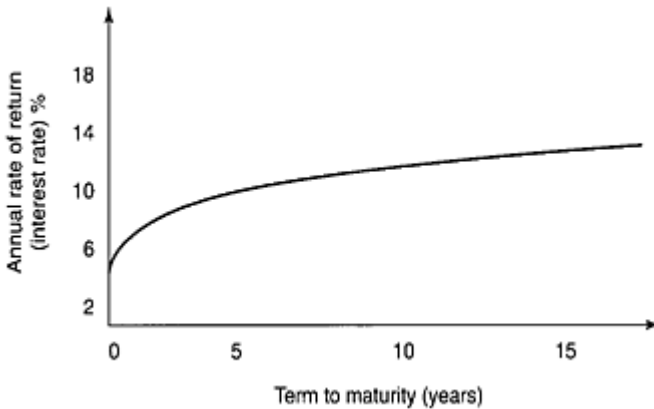
Figure 19.1 is a graph of the term structure of interest rates. It illustrates the relationship between the return or yield to maturity (y axis) on a security and its time to maturity (x axis). Under normal economic conditions the yield curve is upward sloping, indicating that yields (interest rates) on short-term securities are less than on long-term securities.

It may be noted that this is the normal shape of the yield curve, but there are occasions (e.g. during 1998) when it will take on a different shape. For example, when investors expect interest rates to fall in the future, short-term interest rates may be higher than long-term rates, resulting in a yield curve that slopes downward to the right. For some years

now the interest yield curve in the UK has been inverted, that is, sloping down to the right.

The shape of the yield curve provides the financial manager with a useful pointer as to the future direction of interest rates, as it represents the financial markets' consensus view of the future direction of interest rate movements. As inflation is a major factor in determining interest rates, the yield curve also signals the likely direction of future inflation.

Borrowing capacity

In our present context, borrowing capacity is the firm's ability to borrow additional short- and medium-term finance. Any assessment of borrowing capacity will consider the level of *existing bank borrowings* and other financing commitments (e.g. leasing and hire purchase obligations) and the availability of assets to offer as *security.*

Current debt or loan agreements may include specific conditions which limit future borrowings, and/or the loans may be secured (by either a fixed or floating charge) on the firm's assets. All of these factors might restrict the firm's ability to raise further finance.

For a limited company, borrowing limits are likely to be specified in its Articles of Association.

Risk

In analysing risk we distinguish between two types of risk, financial risk and business risk. **Financial risk,** or financial gearing, arises from the amount of debt finance in a company's capital structure, and is measured as the ratio of debt to equity finance. Stated simply, the more debt finance a company raises, the higher its gearing or financial risk. Debt increases financial risk because the obligations for interest and principal payments are fixed, they must be paid irrespective of whether a company is trading profitably or not.

B**usiness risk** is the risk inherent in the type of industry in which the firm operates, for example, catering and construction companies traditionally have high levels of business risk. These types of businesses typically have high failure rates and are highly sensitive to changes in the economic climate.

If a firm relies heavily on short-term debt it may find itself in severe financial difficulties during an economic recession—interest rates will be rising and financial institutions will be imposing tighter restrictions on lending. This was the situation experienced by many small and medium-sized businesses during the early to mid-1990s. Many firms with sizeable short-term borrowings could not meet their rising interest costs. Coupled with an economic recession, this led to record numbers of business failures.

Remember that any increase in the firm's level of risk will require a commensurate increase in return.

Flexibility

Financing requirements will change over time, and even in the short term there can be

significant changes, good and bad, in a firm's financing requirements. For example, even if a firm's fortunes should significantly improve with the result that it can repay all or a substantial proportion of short-term borrowings, it may still wish to retain access to its full borrowing facilities for precautionary and/or speculative motives. Alternatively, if business conditions deteriorate a firm may need access to increased credit facilities quickly.

A bank overdraft is perhaps the most flexible form of short-term finance as the facility need only be utilised, within the agreed limits, as and when required.

An astute combination of various sources of short- and medium-term finance will increase a firm's financial flexibility.

Availability

Firms will be limited in their access to finance by virtue of their size or industry. For example, the range of financing sources available to small firms is much more restricted than for large firms. As we shall see later, large firms may create their own sources of short-term financing—for example through issuing commercial paper—but such facilities are not available to small firms.

In addition, long-term debt such as bonds and debentures is expensive to raise and is usually beyond the means of small firms. Thus for many small firms long-term debt is simply not an option. Financial institutions are very reluctant to provide long-term debt finance to small companies due to the costs and risks involved. All of this tends to force small firms to rely more heavily on access to short-term debt.

Terms and conditions

Loan agreements invariably come with strings attached. Agreements may have stringent terms and conditions, or restrictive covenants, which the firm will need to observe. Usually, terms and conditions on short-term loans will be less stringent than on long-term loans.

KEY LEARNING POINT
In choosing an appropriate source of financing, the financial manager will need to evaluate and balance a range of key factors including: *duration, cost, borrowing capacity, risk, flexibility, availability,* and terms and *conditions.*

SHORT-TERM SOURCES OF FINANCE

There are varying definitions of 'short-term' as applied to sources of finance but for our purposes we define short-term sources are those that have to be repaid within a year.

Spontaneous and non-spontaneous sources of finance

It will be helpful to distinguish between **spontaneous** and **non-spontaneous** (or negotiated) sources of finance. Spontaneous finance such as trade credit and accruals (e.g. wages and expenses owing) arises automatically in the course of business: non-spontaneous, or negotiated, finance requires a deliberate arrangement between borrower and lender.

Spontaneous finance will fluctuate automatically in line with business activity. For example, as a firm's level of business activity increases, more goods and services will be ordered from suppliers and the level of trade credit received will commensurably increase. In addition, the firm is likely to incur higher wage, expense and tax liabilities as a result of the growth in activity.

Table 19.1 presents an analysis of short-term financing sources for Pizza Express Plc, a successful and rapidly expanding company in the restaurant and wholesale food distribution business. Table 19.1 exemplifies the types of short-term financing commonly used by companies.

Table 19.1 Short-term financing
Pizza Express: short-term financing Short-term
Creditors: amounts falling due within one year (1998: £000)

Trade creditors	3,985
Other creditors	2,151
Corporation tax	6,332
Other taxation and social security	3,349
Proposed final dividend	2,137
Accruals and deferred income	5,868
Bank loans and overdrafts	10,947
Obligations under finance leases and hire purchase contracts	41
Loan notes	5,600
	40,400

Source: Annual Report 1998.

Spontaneous sources of short-term finance

The major spontaneous sources of short-term finance are **trade credit** and **accruals.** In the case of Pizza Express (Table 19.1) spontaneous sources comprise approximately 59 per cent of the company's current liabilities. Negotiated sources, which are the bank loans, loan notes and leasing and hire purchase obligations, account for the remaining 41 per cent.

Trade creditors account for almost 10 per cent of current liabilities and accruals (payments owed in respect of expenses and taxes, etc.) account for 49 per cent. Most companies operate with trade creditors at around 20–25 per cent of current liabilities,

although it depends on the extent of short-term borrowings. In Pizza Express's case, for instance, short-term borrowings include £5.6 million in the form of loan notes dues to the Bank of Scotland. These were issued in relation to the acquisition of franchised restaurants and are redeemable at three monthly intervals.

Spontaneous sources of finance have other advantages in addition to their spontaneity. Unlike negotiated sources they (at the time of writing) have no direct costs in terms of interest and charges (although they can have significant opportunity costs as we shall see) and they do not require security.

We will now review these two main spontaneous sources of short-term finance beginning with trade credit.

Trade credit

Previously we examined trade credit from the perspective of the seller of goods and services, here we will examine it from the buyer's perspective. In this context trade credit is the credit terms granted to a company by its suppliers and as we have seen above it forms a very substantial part of a company's short-term financing. For example, just consider the effect on a fast-growing company such as Pizza Express if this source of spontaneous short-term finance had not been available.

Credit terms

Credit terms refer to the **credit period** allowed by the supplier before payment becomes due, including any **discount terms** which may be offered as an incentive for early settlement. Credit terms are frequently standard throughout an industry or trade.

For example, credit terms in the confectionery trade are frequently quoted as '2/10 net 30' which we know means that the buyer can deduct a 2 per cent cash discount from the bill if payment is made within 10 days, otherwise the full amount should be paid within 30 days. These terms will normally be stated on the supplier's invoice.

If no discount is offered by a supplier, for example credit terms are 'net 30', the company simply waits until the 30 days are up and then pays the account. If discount is offered, then a decision has to be made to either 'take it or leave it'.

Taking cash discount

For example, if the credit terms are '2/10 net 30' this means that if the company is to take the discount it will pay £98 on (or even before) the tenth day from date of delivery for every £100 worth of goods purchased. Thus on a invoice for £1,000 worth of goods delivered on the 24 June, the company will pay £980 on (or before) 4 July, receiving a discount of £20.

Forgoing cash discount

Should a company, for whatever reason, decide to forgo cash discount this is a very costly way of borrowing short-term finance. The effect of forgoing cash discount is illustrated in Example 1.

Example 1 —*Cost of forgoing cash discount*

Quantum Industries has just received £10,000 worth of goods from a supplier and is offered a 2.5 per cent cash discount for payment within 10 days otherwise payment of the full amount in 30 days. The approximate annual cost of forgoing the discount would be determined as follows:

$$\frac{£250}{£9,750} \times \frac{365}{20}$$
$$\approx 47\%$$

Alternatively applying our formula:

$$\frac{D}{1-D} \times \left[\frac{365}{(CP-DP)} \right]$$

where,

D   = discount offered (in decimal format)
CP = credit period (days)
DP = discount period (days)

$$= \frac{0.025}{1-0.025} \times \frac{365}{30-10}$$

$$= \frac{0.025}{0.975} \times \frac{365}{20}$$

$$= 0.0256 \quad \times \quad 18.25$$

$$= 46.8\%$$

To forgo this cash discount would clearly be a very expensive way of borrowing money.

Recall that the company would be in effect be paying £250 to borrow £9,750 for 20 days, as the extended period of credit is only 20 days (30−10) and there are 18.25 (365/20) 20-day periods in a year.

Remember that an even more accurate determination of the cost of forgoing the discount is to calculate the ***effective annual interest rate (EAIR),*** which is the true rate of interest per year. It takes into account the nominal interest rate, r, and the frequency of compounding, m.

$$EAIR=(1+r/m)^m-1$$

Applying it to Example 1 above:

$$\text{EAIR}=(1+0.0256)^{18.25}-1$$
$$=0.586$$
$$=58.6\%$$

You will notice that the effective annual interest rate is significantly higher than the rate calculated in Example 1, this is because the EAIR is based on compound rather than simple interest.

Both figures represent a high opportunity cost to the company if discount is not taken. From the company's point of view taking cash discount is evidently worthwhile. Not to take it implies paying interest at the rate of the annualised cost of the discount. For any company, forgoing discount is a very expensive way of borrowing short-term funds, as the cost of borrowing from a bank is unlikely to be as high as 47 or 59 per cent per year.

What would be the effect if Quantum Industries decided to forgo the cash discount and extend the period of credit taken to 60 days?

Example 2 —Effect of extending credit period

Quantum Industries has decided to forgo the cash discount offered and to extend its payment period to 60 days. We can calculate the effect of this as follows:

$$\frac{£250}{£9,750} \times \frac{365}{50}$$
$$\approx 19\%$$

Alternatively applying our previous formula:

$$= \frac{0.025}{1-0.025} \times \frac{365}{60-10}$$

$$= \frac{0.025}{0.975} \times \frac{365}{50}$$

$$= 0.0256 \times 7.3$$

$$= 18.7\%$$

If Quantum Industries is able to stretch the payment period to 60 days, then the annualised cost of borrowing drops dramatically. The company would now be paying £250 to borrow £9,750 for 50 days, as the extended period of credit is only 50 days (60–10) and there are 7.3 (365/50) 50-day periods in a year.

The key issue is the effect this would have on supplier relations!

EXERCISE 1 —FORGOING CASH DISCOUNT

   Calculate the cost of forgoing the following discount terms '3/10 net 40' by using the formula in Example 1.

We will now briefly review the second major source of spontaneous short-term financing, that is, accruals.

Accruals

Accruals is an accounting term which is used to describe expenses or other liabilities which have been incurred during an accounting period but for which payment remains to be made at the end of the same accounting period. Examples include salaries, wages, utilities, and taxes.

   As can be noted in the accounts of Pizza Express (Table 19.1), accruals comprise a substantial share of spontaneous short-term financing. These are liabilities clearly owed by the company, but they do not impact on a company's cash flow until the bills are actually paid.

   The following illustrates the accruals effect. Salaried employees work during the month and expect to be paid at the end of the same month. Similarly utility services such as electricity, water and gas are consumed daily but paid for on a monthly, or quarterly, basis in arrears.

   Other liabilities such as social security costs and taxes (income tax, value added tax and corporation tax) are also paid in arrears, but at clearly defined regular intervals. As these items are due to the government, the firm is unable to manipulate their payment.

   Provision must be made to ensure that the firm has sufficient cash available to pay these bills when they fall due.

   With regard to dividends, which are a substantial cash outflow, these are usually paid twice a year at regular intervals. An interim dividend is paid during the financial year and a final dividend is paid usually within six months of the year end. While payment of a dividend is not obligatory, any late or reduced dividend payment will usually meet with an unfavourable market and shareholder reaction. Any change in dividend policy is likely to have a signalling effect as discussed in Chapter 14.

   Unlike trade suppliers, the credit period with most of these items cannot really be manipulated, at least not without incurring severe penalties such as the wrath of employees, or the tax authorities, if salary or tax payments are late.

   Deferred income, which is included with accruals, relates to refundable advance payments or deposits received from customers in respect of goods and services yet to be delivered.

Non-spontaneous sources of finance

Here we will analyse the primary source of non-spontaneous or negotiated finance for companies (and individuals), that is, bank borrowing.

Bank borrowing

There are two main forms of short-term bank borrowing, **overdrafts** and **loans.** Either of these may be *secured* or *unsecured* depending on individual circumstances, such as the company's trading history and the nature of its relationship with its bank(s). Generally banks are risk-averse and some form of security is usually requested. The security may be in the form of a *floating charge* over a group of assets, such as all the firm's current assets, or in the form of a *fixed charge* over a specific asset.

Alternatively, in the case of a limited company, and depending on the nature of the bank-customer relationship, instead of seeking formal charges over assets, a bank may accept personal guarantees from the company's directors. This circumvents the concept of limited liability, as the directors then become personally liable for any default.

Before advancing credit to any customer a bank will assess a customer's credit-worthiness using the 'Five Cs' of credit or a similar risk assessment model.

Overdrafts

A bank overdraft is probably the most common form of short-term bank borrowing. Although for small businesses, according to the Bank of England's report on small business finance (January 1997), over the period 1991 to 1996 the bank overdraft as a source of external finance declined from 60 per cent to 52 per cent. This was partly due to a growth in term loans (see below). However, other forms of 'asset-backed' finance such as factoring and leasing have also grown significantly.

An overdraft facility allows a company to overdraw on its current account, thus emphasising the short-term nature of the arrangement. The normal arrangement is for a company to negotiate an **overdraft limit** with the bank (either *secured* or *unsecured*) and then draw on the facility as and when required, ensuring that the pre-agreed limit is not breached. If the limit is breached the costs in terms of financial penalties levied by the bank and loss of bank goodwill can be substantial.

In theory a bank overdraft is a short-term loan, as it is usually arranged for a period of a year or less, is subject to annual or more frequent review, and is technically repayable on demand by the bank—although in practice this right is not often exercised. However, as we discovered when analysing a firm's capital structure in Chapter 9, bank overdrafts, especially for small and medium-sized enterprises (SMEs), tend to become a virtually permanent source of financing.

In addition, current accounts on which the facility is granted are expected to be in credit for at least 30 days, either consecutively or otherwise, during the 12-month period from the date of approval. Failure to comply with these conditions will usually incur 'non-conforming' charges. These may take the form of 0.5–1 per cent (or more) penalty charge on the account and/or a higher rate of interest being charged.

Ideally a bank overdraft is used to finance peak seasonal operating and cash cycle requirements and as such is self-liquidating. For example, most retail businesses will have a seasonal high in November and December requiring additional investment in working capital, primarily additional stocks for resale. When the additional stocks are sold and the cash received the overdraft will be liquidated.

The key advantages and disadvantages of bank overdrafts are as follows:

Advantages

- **Easily arranged or renewed.** Bank overdraft facilities can usually be arranged very speedily and if operated satisfactorily are fairly easy to renew.
- **Flexible and cost-effective.** The facility is very flexible in that it need only be drawn on when and to the extent needed. It is also one of the most cost-effective sources of finance available in that charges are directly related to usage, although there is usually a fixed arrangement fee.

Interest is charged on a daily basis on the portion of the overdraft utilised. The interest rate is related to the risk category of the borrower and is normally at least several percentage points above the bank base lending rate. Interest and bank charges are also a tax deductible expense.

The effective interest rate on an overdraft can be computed using the ***effective annual interest rate (EAIR)*** formula which reflects the nominal interest rate, r, and the frequency of compounding, m which in the case of a bank overdraft is likely to be 365.

$$EAIR = (1 + r/m)^m - 1$$

Disadvantages

- **Costs.** The costs for a company (in terms of financial penalties, fees, and loss of the lender's goodwill, etc.) of using an unauthorised overdraft facility can be substantial.
- **Risk.** With an overdraft there is always the risk of volatility in interest rates and that the overdraft facility can technically be withdrawn or restricted with little or no notice being given by the lender. Moreover where an agreed overdraft limit is breached, the offending company may run the risk of having the entire facility withdrawn.

Term loans

Term loans can be arranged for short- or medium-terms, depending on the requirements of the business. Although the respective definitions may vary from lender to lender, loans of one to three years are often referred to as short-term, and three to seven years as medium-term.

Term loans will be considered where an overdraft is not the appropriate form of financing, perhaps because the need is for more than short-term temporary cover, such as the acquisition of fixed assets, typically plant and machinery. Permanent assets, such as land and property, will normally be financed with long-term loans, debentures, or equity.

A term loan may be negotiated for a fixed term of a year or more, is due for repayment within the term agreed, and payments of interest and principal will be made in accordance with a contracted schedule.

The respective advantages and disadvantages of term loans can be summarised as follows.

Advantages

- **Risk.** Once agreed the loan is guaranteed for a defined period of time. It cannot therefore be withdrawn at short notice, assuming of course that the borrower continues to comply with the terms and conditions. It may also be possible to arrange a fixed rate of interest for the term. This guaranteed source (and possibly cost) of financing provides a greater degree of certainty and financial stability than reliance on a bank overdraft.
- **Flexibility.** Term loans can be tailored to individual company requirements. For example, arrangements can be made to draw down the loan in tranches, rather than in one initial lump sum, and the method of repayment can be flexible.
  The loan may be a *'bullet loan',* where the entire principal is paid in one bullet repayment at the end of the loan term. This can be helpful for rapidly growing companies who need to retain cash in the early years of the loan term for expansion and development. Alternatively, the principal may be repaid at increasing rates, or in tranches (rather than a single bullet payment) as the end of the loan term approaches. This is known as a *'balloon loan'.*
- **Cost.** Similar to a bank overdraft, the interest charges and arrangement expenses are tax deductible.

Disadvantages

- **Cost.** A term loan is usually more expensive than a bank overdraft. It is more expensive and time-consuming to arrange, and interest is normally charged at one or two percentage points above the overdraft rate. In addition, if the full loan is drawn down initially then interest will be charged on the full amount. However, depending on individual circumstances, it may be possible to arrange more favourable terms.
- **Excess funding.** If the loan has to be drawn down in one initial lump sum this may lead to a temporary excess of funds, as the full amount of the loan may not be required immediately. The excess funds may be put on deposit to earn some interest, and this will help offset the cost of the loan. However, the rate of interest earned on deposits is likely to be substantially less than that charged on the loan.
- **Terms and conditions.** Term loans may have *restrictive covenants* attached. For example, depending on the size and term of the loan and the company's relationship with its bank(s), the loan agreement may require the company to maintain minimum liquidity ratio levels and/or to limit its dividend payout and gearing ratios.
  The borrower may even be required to maintain a *compensating balance* on deposit with the lender. This gives the lender some recourse in the event of default, but increases the cost of the arrangement for the borrower. The greater the proportion of compensating balance required, the greater the cost to the borrower.
  While such restrictions may offer greater protection to the lender, they do limit the company's financial freedom and flexibility in its financing policies. In negotiating with lenders the financial manager will try to minimise such restrictions.

Making a loan application

Loan applications should be prepared and presented to a lender, existing or new, in a

professional manner. Badly prepared or presented applications are likely to reflect unkindly on the applicant (corporate or personal).

The application will need to be supported by relevant information typically in the form of a **business case** for the loan, setting out the purpose of the loan, proposed method of repayment and so forth. Just how much information a lender will require will depend on the applicant's existing relationship, if any, with the lender and the amount and term of the loan. A number of lenders may be approached but it is probably best to start with the company's existing bank.

Information requirements In assessing a loan application a lender will typically require the following information from the applicant:

- **purpose and period** of the loan indicating proposals for repayment;
- **audited accounts** for at least three years;
- **management accounts** showing current up-to-date financial and operating position;
- **financial analysis** detailing appropriate ratios;
- **cash flow projections** including a detailed cash budget for three years ahead;
- **financial projections** including projected profit and loss accounts and balance sheet for three years ahead;
- **business plan** stating background to the application, summary business strategy, key business objectives, marketing and economic assessments including different scenario analyses, the relevance of the loan to the business plan and so on;
- **curriculum vitae** of directors and senior managers showing relevant experience and qualifications if this information is not already known to the lender;
- **bank and trade references** if the applicant is new;
- **assets available** as security.

This may seem like an onerous task but a professional management team (including of course a professional financial manager) will have much of this information already available.

Loan assessment To assess the application lenders may apply the 'Five Cs' of credit format or another format. For example, a popular alternative credit risk assessment model among bankers is **CAMPARI:**

- **C**haracter of borrower
- **A**bility to borrow and repay
- **M**argin to profit
- **P**urpose of loan
- **A**mount of loan
- **R**epayment terms
- **I**nsurance against risk of default—security

As we mentioned in relation to the management of debtors, many lenders today use sophisticated credit risk assessment systems such as computerised credit scoring arrangements.

The Small Firms Loan Guarantee Scheme

The Small Firms Loan Guarantee Scheme was first introduced by the government in

1981 (revised in 1993 and 1996) to help **small firms** obtain finance when all other efforts to obtain finance from conventional sources have failed. This usually is a result of the firm not having sufficient assets to offer as security or because the firm has no business track record. Thus the scheme is only available to small firms which cannot get access to conventional loans.

Small firms can be sole traders, partnerships, franchises, cooperatives and limited companies (firms with over 200 employees will not be eligible). The firms may be established firms, new firms or firms about to start trading within a reasonable period of time. In addition to employee limits there are also turnover limits, the maximum turnover level for manufacturing firms is £3m and for non-manufacturing £1.5m.

There are, however, many business activities which are excluded from the scheme. For example firms engaged in activities such as agriculture and fisheries, catering, betting, gambling, night-clubs, banking, finance, insurance and associated services, all retailing and travel agents (but not tour operators), will not be eligible.

Under the scheme an *established small firm* which has been trading for at least two years can borrow up to £250,000 from a bank (most commercial banks participate in the scheme) and the government will guarantee 85 per cent of the loan. For *new firms* the borrowing limit under the scheme is £100,000 with a 70 per cent guarantee. Guarantees are only available on loans with a term of between 2 and 10 years (the maximum loan term).

The loan agreement will be in the form of a contract between the borrower and the lending institution, which will provide the entire loan. The Department of Trade and Industry (DTI) which operates the scheme as a joint venture with lenders will not become directly involved other than to approve loans over £30,000. Negotiations on the terms and conditions of the loan contract are a matter for the individual borrower and lender and the DTI cannot intervene in the commercial decisions taken by lenders.

A carefully prepared business plan giving details on management, product or service, objectives and strategy, markets, financial projections and so forth will be required by the lender.

The Loan Guarantee Scheme enabled companies such as Sock Shop and Waterstones to get started.

Cost The borrower pays a premium of 0.5 or 1.5 per cent per year on the whole loan to the DTI, depending on whether the loan is fixed rate, variable rate or for Inner City Task Force and City Challenge areas.

EXERCISE 2 —COST OF FINANCE

From an analysis of her cash budget the financial manager of Buffet Air Cargo estimates that for the next financial year the company will need a minimum borrowing requirement of £100,000 and a peak requirement of £150,000. The average financing requirement during the year is expected to be £125,000.

The financial manager is considering two options:

1. An overdraft facility for £150,000 with interest charged at 2 per

cent above base rate. At the end of the year the bank will also charge an arrangement or set-up fee of 0.5 per cent of the total requirement and a commitment fee of 0.25 per cent per year on any unused balance. Interest charges will be computed on a daily basis.

2. A short-term loan of £150,000 with interest charged annually at 3 per cent above base rate. The arrangement fee is similar to the overdraft.

Base rate is currently 10 per cent and any surplus funds can be invested at 5 per cent per year.

Calculate the cost of each option. Which seems to be the more cost-effective?

Bills of Exchange (BOEs)

Bills of Exchange (BOEs) are short-term negotiable instruments, rather like post-dated cheques or even lOUs, used by traders to settle trade payments. Bills of Exchange have been used to finance trade—domestic and international—for centuries, today, however, their use is mainly confined to the financing of international trade.

The legal nature of Bills of Exchange is defined in the Bills of Exchange Act 1882. Section 3 of the Act defines a bill of exchange as: 'an unconditional order in writing, addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in money to or to the order of a specified person, or to bearer'.

BOEs which are issued by companies in the course of trading are known as **trade bills.** For example if Company A wishes to sell goods worth £100,000 to Company B the two parties may agree to finance the trade using a trade bill. In which case Company A (the drawer) would draw (create or write) a bill for £100,000 on Company B (the drawee)—the minimum value for a trade bill is usually £75,000.

The bill drawn by A would state the terms, for example payment is to be made 90 days from the date of the bill. If Company B agrees, it will accept the bill by signing it and returning it to Company A. Company B has thus obtained 90 days trade credit. The bill is now in effect a financial contract between the two parties, Company B's acceptance of the bill is unconditional. The consequences of defaulting on a bill of exchange are clearly set out in the 1882 Act.

After acceptance Company A has the option of retaining the bill until its maturity in 90 days time or it can *discount the bill* through a bank or Discount House. If the bill is discounted Company A will receive cash for the face value of the bill less the rate of discount immediately. The rate of discount will be linked to the prevailing London Inter-Bank Offered Rate (LIBOR).

The bill can continue to be traded in the money markets until it matures at which time the holder of the bill will receive payment for the full amount of the bill from Company

B.

Clearly the credit standing of the parties will be important in determining the bill's 'quality' and its cost (rate of discount) in the markets.

While 90 days is the typical bill period, bills can also be for periods as short as 60 days or as long as 180 days.

Where a bill is drawn on and accepted by a bank rather than a company it is referred to as a **bank bill.** For example in the above illustration Company B may be able to get its bank to accept the bill from A on Company B's behalf. Clearly Company B's bank will wish to be assured that B will have the funds available to pay the bank when the bill matures.

The cost of a bill

The cost of a bill depends on the discount rate. Suppose in the above example that Company A discounts the bill and that the discount rate is 2 per cent, then the cost of the bill would be calculated as follows using the effective annual interest rate (EAIR) formula:

$$EAIR=(1+r/m)^m-1$$
$$=(1+2/98)^4-1$$
$$=(1+0.0204)^4-1$$
$$=1.084-1$$
$$=8.4\%$$

For convenience we have assumed a 360 day year, therefore m=4, (360/90).

Advantages of bill finance

The main advantages of using bills of exchange can be summarised as follows:

Flexibility Bills of exchange are negotiable instruments, they can be traded easily in the money markets. Bill finance may be drawn on where other credit sources are limited or are committed to, or being held in reserve for, other purposes.

Self-liquidating Cash is received by the drawer as soon as the bill is discounted. The bank or discount house can hold or trade the bill, with the final holder receiving payment direct from the drawee when the bill matures.

Cost The cost of financing with bills of exchange is easier to determine and often cheaper than a bank overdraft. As indicated above, the cost of the facility will depend on prevailing interest rates and the quality of the bill, but at least the true cost of the finance is known when the bill is discounted. Bank bills tend to be cheaper than trade bills due to the credit standing and reputation of banks.

Acceptance credits

Acceptance business, that is the business of accepting bills of exchange and providing acceptance credits, originated with the early merchant bankers. These were successful, wealthy merchants who provided trade (particularly international trade) finance for their less wealthy colleagues by accepting bills of exchange on their behalf. These wealthy merchants developed their activities into specialised Acceptance Houses dealing in bills

and acceptance credits. Acceptance business is today provided by all the major banks.

Acceptance credits are in many respects similar to bank bills but they are really not the same type of instrument; they are limited to large companies and in effect operate more like a bank overdraft or **line of credit** facility. A line of credit is an agreement between the company and its bank to lend the company up to a specified amount over a defined period of time.

Like an overdraft, the line of credit specifies the limit on the amount that can be outstanding at any point in time. An acceptance credit facility therefore is a line of credit provided by a bank in association with discountable bills of exchange.

For example Company A, a large company of good credit standing, may arrange an acceptance credit facility with its bank. The facility, which can last for up to five years, will allow Company A to draw bills of exchange (in sterling or in a foreign currency) on its bank up to a pre-agreed limit, usually for a minimum limit of £250,000. Each bill will be accepted by the bank and discounted in the money market. The cash received for the bill, less the bank's commission, will be paid over to Company A by the bank.

On maturity, which may be 60, 90 or 180 days after the bill is drawn, the bank will receive the full value of the bill from Company A and pass the payment on to the bill holder. Alternatively Company A could draw a new bill on the bank to replace the maturing one, effectively rolling it over.

The main advantages and disadvantages of using acceptance credits can be summarised as follows:

Advantages
Flexibility Acceptance credits have essentially the same flexibility advantages as bills of exchange. In addition, compared to a bank overdraft, an acceptance facility can be arranged for longer periods.
Cost An acceptance credit facility can be cheaper than many other forms of short-term financing and again the cost of financing is known with a greater degree of certainty than for example, a bank overdraft. However, if interest rates change this is likely to affect the discount rate. Interest rates will tend to be lower because the bill is guaranteed by a bank. If the customer defaults, the bank has to honour the bill.

Disadvantages
Availability Acceptance credit facilities are only available to large, creditworthy companies.

Commercial paper (CP)

Large companies can issue their own securities in the form of commercial paper (CP), which are short-term unsecured promissory notes. A promissory note is simply a promise to pay given in writing. Commercial paper securities can have maturities ranging from one day to a year (the average is around 40 days) and have minimum values of £100,000, although in practice issues are seldom less than £1m.

Commercial paper does not pay explicit interest, rather, it is normally issued at a discount to its par value. It is what is known in the markets as a *pure discount* security, so when it matures, investors (financial institutions or other companies) will receive its par

value. However, a rate of interest is clearly implied in the value of the discount offered.

The market for sterling commercial paper originated in London in 1986 and was initially restricted to the very large companies. The market has subsequently developed to allow medium-size companies, those with net assets of at least £25m, to participate.

Companies issuing commercial paper generally have to open a line of credit to back the issue.

Companies often engage in a *rolling programme* of commercial paper issues, as one issue matures it is replaced with a fresh issue. This in effect converts what is essentially short-term financing into medium-term financing.

The **eurocommercial paper market** allows companies to extend their commercial paper financing options by issuing the paper in currencies other than sterling.

Commercial paper is an example of *securitisation,* that is, issuing securities to raise debt finance instead of raising loans direct from a financial intermediary. In this respect it is also a form of *disintermediation* —removing or reducing the need for a financial intermediary—which we covered in Chapter 3. The paper can be traded between companies directly thus eliminating the role of intermediaries completely.

For a company wishing to raise short-term finance the advantages and disadvantages of using commercial paper include the following:

Advantages

Flexibility A company issuing commercial paper can choose the timing and maturity of the security most suitable to itself. In addition, unlike a bond issue for example, a commercial paper issue is not 'rated'.

Cost By issuing paper direct to investors such as another large company which may have surplus cash to invest short-term, the cost in terms of the implied interest rate is less than if a financial institution was involved.

Disadvantages

Availability As a source of short- to medium-term financing commercial paper is only available to the bigger companies.

Having reviewed the main sources of short-term corporate finance we will proceed to examine the main sources of medium-term corporate finance.

MEDIUM-TERM SOURCES OF FINANCE

Similar to short-term there are various definitions of 'medium-term' in relation to sources of finance. Normally medium-term finance is for periods of 2–4 years. The main sources of medium-term finance include:

1 **medium-term loans;**
2 **leasing;**
3 **hire purchase (HP); and**
4 **debtor-based financing.**

Medium-term loans

As we have already discussed in relation to bank borrowing, term loans can be arranged for short- or medium-term purposes depending on the needs of the business. Medium-term loans will be considered where overdrafts and short-term loans are not appropriate.

A medium-term loan may be negotiated for a fixed term of several years, is due for repayment within the term agreed, and payments of interest and principal will be made in accordance with a contracted schedule.

The respective advantages and disadvantages of medium-term loans are essentially the same as those outlined in relation to short-term loans.

Leasing

A lease is a contract between two parties—the *lessor* who owns the asset and the *lessee* who operates or uses the asset—which grants the lessee the right to operate or use an asset for an agreed period of time. Under a leasing contract the lessee agrees to make regular payments to the lessor in return for having use of the asset during the term of the lease.

As indicated in the Bank of England's report on small business finance (January 1997), leasing has continued to grow in popularity as a form of medium- to long-term asset financing—for all types of business, large and small.

Long-term leases can be arranged to finance long-term assets such as property, and medium-term leases to finance medium-term assets such as plant, machinery and equipment. Construction companies, for example, will arrange short-term leases for plant and equipment which they intend for use on specific construction projects. Leasing facilities can be arranged through divisions or subsidiaries of most of the commercial banks.

There are two main types of lease, a **finance lease** and an **operating lease** and the key distinction between them is the degree to which 'the risks and rewards associated with ownership of an asset, other than the legal title' are transferred to the lessee.

Finance lease

A finance lease is defined in Statement of Standard Accounting Practice (SSAP) 21: Accounting for leases and hire purchase contracts as one in which: 'The lessee has substantially all the risks and rewards associated with ownership of an asset, other than the legal title.' SSAP 21 is a professional accounting standard issued in 1984 by the former Accounting Standards Committee (ASC), a body which has since been replaced by the Accounting Standards Board (ASB).

Such a substantial transfer of ownership risks and rewards is deemed to occur if, at the beginning of the lease, the present value of *all* the lease payments amounts to 90 per cent or more of the fair value of the asset—which is normally its cash purchase price. The present value of the future lease payments is calculated using the interest rate implied in the lease.

A finance lease is **capitalised** by the lessee, in other words the asset is treated as if owned by the lessee and appears under assets in the lessee's balance sheet. The obligation for the future rental payments also appears as a corresponding liability in the balance sheet. The value which should be recorded for both the asset and corresponding liability is the present value of the lease payments. The asset will then be depreciated over the shorter of the lease term and its useful economic life.

Rentals paid should be apportioned between a *finance charge* and a *capital repayment.* The capital repayment will reduce the liability in the balance sheet and the finance charge will be appear as an expense in the profit and loss account.

For all practical purposes a finance lease is effectively a term loan in which the capital is repaid by instalments. It is analogous to debt financing.

Operating lease

In contrast to a finance lease an operating lease is a much more straightforward arrangement. An operating lease is effectively a hiring or rental contract rather than a purchasing arrangement, and compared to a finance lease there is no long-term fixed commitment.

An operating lease is easily terminated without incurring the substantial financial penalties usually involved with the premature termination of a finance lease. This mainly explains its attractiveness to industries, such as construction and engineering, where equipment and machinery are used on specific short-term projects.

With an operating lease, the lessee pays a rental to the lessor for the hire of an asset over a period of time and simply charges the rentals paid to the profit and loss account as an operating expense. Thus for the user, the accounting or bookkeeping is much simpler than for a finance lease.

Because neither the asset nor the liability appear on a company's balance sheet, an operating lease arrangement is often referred to as *'Off Balance Sheet' finance,* or 'hidden gearing' as it does not impact on a company's capital structure or gearing ratios. However, as is illustrated in the accounts of Pizza Express (Table 19.2), details of leasing finance must be given in notes to the accounts. It is therefore not too difficult for debt and equity providers to determine the true capital structure or borrowing position of a company.

At the time of writing (Winter 1998) the Accounting Standards Board (ASB) is currently reviewing lease accounting and is considering a requirement for operating leases also to be capitalised on the firm's balance sheet.

If markets are efficient, attempts by companies to camouflage the true level of their indebtedness by using operating leases would be futile. Professional investors and analysts would not be deceived by such practices. Remember from our studies of market efficiency in Chapter 4 that in efficient financial markets accounting or financial transactions alone will rarely enhance shareholder wealth.

In efficient markets it is irrelevant which type of financing is used, or what its respective characteristics may be. The more important concern is not with what type of financing a company uses, but rather with how profitably the actual funds raised will be invested by the firm. This implies that it is the quality of a firm's investment decisions

which really affect its value rather than its financing decisions.

Contract hire agreements

Operating leases are a very popular method by which vehicle fleet operators acquire their vehicles. These arrangements are usually referred to as **contract hire agreements** and normally involve substantial amounts of financing for companies which operate large fleets of cars and commercial vehicles.

In a contract hire arrangement the vehicles, which may be fleets of company cars or delivery/distribution vehicles, will be supplied to a company by a specialist leasing and contract hire firm, which is usually a subsidiary of one of the major vehicle manufacturers.

Under a contract hire arrangement, the period of the agreement is typically three years and rentals are based on an agreed volume of mileage, for example 60,000 miles per vehicle, over the three-year period. If these mileage volumes are exceeded, and/or if there is excessive wear and tear on the vehicles, then excess charges are likely to be levied.

The advantages and disadvantages of contract hire arrangements are essentially the same as leasing in general.

The advantages and disadvantages of leasing

For a company considering leasing as a form of short- or medium-term financing the advantages and disadvantages can be summarised as follows.

Advantages
Cash flow Leasing, whether finance or operating, avoids the need for substantial initial cash outlays (consider the financial implications of purchasing a large fleet of 50 vehicles or more) although there may be a relatively small initial outlay in the form of 3 to 6 months rentals to be paid in advance. As the cash outflows, in the form of lease payments, are fixed under the terms of the agreement they are predictable, and this facilitates cash and profit planning and control.

In addition, leasing covers the total purchase price of the asset: there is 100 per cent financing. A lease can also be self-financing, in that the asset—particularly a productionline asset—should itself be generating cash flows.

Leasing clearly has significant cash flow benefits, when compared with traditional purchasing arrangements, as the cash is available for alternative uses, such as investment in essential working capital for a growing firm.
Cost A finance lease may be cheaper than a loan. The implied rate of interest in a finance lease can be compared with the cost of borrowing. In addition, the taxation benefits of leasing (see below) help reduce its cost to the company.

There can also be substantial administrative savings to companies involved in contract hire agreements. The lessor will administer all taxation, insurance and servicing arrangements. For a company operating large numbers of vehicles (many companies operate fleets in excess of 100 vehicles) this can amount to very significant savings in administration. For example, consider the number of individual invoices to be checked

and payments to be made if a company itself were to manage a fleet of 100 vehicles.

Taxation Leasing expenses are tax deductible. The total amount of operating lease rentals are tax deductible expenses. In relation to finance leases under the Finance Act 1991 in the UK both the depreciation and the finance charge elements of a finance lease are tax deductible expenses.

In respect of contract hire, there are also significant value added tax (VAT) advantages to both lessor and lessee. Since 1995 lessors can reclaim VAT on the cars they buy, individual companies cannot. This enables lessors to quote rental rates based on the VAT-exclusive price of the car.

The VAT advantages for the lessee is that 50 per cent of the VAT on the monthly rental, and 100 per cent of the VAT on maintenance costs for a car can be reclaimed.

While there can be significant tax advantages to leasing, a professional financial manager will never make financing and investment decisions based on tax considerations alone. The old adage of 'don't let the tax tail wag the business dog' is appropriate.

Risk With an operating lease the lessor assumes all the risks of depreciation and obsolescence. High technology equipment can easily become outdated before the end of its useful economic life thus reducing or even eliminating residual or resale values. Thus for equipment which has a high rate of technological obsolescence, such as telecommunications and computing equipment, an operating lease might be the most cost-effective financing alternative.

In the case of contract hire arrangements it is the lessor who assumes the risk of vehicle depreciation and of disposing of the vehicle when the agreement terminates, but if there is excessive wear and tear on the vehicles, then excess charges are likely to be levied. The lessor also assumes the risk that interest rates may rise over the period of the agreement. Although both types of risk will usually be reflected in determining the monthly rentals at the outset.

However, like all aspects of leasing agreements, these variables are a matter for negotiation between lessor and lessee.

Flexibility The different types of leasing available offer the potential user considerable flexibility in determining financing arrangements. The terms of the leasing arrangement is simply a matter to be decided between lessor and lessee.

Availability Leasing is easily available and has less restrictions than many other sources of financing.

Security A further attraction of leasing, which is particularly helpful to small firms, is that no security is required to cover the finance raised—the leased asset itself provides security for the agreement.

Disadvantages

Cost Because of its pay-as-you-use nature, an operating lease is more expensive for the lessee than a finance lease. The rental payments are higher in order to compensate the owner, the lessor, for the greater variability in the use of the assets and for the servicing and maintenance costs and other risks.

As assets are only required by users on a short-term basis (except in contract hire arrangements where the period of the agreement is typically three years) there may be periods when they lie idle with the lessor.

Under a finance lease, it is the lessee who assumes responsibility for the insurance, servicing and maintenance of the asset.

Risk It may not be possible, or alternatively extremely expensive, to cancel leases if business conditions change. For example, if a lessee company experiences a downturn in business conditions half way through a three-year contract hire agreement, then it may have to a pay six or nine months rental penalty to terminate the agreement.

With a finance lease, it is the lessee who assumes the risks of depreciation and obsolescence.

To lease or buy?

Financial managers are frequently faced with the decision of whether to lease or buy an asset would be the more cost-effective alternative. We can illustrate the approach to lease-buy evaluation by considering Example 3. The method used in this case is the net present value (NPV) technique. The internal rate of return (IRR) can also be used to evaluate lease-buy decisions by comparing the respective IRRs of the leasing and purchase options. However, we will focus on the NPV approach.

Example 3 —Leasing versus purchase

Melmount Enterprises is considering whether to purchase or lease new high technology production equipment at a total cost to buy of £100,000. The equipment is expected to have a productive life of 5 years at the end of which time it is estimated to have a nil residual value. If the asset is purchased the company will need to pay £2,000 per year in servicing costs. Alternatively, if leased, servicing costs will be included in the yearly rental payments, which the leasing company have quoted as £25,000 per year for 5 years.

The financial manager estimates Melmount's cost of capital at 18 per cent and its before tax cost of debt at 14 per cent. If purchased, the company will be entitled to claim for taxation purposes writing down allowances at the rate of 25 per cent on a reducing balance basis. The relevant rate of corporation tax is 30 per cent and the company is earning sufficient profits to benefit from any allowances.

To evaluate the lease-buy decision we need to compare the respective cash flows of the two options and, assuming leasing is a straight substitute for borrowing, the appropriate discount rate is the after-tax cost of debt—in this case 10 per cent to the nearest whole number [$14\% \times (1-0.3)$].

If the asset is purchased outright, Table 19.2 shows the tax benefit derived from the use of writing down allowances (column 4). The financial benefit to the company is the reduction in the annual tax bill, which is equivalent to 30 per cent of the actual writing-down allowance (column 3×0.3). The tax relief obtained on the servicing

costs is also included (column 5) as these are also chargeable against taxable profits.

Table 19.2 Tax benefit of purchasing option

1	2	3	4	5	6	7
			Tax benefit			
Writing down allowances	*Cost/WDV (£)*	*WDA (£)*	*WDA at 30% (£)*	*Servicing at 30% (£)*	*Tax saved at 30% (£)*	*Year available*
Year						
1	100,000	25,000	7,500	600	8,100	2
2	75,000	18,750	5,625	600	6,225	3
3	56,250	14,063	4,219	600	4,819	4
4	42,188	10,547	3,164	600	3,764	5
5	31,641	31,641	9,492	600	10,092	6

The total tax saved each year if the asset is purchased is shown in column 6, and the timing of the tax savings, that is, the year they will actually impact on the company's cash flows, is shown in column 7.

If the asset is leased the company will have to pay the annual leasing rentals (assumed here to occur at the end of each year) of £25,000. This expenditure will reduce the company's annual taxable profits by £7,500 (£25,000×0.3) as shown in column 3 of Table 19.3. The net present value (NPV) of the leasing option (−£68,930), using the after-tax cost of debt as the discount rate, is shown in column 5. The next step is to calculate the net present value of the purchasing option, this is presented in Table 19.4.

Table 19.3 Net present value of lease option

1	2	3	4	5
Year	*Lease payments (£)*	*Tax benefit (£)*	*Discount factor (10%)*	*Present value (£)*
1 to 5	−25,000		3.791	−94,775
2 to 6		7,500	3.446	25,845
			NPV	−68,930

Table 19.4 reveals that the net present value (or net present cost) of the purchase option (−£84,884) is greater than that of the lease option (−£68,930). In this case leasing is the more financially advantageous method of financing the asset. As the NPVs are negative in such circumstances, the option with the lower negative value is financially the preferred option. Alternatively, we could say that leasing is the

lower *net present cost (NPC)* option.

Table 19.4 Net present value of purchase option

1	2	3	4	5	6	7
Year	*Initial cost (£)*	*Servicing (£)*	*Tax saved at 30% (£)*	*Cash now (£)*	*Discount factor (10%)*	*Present value (£)*
0	−100,000			−100,000	1.000	−100,000
1		−2,000		−2,000	0.909	−1,818
2		−2,000	8,100	6,100	0.826	5,039
3		−2,000	6,226	4,225	0.751	3,173
4		−2,000	4,819	2,819	0.683	1,925
5		−2,000	3,764	1,764	0.621	1,095
6			10,092	10,092	0.565	5,702
					NPV	−84,884

Notes to Example 3:
1 As discussed in Chapter 10, in the UK taxation system, depreciation is not allowed as a business expense to be set against taxable profits, instead a uniform system of capital allowances operates. Capital allowances, which only apply to certain types of capital investments, will reduce taxable profits and thus tax payments. These allowances usually take the form of a writing-down allowance (WDA), which is granted at varying rates on assets such as industrial buildings and plant and equipment and is calculated on a reducing balance basis.
2 Each year the writing-down allowance (WDA), is calculated at 25 per cent of the written-down or reducing balance at the end of the previous year.
3 The reducing balance is referred to as the written-down value (WDV).
4 The tax saved by the writing-down allowance is calculated at 30 per cent of the annual allowance. This will be treated as a cash inflow in the following year (see note 6 below).
5 The final WDA of £31,641 for year 5 (Table 19.2) is simplythe balancing allowance. At the end ofthe period the asset is expected to have a residual value of nil.
6 The tax due on the corporate profits earned in one accounting year is normally paid in the following accounting year. Thus the actual payments of corporation tax are usually assumed to lag one year behind the accounting year in which the taxable profits have been earned.
7 Remember that it is not necessary to account for the interest

on borrowing as financing costs are subsumed within the
discount rate. The interest on borrowings would be tax
allowable, but if the net repayments (after allowing for tax
relief) on a loan are discounted at the after-tax cost of debt this
would result in an NPV approximately equal to the amount of
the loan.

You will appreciate that what is being evaluated in Example 3 is the *financing decision.* It
is assumed that the investment decision using NPV analysis has already indicated that the
asset itself is worthwhile acquiring, that is, it will yield a positive NPV. The investment
appraisal would include the incremental cash flows (incremental revenues minus
incremental operating costs) arising from the asset.

   It is possible that an initial investment appraisal may project a negative NPV for an
investment, but when the financing alternatives are evaluated it may be that, because of
low cost financing, the project is acceptable. By implication, an investment project with a
negative NPV should not be summarily dismissed until an appraisal of its financing side
has also been carried out.

Lease or buy?—further considerations

- Clearly changes in tax rates, tax allowances, and tax regulations occur frequently,
  and can affect, either favourably or adversely, the outcome of any evaluation.
- Asset disposal or residual values may differ from those expected and thus alter the
  NPV determined for the purchasing option.
- Both the *taxation and borrowing positions* of a company will need to be considered
  in any evaluation. We have assumed, for example, that the company can absorb all
  available allowances. If a company is loss-making then it may be unable to derive
  any taxation benefit from capital allowances. Such a company is referred to as being
  'tax exhausted', that is, it has no taxable profits against which it can set the relevant
  capital allowances.
- Similarly we have assumed that the company has sufficient *borrowing capacity* to
  be able to make purchasing a feasible alternative. It has also been assumed that the
  company would borrow funds, rather than finance the purchase from retained
  earnings.
- In any evaluation, the alternative uses of the purchase outlay would need to be
  considered.
- In Example 3 we have essentially assumed that lease rentals are payable at the end
  of each year. The *timings of lease payments* may vary under different agreements,
  for example, rentals may be payable in advance at the start of each year. As with all
  cash flows, their timings (and amounts) will affect their value, and this may impact
  on the outcome of the appraisal.

Hire purchase (HP)

Hire purchase (popularly known as HP), as the name suggests, involves two elements, a *hiring element* followed by a *purchase element.* Hire purchase is very similar to leasing with the key distinction that ownership or title actually transfers to the user when the final instalment payment under the contract is made. In fact hire purchase is often referred to today as 'lease purchase'.

SSAP 21 defines a hire purchase contract as: 'a contract for the hire of an asset which contains a provision giving the hirer an option to acquire legal title to the asset upon the fulfilment of certain conditions stated in the contract'. Evidently one of the conditions will be full payment for the asset.

Similar to leasing, HP will probably be arranged through a financial intermediary such as a subsidiary or division of a commercial bank. Normally HP works in the following way. For example, when purchasing an asset such as a car, the car dealer will sell the car to a finance company. In this scenario, most large companies will provide credit arrangements, HP or otherwise, through what is referred to as a **captive finance company.** This is most likely to be a wholly-owned subsidiary of the car manufacturer which specialises in the provision of financial services, such as Ford Finance or the Toyota Motor Credit Corporation.

The user, having signed a contract and been successfully screened for credit risk by the finance company, will take delivery of the vehicle from the dealer. The finance company will pay the dealer the sale value of the car and in turn collect regular instalment payments under the contract direct from the user, usually through the user's bank account by direct debit or standing order.

The instalment payment is similar to that under a finance lease, in that it consists of the same two elements, a finance or *interest charge* and a *capital repayment.* However, under a HP arrangement title will transfer to the user when the final payment is made. If payment is not made in accordance with the agreement then the owner, the finance company, can repossess the asset.

Under a HP arrangement the purchaser/user of the asset will be able (assuming the business is not tax exhausted) to take full advantage of any capital allowances which are available from the date the asset is acquired. Similar to a finance lease, the interest element in a HP agreement is also a tax allowable expense.

In contrast to leasing, a hire purchase contract normally requires the user to pay an *initial cash deposit* of around 10 to 33 per cent. Alternatively, as is common with vehicles, a trade-in of a used, resaleable asset may be accepted from the user in lieu of, or in part payment of, a cash deposit.

The advantages and disadvantages of hire purchase are essentially the same as those of finance leasing. However, HP is more expensive than finance leasing as interest is charged on the initial amount borrowed, not on the reducing balance.

For a hire purchase agreement a quick way of calculating the interest rate is as follows:

$$\text{Interest rate} = \frac{\text{Quoted rate} \times 2 \times \text{Number of instalments}}{\text{Number of instalments} + 1}$$

We illustrate the effect of this in Example 4.

Example 4 —Rate of interest on hire purchase

Speedie Courier Services, a small courier service business, wishes to purchase a new vehicle costing £20,000 and has been offered the following hire purchase terms by the Vehicle Finance Company.

The Vehicle Finance Company will require a deposit of 25 per cent of the purchase price with the balance to be repaid in monthly instalments over three years, and has quoted an interest rate of 12 per cent. The vehicle has an estimated useful life of five years. The rate of interest is calculated as follows:

$$\text{Rate of interest} = \frac{0.12 \times 2 \times 36}{36 + 1} = \frac{8.64}{37}$$

$$= 23.4\%$$

As interest is calculated on the initial amount of the loan (£20,000×0.75×0.12) not on the reducing balance, the effective rate of interest is almost double the rate quoted by the finance company. A more accurate measure of the interest cost would be to calculate the annual percentage rate (APR) or EAIR.

Note from the preceding example that it is common practice in HP agreements for the term of the agreement to be less than the useful life of the asset. This gives some recourse to the lender in the event of default by the purchaser as the asset will still retain a resale value.

Hire purchase is a common method of financing general consumer and small firm purchases.

Debtor-based financing

The most common forms of debtor-based financing are **factoring** and **invoice discounting,** where the asset of debtors is in effect used as security for short- to medium-term borrowing.

We have already described the role of factoring and invoice discounting in relation to the management of debtors. Both techniques will provide finance by allowing a business to immediately liquidate the cash normally tied up in debtors—which for many businesses, forms a substantial proportion of their working capital investment.

By using a factoring or invoice discounting service, a business will receive payment of its invoices within one or two working days from the day of sale to its customers, instead of having to wait the normal credit period of 30 or 60 days. Thus the debtors days conversion period is virtually eliminated, and the cash cycle is significantly reduced, although as we shall see this is achieved at a cost.

A significant part of the cost arises from the reduction in value of the asset (the debt), as the liquidation or conversion value of the debt by the factor or discounter will be less than its intrinsic value. In other words, if the value of the debt on an invoice is £1,000 the company may only receive £975 from a factor, after charges have been deducted.

Factoring and invoice discounting services are offered by subsidiaries of the major banks and other specialist finance companies, and new providers (particularly American financial institutions such as GE Capital Commercial Finance and Bank of America) are continually entering the market—making it much more competitive and innovative.

Factoring and discounting companies do not have the stigma they once did, as they were often perceived as lenders of last resort. According to the Factors and Discounters Association (FDA), (which is incidentally considering modernising its name) factoring and invoice discounting are growing sources of finance. From 1995 to 1996 factoring usage had increased by 13 per cent and invoice discounting by 25 per cent.

Over the past four years, according to the FDA, the value of finance provided by factors and discounters has doubled. This still represents a relatively small proportion of the total financing market, however the FDA (which currently has 37 member firms) is projecting annual growth rates of 15–20 per cent.

Factoring

Factor is another term for agent or middleman. Under a factoring arrangement the management of the company's sales ledger function will be 'outsourced' to a factor, who will typically be responsible for managing the sales ledger, providing credit insurance, and collecting payment from the customer.

With a factoring arrangement a company sends the factor copies of its invoices (manually or electronically) and then will normally receive, from the factor, a prepayment of up to 85 per cent of the invoiced amount within one or two working days of the sale. The balance of up to 15 per cent, less administration fees of between 0.75 and 2.5 per cent of the total invoice value, is recovered by the company when the customer pays the factor.

A factor's involvement is therefore visible to customers and this may have a negative impact on customer relations: invoice discounting in contrast can be provided confidentially.

In addition to the commissions and fees, there is the cost of the *prepayment financing* which is usually charged at least a few percentage points over bank overdraft rate.

Factoring is available in two forms, technically referred to as **recourse** and **non-recourse** factoring. Non-recourse means that the factor does not have recourse to the company for those customers who do not pay. With non-recourse factoring bad debt insurance cover is provided, thus even if the customer is unable to pay, the company will still receive payment from the factor. The factor does have recourse to the insurance company.

Factoring is generally suitable for businesses with annual credit sales of at least £100,000.

Invoice discounting

The process of invoice discounting is similar to Bill of Exchange discounting which we examined earlier.

With invoice discounting the company retains management of its own sales ledger, credit control and payment collection procedures. The lender will require to be satisfied that the company's credit management systems and controls are sound before any financing arrangement can be made.

As with factoring, the company sends copies of the invoices (manually or electronically) to the discounter and receives the prepayment, up to 80 per cent, within a few days. The remaining 20 per cent (less administration fees of around 0.25 to 0.75 per cent of the total invoice value) is paid when the discounter receives payment from the customer within the normal credit period.

Compared to factoring, an invoice discounter's role need not be visible to customers as the service can be provided confidentially. Confidential invoice discounting is usually only suitable for businesses with an annual turnover of £1 million or more, although the market is continually changing and some providers are reducing these turnover thresholds.

Invoice discounting is also available in either *recourse* or ***non-recourse*** form. Some lenders will provide up to 90 per cent prepayment if non-recourse discounting is arranged. However, they tend to charge higher administration fees at around 0.75 to 1.00 per cent of turnover.

Similar to factoring, in addition to the administration fees, there is the cost of the prepayment financing, which is usually charged at least a few percentage points over bank overdraft rate.

When arranging invoice financing, usually a formal agreement will be signed, which is subject to a period of notice, usually 3 months, on either side. However, the agreement does not constitute a formal legal charge over the asset of debtors, so it does not have to be registered with the Registrar of Companies.

The essential distinction between factoring and invoice discounting is the extent to which the external party becomes involved in the management of the company's sales ledger.

International factoring and discounting

Factoring and invoice discounting can also be arranged to finance international sales, where there are the added risks of volatile currency exchange rates, information for credit risk assessment is more difficult to obtain, and usually longer credit periods are involved. For example, while firms in Germany and Scandinavia generally tend to pay within agreed credit terms, firms in Italy can take up to 120 days to pay.

Most of the leading factoring and discounters will provide international services. They usually have a local presence, in the form of subsidiaries or agents, in most overseas markets, as this reduces potential language and settlement difficulties. Invoicing will normally be in the customer's own language and currency, with around 80 per cent of the

invoice value being provided within one working day.

There is also an increasing tendency for banks to provide finance for export sales secured against the receivable debt, provided that the exporter can arrange export credit insurance that meets with the banks' requirements. For example, the insurance contract usually includes a guarantee that the banks will be covered against default risk even if the exporter fails to keep up the insurance premiums, or fails in any other way to comply with the terms of the contract.

Advantages and disadvantages of factoring and discounting

The advantages and disadvantages of factoring and discounting are summarised as follows:

Advantages
Cash flow The main advantage of either arrangement is the immediate improvement in cash flow. This may be of particular benefit to a small or medium-sized business going through a rapid growth stage which is putting severe strains on cash flow and liquidity, or, for example, to a management team who have just invested most of their capital in buying out their company from its parent organisation and have little capital left to finance working capital requirements.
Flexibility As a company's sales grow so too will the financing provided by the lender— *spontaneous financing.* However, some lenders may impose credit limits on the business which have to be periodically renegotiated: this restricts the actual degree of spontaneity.
Cost Like a bank overdraft a business only pays for the amount of financing actually used, although the interest rates are several percentage points higher than an overdraft. In addition invoice discounting, and factoring in particular, relieve a small business of the burden and cost of debtor management and credit control allowing it to devote more of its limited resources to developing the business.
Risk The risk of bad debts can be reduced through non-recourse arrangements.

Disadvantages
Cost Both factoring and discounting services come at a price, and the combination of financing charges, commissions and fees can make it an expensive source of finance. The prepayment financing for instance is typically charged at a few percentage points above bank overdraft rates.
Risk Factoring and invoice discounting companies will only finance those debts which *they* regard as recoverable, in other words the good quality accounts. The company is usually left to manage poor credit risk accounts.

Business circumstances can change and charges can increase. There is also the risk that a factoring arrangement may prove unsuccessful, thus there would be the direct costs and inconvenience of setting up a sales ledger again.
Availability A factor will only consider businesses with an annual turnover of £100,000 or more. For an invoice discounter the minimum turnover is *usually* around £1m, especially for confidential discounting. In addition lenders will screen applicants for creditworthiness and they will only consider businesses with a profitable trading history and good growth prospects.

Example 5 —Factoring

Speedie Courier Services, a small courier service company, is growing rapidly but is experiencing difficulty in collecting payment promptly from many of its customers—the average credit period taken is now 60 days and bad debts have risen to 0.75 per cent of credit sales. This is placing a serious strain on the company's cash flow and is restricting its growth plans. Debtors are currently being financed with a bank overdraft at an interest rate of 12 per cent. The directors are considering a factoring arrangement and have approached the Friendly Factoring Company.

The directors would prefer a non-recourse facility. The factor has quoted terms of a prepayment of 85 per cent of the amount invoiced, with the balance of 15 per cent, less fees of 1.25 per cent of credit sales, being paid over to the company 30 days later. Financing charges will be at 15 per cent per year on the monies advanced, and bad debts will be eliminated.

Credit sales for the next year are projected at £250,000 per month, and the company is currently spending £25,000 per year on administering its sales ledger and credit control systems. If the existing system was to be retained then the directors estimate that they would need to spend an additional £10,000 per year to upgrade systems and improve staffing. This expenditure would be saved if a factoring arrangement was adopted.

Assuming a 365 day year, and that all the customer accounts will be accepted by the factor, calculate the net cost of factoring and compare this with the current bank overdraft facility.

		£
Projected annual credit sales=£250,000×12	=	3,000,000
Factoring service:		
Fees=£3,000,000×1.25%	=	37,500
Financing=£3,000,000×0.85×(30/365) ×0.15	=	31,438
Annual cost	=	68,938
Bank overdraft[1] £3,000,000×0.15× (30/365)×0.12	=	4,438
		73,376
Less: Administrative savings (£25,000+£10,000)		35,000
Net cost of factoring		38,376
Present arrangement:		
Bank overdraft £3,000,000×(60/365)×0.12=	59,178	

Bad debts £3,000,000×0.75%	= 22,500	81,678
Net benefit of factoring		43,302

[1] It is assumed that the remaining 15 per cent of debtors will be financed with the overdraft facility at 12 per cent.

   If the company entered into a factoring arrangement it would save £43,302 per year.

   With an overdraft, the company would need a facility of £493,150 (£3,000,000×60/365) at an interest rate of 12 per cent. Clearly this would be a substantial amount for a small business, and would be unlikely to be provided without adequate security—which may, or may not, be available.

We conclude our review of short- and medium-term sources of business finance with a summary of the main sources, this is presented in Table 19.5.

Table 19.5 Main sources of short- and medium-term finance

	Summary
	Main sources of short- and medium-term finance
Short-term	*Medium-term*
Spontaneous	
Trade credit and accurals	
Negotiated	
Bank overdraft	Leasing
Bank loan	Hire purchase
Bills of exchange	Bank loans
Acceptance credits	
Commercial paper	
Invoice discounting	
Factoring	

RECAP

Choosing sources of finance: In choosing an appropriate source of finance the key decision variables are: **duration, cost, borrowing capacity, risk, flexibility, availability** and **terms and conditions.**

Short-term sources of finance: These can be **spontaneous** or **non-spontaneous.**

Spontaneous finance, such as trade credit and accruals, arises automatically in the course of business whereas non-spontaneous or negotiated finance requires a deliberate arrangement between borrower and lender. Non-spontaneous sources include bank borrowings, bills of exchange, acceptance credits and commercial paper.

Medium-term sources of finance: These will include medium-term loans, leasing, hire purchase, and debtor-based finance such as factoring and invoice discounting.

Evaluation of finance sources: Each individual source of short- and medium-term finance has its respective advantages and disadvantages. These will require to be evaluated before an appropriate financing choice can be made.

REVIEW QUESTIONS

Concept review questions

1 Briefly explain the key variables which a financial manager should consider in evaluating alternative sources of business finance.
2 Distinguish between *spontaneous* and *non-spontaneous* sources of short-term finance. Give examples of each.
3 Summarise the advantages and disadvantages of bank overdrafts and bank loans as sources of short-term finance.
4 Discuss the advantages and disadvantages of leasing as a source of medium-term finance.
5 As a newly appointed assistant to the financial manager of Growfast Ltd you have been asked to assist in preparing an application for a substantial medium-term loan to finance the company's expansion plans. Outline the information which you think a potential lender would require the application to include.

Practice question

6 **Factoring services.** Your friend John owns and operates Craft Catering, a medium-sized catering service business, which has supply contracts with leading airlines, local pubs, and supermarket chains. It supplies 80 per cent of its sales on credit. The pressures of managing substantial business growth in recent years have resulted in a deterioration in credit management and debtor collection procedures. The average collection period has consequently slipped from 30 days to 70 days, and bad debts have risen to one per cent of credit sales. The business is currently relying on a bank overdraft, at an interest rate of 8 per cent, to finance its debtors.
John has heard about factoring, and is considering contracting out the entire credit management function to the factoring services arm of his local bank. The factor has quoted terms of a prepayment of 75 per cent of the amount invoiced. The balance of 25 per cent, less fees of 1.5 per cent of credit sales, will be paid over to the company when the customer pays the factor. The factor insists all customer accounts will be collected within the normal 30 day credit period, and that bad debts will be

eliminated. Financing charges on the monies advanced will be at 9 per cent per year. Sales for Craft Catering for next year are projected at £8m. The company is currently spending £20,000 per year on administering its sales ledger and credit control systems.

You are required to advise John whether he should accept the factoring arrangement. Assume a 365 day year.

Test questions

7 **Working capital management—general.**

(a) Discuss:

(i)   the significance of trade creditors in a firm's working capital cycle, and

(ii) the dangers of over-reliance on trade credit as a source of finance.

(b) Keswick plc traditionally follows a highly aggressive working capital policy, with no long-term borrowing. Key details from its recently compiled accounts appear below:

	£m
Sales (all on credit)	10.00
Earnings before interest and tax (EBIT)	2.00
Interest payments for the year	0.50
Shareholders' funds (comprising £1m issued share capital, par value 25p, and £1m revenue reserves)	2.00
Debtors	0.40
Stocks	0.70
Trade creditors	1.50
Bank overdraft	3.00

A major supplier which accounts for 50 per cent of Keswick's cost of sales, is highly concerned about Keswick's policy of taking extended trade credit. The supplier offers Keswick the opportunity to pay for supplies within 15 days in return for a discount of 5 per cent on the invoiced value.

Keswick holds no cash balances but is able to borrow on overdraft from its bank at 12 per cent. Tax on corporate profit is paid at 33 per cent.

Required:

Determine the costs and benefits to Keswick of making this arrangement with its supplier, and recommend whether Keswick should accept the offer.

Your answer should include the effects on:

• the working capital [cash conversion] cycle
• interest cover
• profits after tax
• earnings per share
• return on equity

- capital gearing.

8 **Factoring and invoice discounting.** Distinguish between factoring and invoice discounting, explaining the benefits which companies obtain from each.

9 **The Interest Yield Curve.** You are required

   (i) to explain what is meant by the Interest Yield Curve, illustrating your explanation numerically and with a freehand graph;
   (ii) to suggest what information might be derived from the Interest Yield Curve in the area of financial forecasting.

10 **Leasing versus purchase.** Rembrandt Reprographics, a specialist printing and publications design company, has decided to acquire state-of-the-art printing and reprographics equipment at a purchase cost of £80,000. The equipment is expected to be usable for 5 years, after which time it could be disposed of for an estimated £5,000. The ABC Finance Company has approached Rembrandt offering leasing terms of £19,000 per year over the five-year period.
   If the equipment is purchased outright the company can claim appropriate capital allowances of 25 per cent on a reducing balance basis, but will need to spend approximately £1,000 per year on servicing and repairs.
   Assuming corporation tax is at 30 per cent and that the company's before tax cost of debt is 17 per cent, determine whether leasing or outright purchase would be the more cost-effective option. You may also assume that Rembrandt is a very profitable company with adequate borrowing capacity.

11 **Leasing versus purchase.** MRF is a charitable organisation and exempt from all taxes. It is about to acquire some new capital equipment for a special project. The President of the charity has been advised that it might be advantageous to acquire the equipment with a finance lease. The cost to the charity of the equipment, if it were purchased outright, would be £22.5 million. However, the leasing company would be able to negotiate a 20 per cent discount on this price because of its long-term commercial relationship with the suppliers of the type of equipment being purchased. This discount would not be available to the charity if it purchased the equipment with a bank loan.
   The leasing company is nearing its year end and is keen to obtain the tax advantages denied to MRF because of its charitable status. It has therefore offered what it considers to be very favourable terms. Payments by MRF would be £7.5 million per annum for 6 years, payable at the end of each year of the lease contract. Writing down allowances are available to the leasing company at 25 per cent on a reducing balance basis. At the end of year 6, it is estimated that the second-hand value of the equipment would be £4 million. Insurance and maintenance would be the responsibility of the charity, whether it leases or purchases the equipment.
   The cost of a bank loan to the charity would be 12 per cent. The opportunity cost of capital for the leasing company would be 14 per cent.
   Assume no time lag in tax payments or refunds.
   You should work to two decimal places throughout.
   Required:

(a) Assume you are MRF's treasurer. Evaluate the financial aspects of the lease and recommend to the President whether the charity should purchase with a bank loan or use a finance lease. You should state the reasons for your recommendation and any assumptions you make in arriving at your decision.

(b) Now assume that your are an account negotiator for the leasing company. You have been informed that MRF has decided to buy the equipment with a bank loan at 12 per cent interest. Your boss, Helen, has asked you to advise her whether the lease terms could be reduced so as to be competitive with the bank loan. The leasing company pays tax at the marginal rate of 33 per cent. Assume that the lease receipts from MRF are fully taxable.

Required:

Write a short report advising Helen of:

- the annual lease payments required for the charity to be indifferent between the bank and the leasing company;
- the effect on the leasing company's evaluation if the lease payments were reduced to the amount calculated above (if you are unable to calculate a figure, assume £5 million per annum);
- other actions which the company could take to rescue the deal.

Supporting calculations should be provided where appropriate.

12 **Financing.** Assume you are a consultant to a small engineering company that wishes to borrow £400,000 to expand. The annual turnover is £2 million, pre-tax profits are £280,000 and 35 staff are employed. The company's summarised balance sheet is shown below:

Balance sheet of Midcount Ltd as at 31 March...

		£000
Fixed assets (net)		780
Current assets		
Stock	320	
Debtors	290	
Cash	30	640
Less current liabilities		
Trade creditors	350	
Overdraft (secured)	220	
Tax payable	80	(650)
Five-year fixed rate bank loan (secured)		(200)
		570
Ordinary shares (50 pence par)		190
Reserves		380
		570

Required:

Prepare a brief report for the company's directors advising them on:

(i) How to present their arguments in support of the loan to potential lenders,
(ii) What sources of finance might be available to the company.

13 **Evaluating alternative sources of financing.** Oldsyl Ltd expects to need to
borrow an average of £550,000 during the next year. Borrowing is expected to be
as low as £500,000 at some times during the year, and as high as £600,000 at
others. Four alternative sources are being considered.
(1) A £600,000 overdraft facility at an annual interest rate of base rate plus 2 per
cent. The overdraft would have an arrangement fee of 0.5 per cent of the total
facility and an annual commitment fee of 0.25 per cent per year of any unused
facility, both fees payable at the end of the year. Interest on the overdraft is
compounded on a daily basis.
(2) An acceptance credit facility for up to £600,000. Credits can be sold at an initial
discount of 1 1/8 per month, with an annual 0.25 per cent bank commission on the
entire, facility.
(3) A short-term loan of £600,000 at an interest rate of 14 per cent per year
compounded annually.
(4) ECU (European Currency Unit) loan at 10 per cent per year compounded
annually. A loan of 800,000 ECUs has been offered by a European bank.
Current exchange rates are:

ECU/£
Spot   1.4520–1.4600

One year forward 0.0430–0.0390 ECU pm
Surplus funds may be invested in money market deposits at an interest rate of 9.25
per cent per year.
Base rate is currently 11 per cent.
Required:
(a) Evaluate which of the financing sources Oldsyl should use. Relevant
calculations as well as discussion of risk and other relevant factors should form part
of your evaluation.
(b) Ignoring your calculations in (a) above, if the overdraft was chosen but Oldsyl
was concerned about possible increases in interest rates by up to 3 per cent during
the year, discuss how the company could protect itself against such interest rate
changes.
Author's note: Students not familiar with foreign exchange may simply ignore item
(4), the ECU loan.

14 **Working capital—various.** Bardsey plc operates a chain of city centre furniture
stores, specialising in high quality items. It is 60 per cent owned by the original
family founders. Its sales over the past decade have never grown faster than 5 per
cent in any one year, even falling during a recent recession. No growth is expected
from existing operations in the next few years despite continuing to offer generous

credit to customers.

In order to achieve faster growth, it is considering the development of a number of 'out of town' sites, adjacent to giant supermarkets and DIY stores. During 1997, this would involve a capital outlay of £50m plus additional working capital requirements of £20m in order to finance stock-building. In recent years, Bardsey's capital expenditure, mainly store refurbishments and vehicle replacements, and averaging around £10m per annum, has been financed entirely from cash flow. This category of investment will continue at about the same level next year. Bardsey's fixed assets were revalued two years ago.

Bardsey's accounting statements for the last financial year are summarised in Exhibit A, and Exhibit B gives information on key financial indicators for the stores sector as a whole (listed companies only).

Bardsey's debentures currently sell on the stock market at £130 per £100 nominal. The current bank base rate is 8 per cent, and economists expect interest rates in general to fall over the next few years. The stock market currently applies a price earnings ratio of 11:1 to Bardsey's shares.

Required:

As Bardsey's chief accountant, you are instructed to:

(a) Calculate Bardsey's expected net cash flow in 1997 without the investment, assuming no changes in the level of net working capital.

(Note: A statement in FRS1 format is not required.)

(b) Prepare a report, containing suitable reservations about the use of ratio analysis, which compares Bardsey's financial performance and health with the stores sector as a whole.

(c) Advise the board of Bardsey as to how the proposed investment programme might be financed. You should refer to possible economic reasons why interest rates may fall, and to the possible implications for Bardsey's financing decision.

(d) Suggest other possible uses of the increasing cash balances if Bardsey rejects the proposed investment.

Exhibit A: Bardsey's financial statements
Profit and loss account for the year ended 31 December 1996

	£m
Turnover	150.0
Cost of sales*	(90.0)
Operating profit	60.0
Interest charges	(15.0)
Pre-tax profit	45.0
Corporation tax	(12.0)
Profits after tax	33.0
Dividends proposed	(20.0)
Retained earnings	*13.0*

Balance sheet as at 31 December 1996

Assets employed	£m	£m	£m

Fixed (net):			
Land and premises	200		
Fixtures and fittings	50		
Vehicles	50		300
Current:			
Stocks	60		
Debtors	100		
Cash	40	200	
Current liabilities:			
Trade creditors	(85)		
Dividends payable	(20)		
Tax payable	(12)	(117)	
Net current assets			83
Total assets less current liabilities			383
15% Debentures 2010–12			(100)
Net assets			*283*
Financed by:			
Issued share capital (par value 25p):			100
Revaluation reserve			60
Profit and loss account			123
Shareholders' funds			*283*

* This includes depreciation of £8m.

Exhibit B: Selected ratios for the stores sector

Return on (long-term) capital employed	14.3% (pre-tax)
Return on equity	15.3% (post-tax)
Operating profit margin	26.2%

Fixed asset turnover (sales/fixed assets)	1.2 times
Stock period	180 days
Debtor days	132 days
Gearing (total debt/equity)	42%
Interest cover	3.2 times
Dividend cover	2.1 times
P/E ratio	15:1

Practical project

   Obtain a copy of the most recent annual report and accounts for at least two companies in unrelated business sectors. In addition, survey

the financial media for current information relevant to your companies.

You should then:

1 For the two years given in the accounts, analyse and compare each company's working capital structure. Calculate their respective working capital ratios, operating and cash cycles. Have there been any notable changes over the two years?
2 Can you identify their respective working capital policies? Is it possible to explain any variations? Briefly discuss any difficulties you encounter in making your comparisons.
3 Do the annual reports refer to any particular problems or future developments with regard to working capital management? Highlight these in your analysis.
4 Do the reports provide an analysis of short- and medium-term sources of finance? If they do, identify the key features.

CASE STUDY 7 —SHORT-TERM FINANCIAL MANAGEMENT

High Sierra Ltd

High Sierra Ltd is a small business which designs, manufactures and markets a range of quality clothing and footwear for sporting and related outdoor activities. The present company has evolved from a traditional family clothing manufacturing business.

Over the past three years High Sierra has invested significantly in product design and marketing, particularly in building up its current range of quality brand names. This strategy has proved successful and consequently the company has experienced a period of rapid growth over the past three years. The board's strategy is to grow further by building on current strengths and taking advantage of expected market growth opportunities.

The board—which to date has consisted of a marketing director, a managing/ operations director and a design director—recognises its shortcomings in the financial management of the company and now wishes to recruit a financial manager.

Assume you have been appointed as the company's first full-time financial manager. At your first meeting, the board have presented you with the financial extracts from the company's accounts which are set out below. These show the actual financial position for the

years 1997–99, together with the board's financial forecast for the year 2000. All the company's sales are on credit.

High Sierra Ltd

	2000	1999	1998	1997
	Forecast		Actual	
Summary Profit & Loss Account	£m	£m	£m	£m
Sales	6.54	4.67	3.68	3.04
Cost of sales	3.47	2.48	1.99	1.67
Gross profit	3.07	2.19	1.69	1.37
Operating expenses	2.31	1.69	1.27	0.96
Operating profit	0.76	0.50	0.42	0.41
Interest	0.07	0.07	0.07	0.00
Tax	0.21	0.13	0.11	0.12
Profit after tax	0.48	0.30	0.24	0.29
Dividends	0.05	0.03	0.02	0.00
Retentions	0.43	0.27	0.22	0.29
	2000	1999	1998	1997
	Forecast		Actual	
Balance Sheet Extracts	£m	£m	£m	£m
Current assets				
Stocks	0.63	0.39	0.26	0.16
Debtors	1.27	0.72	0.41	0.26
Cash	0.00	0.02	0.11	0.12
	1.90	1.13	0.78	0.54
Current liabilities				
Creditors & accruals	0.35	0.23	0.17	0.14
Tax & dividends	0.26	0.16	0.13	0.12
Bank overdraft	0.22	0.00	0.00	0.00
Net current assets	1.07	0.74	0.48	0.28
Non-current liabilities				
Term loan	0.50	0.50	0.50	0.00

You have also been told that at the start of 1998 the board negotiated with its bank *a* £500,000 five-year secured loan to invest in fixed assets to upgrade High Sierra's design and manufacturing technologies. The term loan was initially negotiated to be repaid over five years at a fixed rate of 14 per cent. However, to date no repayments of principal have been made and the bank has been expressing its concerns.

Required:

(a) Calculate High Sierra's operating cycle and cash conversion

cycle for each year and comment on your findings.

(b) Assuming that the annual cost of sales figure represents the company's financial investment in its operating cycle and that there is a constant rate of flow in all elements of the operating cycle throughout the year, calculate the approximate amount of non-spontaneous financing which High Sierra would require in the year 2000.

(c) While attending a recent trade and industry conference you have learned that the industry in general has an average customer collection period of 48 days, an average stock holding of 40 days and an average creditor payment period of 50 days. Calculate the effect on the company's working capital position, cash flow and short-term financing for the year 2000, assuming it is possible to reduce the operating and cash conversion cycles to the average industry levels. Compare this with your findings in (b) above. For cash flow calculations assume tax and dividends are paid in the year in which they occur.

(d) As a means of reducing working capital investment even further the marketing manager has suggested offering customers a cash discount of 2 per cent for payment within 10 days. The marketing director has estimated that sales would increase by 4 per cent if a 2 per cent discount was offered. Variable costs are 65 per cent of sales.

The marketing director expects 70 per cent of customers to avail themselves of the discount. It is estimated that the average collection period would reduce to 28 days and bad debts would also reduce from 2 per cent to 1.5 per cent of sales. The company's opportunity cost of capital is currently 14 per cent. Evaluate the expected financial effects for the year 2000— assuming the industry averages are achieved—of implementing the marketing manager's proposal.

(e) Based on your analysis summarise the recommendations you feel you should submit to the board.

State clearly any assumptions you make. For convenience round your £m calculations to two decimal places and day calculations to the nearest whole number.

CASE STUDY 8 —COMPREHENSIVE

We conclude with a comprehensive case study of financial management. This case integrates a range of financial management topics covered in the text.

Lavinia Products plc

Lavinia Products plc manufactures toys and other goods for children. It has been trading for three years. The shares in the company are owned by five people, all of them employed full-time in the business. The company is doing well and now needs additional capital to expand operations.

Assume you are a consultant working for Lavinia Products plc. You have been assigned to the company to advise on its objectives and financial situation. As well as being provided with financial statements for the year to 31 December 1996, the company's accountant gives you the following information:

1 Sales and cost of sales are expected to increase by 10 per cent in each of the financial years ending 31 December 1997, 1998 and 1999. Operating expenses are expected to increase by 5 per cent each year.
2 The company expects to continue to be liable for tax at the marginal rate of 33 per cent. Assume tax is paid or refunded 12 months after the year end.
3 The ratios of *debtors to sales* and *creditors to cost of sales* will remain the same for the next three years.
4 The fixed assets are land and buildings which are not depreciated in the company's books. Capital allowances on the buildings may be ignored. All other assets used by the company (machinery, cars, etc.) are rented.
5 Dividends will grow at 25 per cent in each of the financial years 1997, 1998 and 1999, as per the company's objectives.
6 The company intends to purchase new machinery to the value of £500,000 during 1997 although an investment appraisal exercise has not been carried out. It will be depreciated straight line over 10 years. The company charges a full year's depreciation in the first year of purchase of its assets. Capital allowances are available at 25 per cent reducing balance on this expenditure.
7 Additional stock was purchased for £35,000 at the beginning of 1997. The value of stock after this purchase is likely to remain at £361,000 for the foreseeable future.
8 No decision has been made on the type of finance to be used for the expansion programme. However, the company's directors think they can raise new medium-term secured debt if necessary.
9 The average P/E ratio of listed companies in the same industry as Lavinia Products plc is 15.

A summary of the financial statements for the year to 31 December 1996 is as follows:

Lavinia Products plc
Summarised profit and loss account for the year to 31 December 1996

	£000
Turnover	1,560
Cost of sales	950
Gross profit	610
Operating expenses	325
Interest	30
Tax liability	84
Net profit	171
Dividends declared	68

Summarised balance sheet at 31 December 1996

	£000
Fixed assets (net book value)	750
Current assets:	
Stock	326
Debtors	192
Cash and bank	50
Current liabilities:	
Trade creditors	(135)
Other creditors (including tax and dividends)	(152)
Total assets less current liabilities	1,031
Financing	
Ordinary share capital (ordinary shares of £1)	500
Retained profits to 31 December 1995	128
Retentions for the year to 31 December 1996	103
10% debenture redeemable 2010	300
Total financing	1,031

The company's objectives include the following:

- to earn a pre-tax return on the closing book value of shareholders' funds of 35 per cent each year;
- to increase dividends per share by 25 per cent per year;
- to obtain a quotation on a recognised stock exchange within the next three years.

1 Discuss the specific problems encountered by small and medium-sized enterprises (SMEs) in raising finance for expansion.
   This part of the question should be answered in general terms, although your answer may use the case details for illustration if you wish.

2 Using the information in the case:

 (a) prepare forecast profit and loss accounts for the years 1997, 1998 and 1999, and calculate whether the company is likely to meet its stated financial objective (return on shareholders' funds) for these three years;

 (b) prepare cash flow forecasts for the years 1997, 1998 and 1999, and estimate the amount of funds which will need to be raised by the company to finance its expansion.

Notes

 • You should ignore interest on returns on surplus funds invested during the three-year period of review.

 • This is not an investment appraisal exercise; you may ignore the timing of cash flows within each year and you should not discount the cash flows.

 • Ignore inflation.

3 Write a report to the directors of Lavinia Products plc which:

 (a) discusses the key aspects and implications of the financial information you have obtained in your answer to part (b) of the question, in particular noting whether the company is likely to meet its stated objectives;

 (b) discusses whether the objectives stated are suitable for the company at the present stage of its development, and discusses alternative objectives which the directors could consider;

 (c) recommends additional methods of financial forecasting which could be used with advantage by the company's management. You should assume that the only forecasts prepared by the company at present are similar to those you have prepared for your answer to part (b) of this question.

FURTHER READING

Factoring and Discounting

See periodic reports of the *Factors and Discounters Association.*

Leasing

• *Asset Finance and Leasing Handbook* . Grant, R., Woodhead-Faulkner, 1992.

• *Leasing Handbook* . Soper, D.R., McGraw, 1992.
• *Money and Machines* . Department of Trade and Industry, HMSO, 1995.
In respect of vehicle leasing see various publications of the *British Vehicle Rental and Leasing Association (BVRLA).*

Small firms financing

A range of publications on small firms financing is available from the Department of Trade and Industry, see for example:
• *A Guide to Help Small Firms* . Department of Trade and Industry, February 1997.
   The following also provide helpful insights into small firms financing:
Understanding the Small Business Sector . D.J.Storey, International Thomson Business Press, 1997.
'Banks and small to medium sized business financing in the United Kingdom: some general issues.' Hutchinson, R. and McKillop, D., *National Westminster Bank Quarterly Review* , 1992.

APPENDIX A
Financial Tables

Table A1 Future value interest factor (FVIF) for £1 compounded at *r* per cent for *n* periods

   Table A2 Future value interest factor (FVIFA) for a £1 annuity compounded at *r* per cent for *n* periods

   Table A3 Present value interest factor (PVIF) for £1 discounted at *r* per cent for *n* periods

   Table A4 Present value interest factor (PVIFA) for a £1 annuity discounted at *r* per cent for *n* periods

Table A.1 Future value interest factor (FVIF) for £1 compounded at *r* per cent for *n* periods

n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.188	1.210
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560
19	1.208	1.457	1.753	2.107	2.527	3.026	3.616	4.316	5.142	6.116
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727
21	1.232	1.516	1.860	2.279	2.786	3.399	4.140	5.034	6.109	7.400

n										
22	1.245	1.546	1.916	2.370	2.925	3.603	4.430	5.436	6.658	8.140
23	1.257	1.577	1.974	2.465	3.071	3.820	4.740	5.871	7.258	8.954
24	1.270	1.608	2.033	2.563	3.225	4.049	5.072	6.341	7.911	9.850
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.834
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.062	13.267	17.449
40	1.489	2.208	3.262	4.801	7.040	10.285	14.974	21.724	31.408	45.258
50	1.645	2.691	4.384	7.106	11.467	18.419	29.456	46.900	74.354	117.386

n	11%	12%	13%	14%	15%	16%	17%	18%	19%	
1	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	
2	1.232	1.254	1.277	1.300	1.322	1.346	1.369	1.392	1.416	
3	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	
4	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	
5	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	
6	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	
7	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	
8	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	
9	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	
10	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	
11	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	
12	3.498	3.896	4.334	4.818	5.350	5.936	6.580	7.288	8.064	
13	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	
14	4.310	4.887	5.535	6.261	7.076	7.987	9.007	10.147	11.420	
15	4.785	5.474	6.254	7.138	8.137	9.265	10.539	11.974	13.589	
16	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.171	
17	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	
18	6.543	7.690	9.024	10.575	12.375	14.462	16.879	19.673	22.900	
19	7.263	8.613	10.197	12.055	14.232	16.776	19.748	23.214	27.251	
20	8.062	9.646	11.523	13.743	16.366	19.461	23.105	27.393	32.429	
21	8.949	10.804	13.021	15.667	18.821	22.574	27.033	32.323	38.591	
22	9.933	12.100	14.713	17.861	21.644	26.186	31.629	38.141	45.923	
23	11.026	13.552	16.626	20.361	24.891	30.376	37.005	45.007	54.648	
24	12.239	15.178	18.788	23.212	28.625	35.236	43.296	53.108	65.031	
25	13.585	17.000	21.230	26.461	32.918	40.874	50.656	62.667	77.387	
30	22.892	29.960	39.115	50.949	66.210	85.849	111.061	143.367	184.672	
40	64.999	93.049	132.776	188.876	267.856	378.715	533.846	750.353	1051.6421	
50	184.559	288.996	450.711	700.197	1083.619	1670.669	2566.080	3927.189	5988.7309	

n	21%	22%	23%	24%	25%	26%	27%	
1	1.210	1.220	1.230	1.240	1.250	1.260	1.270	
2	1.464	1.488	1.513	1.538	1.562	1.588	1.613	
3	1.772	1.816	1.861	1.907	1.953	2.000	2.048	
4	2.144	2.215	2.289	2.364	2.441	2.520	2.601	

5	2.594	2.703	2.815	2.932	3.052	3.176	3.304
6	3.138	3.297	3.463	3.635	3.815	4.001	4.196
7	3.797	4.023	4.259	4.508	4.768	5.042	5.329
8	4.595	4.908	5.239	5.589	5.960	6.353	6.767
9	5.560	5.987	6.444	6.931	7.451	8.004	8.595
10	6.727	7.305	7.926	8.594	9.313	10.086	10.915
11	8.140	8.912	9.749	10.657	11.642	12.708	13.862
12	9.850	10.872	11.991	13.215	14.552	16.012	17.605
13	11.918	13.264	14.749	16.386	18.190	20.175	22.359
14	14.421	16.182	18.141	20.319	22.737	25.420	28.395
15	17.449	19.742	22.314	25.195	28.422	32.030	36.062
16	21.113	24.085	27.446	31.242	35.527	40.357	45.799
17	25.547	29.384	33.758	38.740	44.409	50.850	58.165
18	30.912	35.848	41.523	48.038	55.511	64.071	73.869
19	37.404	43.735	51.073	59.567	69.389	80.730	93.813
20	45.258	53.357	62.820	73.863	86.736	101.720	119.143
21	54.762	65.095	77.268	91.591	108.420	128.167	151.312
22	66.262	79.416	95.040	113.572	135.525	161.490	192.165
23	80.178	96.887	116.899	140.829	169.407	203.477	244.050
24	97.015	118.203	143.786	174.628	211.758	256.381	309.943
25	117.388	144.207	176.857	216.539	264.698	323.040	393.628
30	304.471	389.748	497.904	634.810	807.793	1025.904	1300.477
40	2048.309	2846.941	3946.340	5455.797	7523.156	10346.879	14195.051
50	13779.844	20795.680	31278.301	46889.207	70064.812	104354.562	154942.687

n	31%	32%	33%	34%	35%	36%	37%
1	1.310	1.320	1.330	1.340	1.350	1.360	1.370
2	1.716	1.742	1.769	1.796	1.822	1.850	1.877
3	2.248	2.300	2.353	2.406	2.460	2.515	2.571
4	2.945	3.036	3.129	3.224	3.321	3.421	3.523
5	3.858	4.007	4.162	4.320	4.484	4.653	4.826
6	5.054	5.290	5.535	5.789	6.053	6.328	6.612
7	6.621	6.983	7.361	7.758	8.172	8.605	9.058
8	8.673	9.217	9.791	10.395	11.032	11.703	12.410
9	11.362	12.166	13.022	13.930	14.894	15.917	17.001
10	14.884	16.060	17.319	18.666	20.106	21.646	23.292
11	19.498	21.199	23.034	25.012	27.144	29.439	31.910
12	25.542	27.982	30.635	33.516	36.644	40.037	43.716
13	33.460	36.937	40.745	44.912	49.469	54.451	59.892
14	43.832	49.756	54.190	60.181	66.784	74.053	82.051
15	57.420	64.358	72.073	80.643	90.158	100.712	112.410
16	75.220	84.953	95.857	108.061	121.713	136.968	154.002
17	98.539	112.138	127.490	144.802	164.312	186.277	210.983

18	129.086	148.022	169.561	194.035	221.822	253.337	289.046
19	169.102	195.389	225.517	260.006	299.459	344.537	395.993
20	221.523	257.913	299.937	348.408	404.270	468.571	542.511
21	290.196	340.446	398.916	466.867	545.764	637.256	743.240
22	380.156	449.388	530.558	625.601	736.781	865.668	1018.238
23	498.004	593.192	705.642	838.305	994.653	1178.668	1394.986
24	652.385	783.013	938.504	1123.328	1342.781	1602.988	1911.129
25	854.623	1033.577	1248.210	1505.258	1812.754	2180.063	2618.245
30	3297.081	4142.008	5194.516	6503.285	8128.426	10142.914	12636.086
50	49072.621	66519.313	89962.188	121388.437	163433.875	219558.625	294317.937

Table A.2 Future value interest factor (FVIFA) for a £1 annuity compounded at *r* per cent for *n* periods

n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436
9	9.368	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531
12	12.682	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523
14	14.947	15.974	17.086	18.292	19.598	21.015	22.550	24.215	26.019	27.975
15	16.097	17.293	18.599	20.023	21.578	23.276	25.129	27.152	29.361	31.772
16	17.258	18.639	20.157	21.824	23.657	25.672	27.888	30.324	33.003	35.949
17	18.430	20.012	21.761	23.697	25.840	28.213	30.840	33.750	36.973	40.544
18	19.614	21.412	23.414	25.645	28.132	30.905	33.999	37.450	41.301	45.599
19	20.811	22.840	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.158
20	22.019	24.297	26.870	29.778	33.066	36.785	40.995	45.762	51.159	57.274
21	23.239	25.783	28.676	31.969	35.719	39.992	44.865	50.422	56.764	64.002
22	24.471	27.299	30.536	34.248	38.505	43.392	49.005	55.456	62.872	71.402
23	25.716	28.845	32.452	36.618	41.430	46.995	53.435	60.893	69.531	79.542
24	26.973	30.421	34.426	39.082	44.501	50.815	58.176	66.764	76.789	88.496
25	28.243	32.030	36.459	41.645	47.726	54.864	63.248	73.105	84.699	98.346
30	34.784	40.567	47.575	56.084	66.438	79.057	94.459	113.282	136.305	164.491
40	48.885	60.401	75.400	95.024	120.797	154.758	199.630	295.052	337.872	442.580
50	64.461	84.577	112.794	152.664	209.341	290.325	406.516	573.756	815.051	1163.865

n	11%	12%	13%	14%	15%	16%	17%	18%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180
3	3.342	3.374	3.407	3.440	3.472	3.506	3.539	3.572
4	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215
5	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154
6	7.913	8.115	8.323	8.535	8.754	8.977	9.207	9.442
7	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.141
8	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327
9	14.164	14.776	15.416	16.085	16.786	17.518	18.285	19.086
10	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521
11	19.561	20.655	21.814	23.044	24.349	25.733	27.200	28.755
12	22.713	24.133	25.650	27.271	29.001	30.850	32.824	34.931
13	26.211	28.029	29.984	32.088	34.352	36.786	39.404	42.218
14	30.095	32.392	34.882	37.581	40.504	43.672	47.102	50.818
15	34.405	37.280	40.417	43.842	47.580	51.659	56.109	60.965
16	39.190	42.753	46.671	50.980	55.717	60.925	66.648	72.938
17	44.500	48.883	53.738	59.117	65.075	71.673	78.978	87.067
18	50.396	55.749	61.724	68.393	75.836	84.140	93.404	103.739
19	56.939	63.439	70.748	78.968	88.211	98.603	110.283	123.412
20	64.202	72.052	80.946	91.024	102.443	115.379	130.031	146.626
21	72.264	81.698	92.468	104.767	118.809	134.840	153.136	174.019
22	81.213	92.502	105.489	120.434	137.630	157.414	180.169	206.342
23	91.147	104.602	120.203	138.295	159.274	183.600	211.798	244.483
24	102.173	118.154	136.829	158.656	184.166	213.976	248.803	289.490
25	114.412	133.333	155.616	181.867	212.790	249.212	292.099	342.598
30	199.018	241.330	293.192	356.778	434.738	530.306	647.423	790.932
40	581.812	767.080	1013.667	1341.979	1779.048	2360.724	3134.412	4163.094
50	1668.723	2399.975	3459.344	4994.301	7217.488	10435.449	15088.805	21812.273

n	21%	22%	23%	24%	25%	26%	27%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.210	2.220	2.230	2.240	2.250	2.260	2.270
3	3.674	3.708	3.743	3.778	3.813	3.848	3.883
4	5.446	5.524	5.604	5.684	5.766	5.848	5.931
5	7.589	7.740	7.893	8.048	8.207	8.368	8.533
6	10.183	10.442	10.708	10.980	11.259	11.544	11.837
7	13.321	13.740	14.171	14.615	15.073	15.546	16.032
8	17.119	17.762	18.430	19.123	19.842	20.588	21.361
9	21.714	22.670	23.669	24.712	25.802	26.940	28.129
10	27.274	28.657	20.113	31.643	33.253	34.945	36.723
11	34.001	35.962	38.039	40.238	42.566	45.030	47.639
12	42.141	44.873	47.787	50.895	54.208	57.738	61.501
13	51.991	55.745	59.778	64.109	68.760	73.750	79.106

14	63.909	69.009	74.528	80.496	86.949	93.925	101.465
15	78.330	85.191	92.669	100.815	109.687	119.346	129.860
16	95.779	104.933	114.983	126.010	138.109	151.375	165.922
17	116.892	129.019	142.428	157.252	173.636	191.733	211.721
18	142.439	158.403	176.187	195.993	218.045	242.583	269.885
19	173.351	194.251	217.710	244.031	273.556	306.654	343.754
20	210.755	237.986	268.783	303.598	342.945	387.384	437.568
21	256.013	291.343	331.603	377.461	429.681	489.104	556.710
22	310.775	356.438	408.871	469.052	538.101	617.270	708.022
23	377.038	435.854	503.911	582.624	673.626	778.760	900.187
24	457.215	532.741	620.810	723.453	843.032	982.237	1144.237
25	554.230	650.944	764.596	898.082	1054.791	1238.617	1454.180
30	1445.111	1767.044	2160.459	2640.881	3227.172	3941.953	4812.891
40	9749.141	12936.141	17153.691	22728.367	30088.621	39791.957	52570.707

n	31%	32%	33%	34%	35%	36%	37%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.00
2	2.310	2.320	2.330	2.340	2.350	2.360	2.37
3	4.026	4.062	4.099	4.136	4.172	4.210	4.24
4	6.274	6.362	6.452	6.542	6.633	6.725	6.81
5	9.219	9.398	9.581	9.766	9.954	10.146	10.34
6	13.077	13.406	13.742	14.086	14.438	14.799	15.16
7	18.131	18.696	19.277	19.876	20.492	21.126	21.77
8	24.752	25.678	26.638	27.633	28.664	29.732	30.83
9	33.425	34.895	36.429	38.028	39.696	41.435	43.24
10	44.786	47.062	49.451	51.958	54.590	57.351	60.24
11	59.670	63.121	66.769	70.624	74.696	78.998	83.54
12	79.167	84.320	89.803	95.636	101.840	108.437	115.45
13	104.709	112.302	120.438	129.152	138.484	148.474	159.16
14	138.169	149.239	161.183	174.063	187.953	202.925	219.05
15	182.001	197.996	215.373	234.245	254.737	276.978	301.10
16	239.421	262.354	287.446	314.888	344.895	377.690	413.52
17	314.642	347.307	383.303	422.949	466.608	514.658	567.52
18	413.180	459.445	510.792	567.751	630.920	700.935	778.50
19	542.266	607.467	680.354	761.786	852.741	954.271	1067.55
20	711.368	802.856	905.870	1021.792	1152.200	1298.809	1463.54
21	932.891	1060.769	1205.807	1370.201	1556.470	1767.380	2006.05
22	1223.087	1401.215	1604.724	1837.068	2102.234	2404.636	2749.29
23	1603.243	1850.603	2135.282	2462.669	2839.014	3271.304	3767.53
24	2101.247	2443.795	2840.924	3300.974	3833.667	4449.969	5162.51
25	2753.631	3226.808	3779.428	4424.301	5176.445	6052.957	7073.64
30	10632.543	12940.672	15737.945	19124.434	23221.258	28172.016	34148.90

Table A.3 Present value interest factor (PVIF) for £1 discounted at *r* per cent for *n* periods

n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909
2	.980	.961	.943	.925	.907	.890	.873	.857	.842	.826
3	.971	.942	.915	.889	.864	.840	.816	.794	.772	.751
4	.961	.924	.888	.855	.823	.792	.763	.735	.708	.683
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621
6	.942	.888	.837	.790	.746	.705	.666	.630	.596	.564
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350
12	.887	.789	.701	.625	.557	.497	.444	.397	.356	.319
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180
19	.828	.686	.570	.475	.396	.331	.277	.232	.194	.164
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149
21	.811	.660	.538	.439	.359	.294	.242	.199	.164	.135
22	.803	.647	.522	.422	.342	.278	.226	.184	.150	.123
23	.795	.634	.507	.406	.326	.262	.211	.170	.138	.112
24	.788	.622	.492	.390	.310	.247	.197	.158	.126	.102
25	.780	.610	.478	.375	.295	.233	.184	.146	.116	.092
30	.742	.552	.412	.308	.231	.174	.131	.099	.075	.057
40	.672	.453	.307	.208	.142	.097	.067	.046	.032	.022
50	.608	.372	.228	.141	.087	.054	.034	.021	.013	.009

n	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	.812	.797	.783	.769	.756	.743	.731	.718	.706	.694
3	.731	.712	.693	.675	.658	.641	.624	.609	.593	.579
4	.659	.636	.613	.592	.572	.552	.534	.516	.499	.482
5	.593	.567	.543	.519	.497	.476	.456	.437	.419	.402
6	.535	.507	.480	.456	.432	.410	.390	.370	.352	.335
7	.482	.452	.425	.400	.376	.354	.333	.314	.296	.279
8	.434	.404	.376	.351	.327	.305	.285	.266	.249	.233
9	.391	.361	.333	.308	.284	.263	.243	.225	.209	.194
10	.352	.322	.295	.270	.247	.227	.208	.191	.176	.162

n										
11	.317	.287	.261	.237	.215	.195	.178	.162	.148	.135
12	.286	.257	.231	.208	.187	.168	.152	.137	.124	.112
13	.258	.229	.204	.182	.163	.145	.130	.116	.104	.093
14	.232	.205	.181	.160	.141	.125	.111	.099	.088	.078
15	.209	.183	.160	.140	.123	.108	.095	.084	.074	.065
16	.188	.163	.141	.123	.107	.093	.081	.071	.062	.054
17	.170	.146	.125	.108	.093	.080	.069	.060	.052	.045
18	.153	.130	.111	.095	.081	.069	.059	.051	.044	.038
19	.138	.116	.098	.083	.070	.060	.051	.043	.037	.031
20	.124	.104	.087	.073	.061	.051	.043	.037	.031	.026
21	.112	.093	.077	.064	.053	.044	.037	.031	.026	.022
22	.101	.083	.068	.056	.046	.038	.032	.026	.022	.018
23	.091	.074	.060	.049	.040	.033	.027	.022	.018	.015
24	.082	.066	.053	.043	.035	.028	.023	.019	.015	.013
25	.074	.059	.047	.038	.030	.024	.020	.016	.013	.010
30	.044	.033	.026	.020	.015	.012	.009	.007	.005	.004
40	.015	.011	.008	.005	.004	.003	.002	.001	.001	.001
50	.005	.003	.002	.001	.001	.001	.000	.000	.000	.000

n	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769
2	.683	.672	.661	.650	.640	.630	.620	.610	.601	.592
3	.564	.551	.537	.524	.512	.500	.488	.477	.466	.455
4	.467	.451	.437	.423	.410	.397	.384	.373	.361	.350
5	.386	.370	.355	.341	.328	.315	.303	.291	.280	.269
6	.319	.303	.289	.275	.262	.250	.238	.227	.217	.207
7	.263	.249	.235	.222	.210	.198	.188	.178	.168	.159
8	.218	.204	.191	.179	.168	.157	.148	.139	.130	.123
9	.180	.167	.155	.144	.134	.125	.116	.108	.101	.094
10	.149	.137	.126	.116	.107	.099	.092	.085	.078	.073
11	.123	.112	.103	.094	.086	.079	.072	.066	.061	.056
12	.102	.092	.083	.076	.069	.062	.057	.052	.047	.043
13	.084	.075	.068	.061	.055	.050	.045	.040	.037	.033
14	.069	.062	.055	.049	.044	.039	.035	.032	.028	.025
15	.057	.051	.045	.040	.035	.031	.028	.025	.022	.020
16	.047	.042	.036	.032	.028	.025	.022	.019	.017	.015
17	.039	.034	.030	.026	.023	.020	.017	.015	.013	.012
18	.032	.028	.024	.021	.018	.016	.014	.012	.010	.009
19	.027	.023	.020	.017	.014	.012	.011	.009	.008	.007
20	.022	.019	.016	.014	.012	.010	.008	.007	.006	.005
21	.018	.015	.013	.011	.009	.008	.007	.006	.005	.004
22	.015	.013	.011	.009	.007	.006	.005	.004	.004	.003
23	.012	.010	.009	.007	.006	.005	.004	.003	.003	.002
24	.010	.008	.007	.006	.005	.004	.003	.003	.002	.002

25	.009	.007	.006	.005	.004	.003	.003	.002	.002	.001
30	.003	.003	.002	.002	.001	.001	.001	.001	.000	.000
40	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
50	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

n	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
1	.763	.758	.752	.746	.741	.735	.730	.725	.719	.714
2	.583	.574	.565	.557	.549	.541	.533	.525	.518	.510
3	.445	.435	.425	.416	.406	.398	.389	.381	.372	.364
4	.340	.329	.320	.310	.301	.292	.284	.276	.268	.260
5	.259	.250	.240	.231	.223	.215	.207	.200	.193	.186
6	.198	.189	.181	.173	.165	.158	.151	.145	.139	.133
7	.151	.143	.136	.129	.122	.116	.110	.105	.100	.095
8	.115	.108	.102	.096	.091	.085	.081	.076	.072	.068
9	.088	.082	.077	.072	.067	.063	.059	.055	.052	.048
10	.067	.062	.058	.054	.050	.046	.043	.040	.037	.035
11	.051	.047	.043	.040	.037	.034	.031	.029	.027	.025
12	.039	.036	.033	.030	.027	.025	.023	.021	.019	.018
13	.030	.027	.025	.022	.020	.018	.017	.015	.014	.013
14	.023	.021	.018	.017	.015	.014	.012	.011	.010	.009
15	.017	.016	.014	.012	.011	.010	.009	.008	.007	.006
16	.013	.012	.010	.009	.008	.007	.006	.006	.005	.005
17	.010	.009	.008	.007	.006	.005	.005	.004	.004	.003
18	.008	.007	.006	.005	.005	.004	.003	.003	.003	.002
19	.006	.005	.004	.004	.003	.003	.003	.002	.002	.002
20	.005	.004	.003	.003	.002	.002	.002	.002	.001	.001
21	.003	.003	.003	.002	.002	.002	.001	.001	.001	.001
22	.003	.002	.002	.002	.001	.001	.001	.001	.001	.001
23	.002	.001	.001	.001	.001	.001	.001	.000	.000	.000
24	.002	.001	.001	.001	.001	.000	.000	.000	.000	.000
25	.001	.001	.001	.001	.001	.000	.000	.000	.000	.000
30	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
40	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Table A.4 Present value interest factor (PVIFA) for a £1 annuity discounted at *r* per cent for *n* periods

n	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791

6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.326	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.746	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.560	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.352	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.292	8.649
22	19.661	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.442	8.772
23	20.456	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985
24	21.244	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985
25	22.023	19.524	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077
30	25.808	22.397	19.601	17.292	15.373	13.765	12.409	11.258	10.274	9.427
40	32.835	27.356	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779
50	39.197	31.424	25.730	21.482	18.256	15.762	13.801	12.234	10.962	9.915

n	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.487	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.303	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.669	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.585	5.316	5.070	4.843

20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
21	8.075	7.562	7.102	6.687	6.312	5.973	5.665	5.384	5.127	4.891
22	8.176	7.645	7.170	6.743	6.359	6.011	5.696	5.410	5.149	4.909
23	8.266	7.718	7.230	6.792	6.399	6.044	5.723	5.432	5.167	4.925
24	8.348	7.784	7.283	6.835	6.434	6.073	5.747	5.451	5.182	4.937
25	8.442	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
40	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
50	9.042	8.305	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999

n	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%
1	.826	.820	.813	.806	.800	.794	.787	.781	.775	.769
2	1.509	1.492	1.474	1.457	1.440	1.424	1.407	1.392	1.376	1.361
3	2.074	2.042	2.011	1.981	1.952	1.923	1.896	1.868	1.842	1.816
4	2.540	2.494	2.448	2.404	2.362	2.320	2.280	2.241	2.203	2.166
5	2.926	2.864	2.803	2.745	2.689	2.635	2.583	2.532	2.483	2.436
6	3.245	3.167	3.092	3.020	2.951	2.885	2.821	2.759	2.700	2.643
7	3.508	3.416	3.327	3.242	3.161	3.083	3.009	2.937	2.868	2.802
8	3.726	3.619	3.518	3.421	3.329	3.241	3.156	3.076	2.999	2.925
9	3.905	3.786	3.673	3.566	3.463	3.366	3.273	3.184	3.100	3.019
10	4.054	3.923	3.799	3.682	3.570	3.465	3.364	3.269	3.178	3.092
11	4.177	4.035	3.902	3.776	3.656	3.544	3.437	3.335	3.239	3.147
12	4.278	4.127	3.985	3.851	3.725	3.606	3.493	3.387	3.286	3.190
13	4.362	4.203	4.053	3.912	3.780	3.656	3.538	3.427	3.322	3.223
14	4.432	4.265	4.108	3.962	3.824	3.695	3.573	3.459	3.351	3.249
15	4.489	4.315	4.153	4.001	3.859	3.726	3.601	3.483	3.373	3.268
16	4.536	4.357	4.189	4.033	3.887	3.751	3.623	3.503	3.390	3.283
17	4.576	4.391	4.219	4.059	3.910	3.771	3.640	3.518	3.403	3.295
18	4.608	4.419	4.243	4.080	3.928	3.786	3.654	3.529	3.413	3.304
19	4.635	4.442	4.263	4.097	3.942	3.799	3.664	3.539	3.421	3.311
20	4.657	4.460	4.279	4.110	3.954	3.808	3.673	3.546	3.427	3.316
21	4.675	4.476	4.292	4.121	3.963	3.816	3.679	3.551	3.432	3.320
22	4.690	4.488	4.302	4.130	3.970	3.822	3.684	3.556	3.436	3.323
23	4.703	4.499	4.311	4.137	3.976	3.827	3.689	3.559	3.438	3.325
24	4.713	4.507	4.318	4.143	3.981	3.831	3.692	3.562	3.441	3.327
25	4.721	4.514	4.323	4.147	3.985	3.834	3.694	3.564	3.442	3.329
30	4.746	4.534	4.339	4.160	3.995	3.842	3.701	3.569	3.447	3.332
40	4.760	4.544	4.347	4.166	3.999	3.846	3.703	3.571	3.448	3.333
50	4.762	4.545	4.348	4.167	4.000	3.846	3.704	3.571	3.448	3.333

n	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
1	.763	.758	.752	.746	.741	.735	.730	.725	.719	.714
2	1.346	1.331	1.317	1.303	1.289	1.276	1.263	1.250	1.237	1.224

3	1.791	1.766	1.742	1.719	1.696	1.673	1.652	1.630	1.609	1.589
4	2.130	2.096	2.062	2.029	1.997	1.966	1.935	1.906	1.877	1.849
5	2.390	2.345	2.302	2.260	2.220	2.181	2.143	2.106	2.070	2.035
6	2.588	2.534	2.483	2.433	2.385	2.339	2.294	2.251	2.209	2.168
7	2.739	2.677	2.619	2.562	2.508	2.455	2.404	2.355	2.308	2.263
8	2.854	2.786	2.721	2.658	2.598	2.540	2.485	2.432	2.380	2.331
9	2.942	2.868	2.798	2.730	2.665	2.603	2.544	2.487	2.432	2.379
10	3.009	2.930	2.855	2.784	2.715	2.649	2.587	2.527	2.469	2.414
11	3.060	2.978	2.899	2.824	2.752	2.683	2.618	2.555	2.496	2.438
12	3.100	3.013	2.931	2.853	2.779	2.708	2.641	2.576	2.515	2.456
13	3.129	3.040	2.956	2.876	2.799	2.727	2.658	2.592	2.529	2.469
14	3.152	3.061	2.974	2.892	2.814	2.740	2.670	2.603	2.539	2.477
15	3.170	3.076	2.988	2.905	2.825	2.750	2.679	2.611	2.546	2.484
16	3.183	3.088	2.999	2.914	2.834	2.757	2.685	2.616	2.551	2.489
17	3.193	3.097	3.007	2.921	2.840	2.763	2.690	2.621	2.555	2.492
18	3.201	3.104	3.012	2.926	2.844	2.767	2.693	2.624	2.557	2.494
19	3.207	3.109	3.017	2.930	2.848	2.770	2.696	2.626	2.559	2.496
20	3.211	3.113	3.020	2.933	2.850	2.772	2.698	2.627	2.561	2.497
21	3.215	3.116	3.023	2.935	2.852	2.773	2.699	2.629	2.562	2.498
22	3.217	3.118	3.025	2.936	2.853	2.775	2.700	2.629	2.562	2.498
23	3.219	3.120	3.026	2.938	2.854	2.775	2.701	2.630	2.563	2.499
24	3.221	3.121	3.027	2.939	2.855	2.776	2.701	2.630	2.563	2.499
25	3.222	3.122	3.028	2.939	2.856	2.776	2.702	2.631	2.563	2.499
30	3.225	2.124	3.030	2.941	2.857	2.777	2.702	2.631	2.564	2.500
40	3.226	3.125	3.030	2.941	2.857	2.778	2.703	2.632	2.564	2.500
50	3.226	3.125	3.030	2.941	2.857	2.778	2.703	2.632	2.564	2.500

APPENDIX B
Solutions to Exercise Questions

CHAPTER 1

Exercise 1:

$$\text{ROI} = \frac{\pounds 2,480,000}{\pounds 17,714,000} \times 100 = 14.0\%$$

$$\text{EPS} = \frac{\pounds 1,680,000}{3,000,000} = 56\text{p}$$

Exercise 2:

1) Investment.
2) Financing.
3) Investment.
4) Revenue expenditure.
5) Revenue expenditure.
6) Revenue expenditure.
7) Investment.
8) Revenue expenditure.
9) Investment.
10) Financing.

Exercise 3: (a) For the two organisations mentioned, financial objectives will have their similarities and distinctions and are likely to include the following:
(i)

- To maximise the owner's wealth.
- To earn a satisfactory rate of return on the investment in the business.
- To provide a value for money service for guests.
- To generate a healthy cash flow.
- To generate sufficient funds for future growth and development.
- To keep any borrowings under control.

(ii)

- To provide value for money services to the local community.
- To achieve a target rate of return of 6 per cent on the assets employed in providing the service.
- To maintain a healthy cash flow.
- To live within its financial budget.
- To keep any borrowings under control.
- To meet other financial objectives as determined from time to time by government.

(b)

Short-term actions could include the following:

- Deferring essential investment in fixed assets. Investing in fixed assets will increase the firm's total investment and reduce profits through increased depreciation charges. This may depress a firm's return on investment (ROI) calculation in the short term.
- Reducing or eliminating expenditures on: marketing and advertising; repairs, maintenance and renovations; and staff training.
- Reducing service and quality standards.

The above lists are not intended to be comprehensive, you may have considered other equally valid objectives and actions.

Exercise 4:

	£000
Operating profit	364
Depreciation	46
	410
Interest	21
Tax	73
	316
Dividends	38
	278
Capital expenditure	109
Free cash now (FCF)	*169*

Exercise 5: Rational risk-averse investors will expect investments to yield a return commensurate with the level of risk. They will expect low risk investments to yield low returns and high risk investments to yield high returns. The higher the return required by the investor, the greater the level of risk the investor will have to accept. Thus increased returns can only be gained at the expense of accepting increased risk.

This is the nature of the **risk-return trade-off**—higher investment returns can only be earned by accepting higher investment risk.

CHAPTER 2

Exercise 1: The revised balance sheet for Davies Enterprises is as follows:

	£m
Fixed assets	5.22
Net current assets	1.23
Total assets less current liabilities	6.45
Long-term loans	2.50
Net assets	3.95
Capital and reserves	
Called up share capital	2.50
Profit and loss account	1.45
Equity shareholders' funds	*3.95*

The revised gearing ratio is calculated as:

$$\frac{£2.50m}{£2.50m + £3.95m} \times 100 = 38.8\%$$

The company's gearing ratio has increased reflecting the increase in its financial risk.

Exercise 2:

1. *Financial risk* is increased through additional borrowings, and *interest rate risk* is increased as the interest rate payable on the loan may rise.
2. *Credit risk*—the risk that the customer might not pay.
3. *Financial risk* is increased. A new leasing agreement will increase fixed financial outlays in the form of regular rental payments.
4. *Currency risk,* due to possible changes in exchange rates, and *credit risk*.

Exercise 3: 2), 5), 6)

Exercise 4: Knowing who the shareholders are is important in maintaining good investor relations and in seeking support for the company's activities. This will be particularly important when it comes to raising further capital and taking action to prevent a hostile takeover bid.

If a company has a track record of poor investor relations then raising additional capital may be difficult and expensive. In addition, if a takeover bid is made for the company disgruntled and poorly informed shareholders will willingly sell and the managers may be dismissed.

Changes in share ownership can also influence a company's share price. A large shareholder who is unhappy with a disinterested management may sell his/her shareholding causing a fall in the company's share price and thus in its total market value. This may also cause other shareholders to similarly dispose of their shareholdings. Alternatively increases in share price may be caused by a predator buying shares in the company, signalling a possible takeover bid.

It is thus in management's own interest, as well as the shareholders, to know who the shareholders are, and to maintain good working relationships with them.

Exercise 5: In this case the directors' proposals would not seem to suggest good corporate governance, or that the codes of best practice are being followed, or even recognised. Can the directors be considered to be acting in the best interests of the shareholders? Are all stakeholders being treated fairly and equitably? Clearly, an agency issues exists.

With regard to the issue of executive pay, this should be determined by an independent remuneration committee, consisting of non-executive directors with no direct financial interest.

It has to be remembered that corporate governance is a complex area, and in many cases it may be difficult, or even impossible, to arrive at definitive, clear-cut answers. The codes of best practice provide very helpful guides to decision-making, but they are unlikely to cover all eventualities. The view of the chairman of the Hampel Committee, for example, was that judgement should take precedence over prescription.

You may find it interesting to discuss the issues raised in this exercise with your colleagues and friends.

Exercise 6: This exercise has been presented as a classic ethical dilemma for which it is not possible to provide a definitive or prescriptive solution. Each of us may behave differently and suggest different approaches to resolving the dilemma. The final decision is likely to involve a resolution of many conflicting issues and trade-offs.

Clearly if the financial director was being asked to make false or deliberately misleading statements or adjustments to the accounts then the answer would be more clear-cut. Apart from being clearly improper and unethical, such actions would be illegal. Again some specific questions you may wish to consider include:

- Would all stakeholders be treated fairly and equitably as a result of my decision, or would some groups be disadvantaged?
- Is the chairman acting in the best interests of the shareholders?

As for the previous exercise, you may find it interesting to discuss the issues it raises with your colleagues and friends.

CHAPTER 3

Exercise 1: Financial markets bring together demanders and suppliers of finance in order to satisfy their mutual financial needs. The markets provide sources of finance for

companies and investment opportunities for investors. Financial markets, through the continuous activity of buying and selling corporate securities and the evaluation of information, determine the market value of corporate firms whose securities are traded in the markets.

Exercise 2: The key attractions of the euromarkets, for investing and borrowing companies, are related to *size, competitiveness, flexibility* and *freedom from controls* . Because of their size and scale euromarkets provide corporate treasurers with greater investment and financing opportunities than domestic markets. The euromarkets offer **cheaper capital** through making larger issues than would be possible in a single domestic market.

Euromarkets generally offer more competitive interest rates on loans and deposits than the domestic markets. They are also free from any government control and regulation, a factor which provides anonymity and taxation advantages for investors. In addition, very large transactions tend to arranged more speedily than in domestic markets.

For the treasurer in an multinational company (MNC) the euromarkets provide an external opportunity (i.e. outside the control of the central bank which issues the currency) to borrow or lend funds *free from any government regulation*.

Exercise 3: In the absence of financial intermediation suppliers of funds might:

- be unable, or only after considerable expense and effort be able, to find suitable investments or demanders of funds which match their investment needs. That is they may have difficulty in finding creditworthy borrowers, or borrowers who are willing to accept their lending terms and conditions.
- be unable to meet demanders' needs, for example, through having insufficient funds or having differing maturity requirements. Borrowers may wish to borrow long-term, suppliers may only be willing to lend short-term.

Demanders of funds might have difficulty in:

- finding a suitable lender. That is, one who is willing and able to provide the amount and maturity of funds the demander or borrower requires.

Exercise 4: (a) An investor can reduce risk by investing funds in a unit trust. Unit trusts enable the private investor to achieve risk reduction through *diversification*. Financial institutions also provide low risk investments e.g. deposit/savings acount.

(b) A company or individual can share or transfer risk through purchasing insurance cover from an insurance institution. The institution will underwrite, for example, normal household and business risks for a fee.

Exercise 5: The main forms of long-term capital available to a company are **equity capital** and **debt capital**. Equity is a permanent source of funding and equity holders are the *owners* of the company. Debt capital is long-term financing which at some future time has to be repaid to lenders. Lenders of debt capital are *creditors* of the company. Their claims on the company's assets may be secured or unsecured. In any event their claims rank before equity holders in the winding up of a company.

Equity holders normally receive their return by way of *dividends* and by way of increases in the capital value of the shares they own, if the company is successful. Dividends are paid out of after tax profits and are paid when all other financial

obligations, such as interest payments and taxes, have been met.

In contrast lenders receive their return in the form of *interest payments,* which may be at fixed or floating rates, over the period of the loan. Interest payments are charged as an expense in the company's profit and loss account. Thus unlike dividends they are tax deductible.

Lenders will also receive repayments of principal in accordance with the terms and conditions of the loan. Equity holders will not receive repayment of their shares, unless the company is wound up. In which case they may or may not receive the value of the shares they have subscribed. Equity holders can of course sell their shares at any time if they wish.

Exercise 6:

$$(£3/£97×12/3)×100=12.37\%$$

In this instance £3 is being earned on £97 over a three-month period and there are four three-month periods in a year (12/3). As expected the price of the bill has fallen and its return has been raised.

CHAPTER 4

Exercise 1: A securities exchange provides a forum in which companies can raise capital, investors can easily buy and sell securities, and a company's securities can be fairly valued.

Exercise 2:
(a) Number of shares to be issued=£4,500,000/£3.00=1,500,000
   (b) Number of shares to be owned=9m/1.5m=6
   Thus the issue would be termed a 'one-for-six' offer. Each shareholder would be entitled to subscribe for one new share for every six presently held.
   (c) Discount to market price=[(£3.75−£3.00)/£3.75]×100=20%
   The offer is being made at a discount of 20% to the current market price.
Exercise 3: (a) After the capitalisation issue, the market value of each Airtour's ordinary share would be expected to fall to around one-third of the pre-issue value, that is, approximately £4.12. In reality the share price did drop to around this level.
   (b) The aggregate market value of each shareholder's investment should not change simply as a result of the capitalisation issue. After the issue each shareholder would own three shares valued at £4.12 each or £12.36 in aggregate, in place of one share previously valued at £12.35.
   (c) The board of directors believed that the issue would increase the marketability of the shares and encourage wider share ownership of the company.

CHAPTER 5

Exercise 1: £4,046(£1,000×4.046)
Exercise 2: (a) 1.340 and (b) 2.773
Exercise 3: £1,000$(1+0.15/12)^{12\times3}$=£1,000(1.56)=£1,560
Exercise 4: (a) £1,000×0.816=£816
(b) £3,000×0.630=£1,890
  (c) £5,000×0.424=£2,120

Exercise 5: £8,000=PMT(8.394) $= \dfrac{£8,000}{8.394} = £953.06 \text{ per year}$

Exercise 6: PVA$_7$=£1,500(4.564)=£6,846.00

Exercise 7: (a) $\text{PVP} = \dfrac{£500}{0.08} = £6,250$

(b) $\text{PVP} = \dfrac{£500}{(0.08 - 0.04)} = £12,500$

CHAPTER 6

Exercise 1: E(r)=0.10(−10%)+0.20(8%)+0.40(10%)+0.30(20%)
=−1%+1.6%+4%+6%
  =10.6%

Exercise 2:

Rate of Return (%)	Probability of Occurrence,		Expected value P(r_i)	
r	Asset A	Asset B	Asset A	Asset B
6	0.05	0.00	0.30	0.00
8	0.10	0.25	0.80	2.00
10	0.20	0.50	2.00	5.00
12	0.30	0.25	3.60	3.00
14	0.20	0.00	2.80	0.00
16	0.10	0.00	1.60	0.00
18	0.05	0.00	0.90	0.00
		E(r)=	12.00	10.00

Standard Deviation Asset A

i	r_i	r	$r_i - r$	$(r_i - r)^2$	$P(r_i)$	$(r_i - r)^2 \times P(r_i)$
1	6	12.00	−6.00	36.00	0.05	1.80
2	8	12.00	−4.00	16.00	0.10	1.60
3	10	12.00	−2.00	4.00	0.20	0.80
4	12	12.00	0.00	0.00	0.30	0.00
5	14	12.00	2.00	4.00	0.20	0.80
6	16	12.00	4.00	16.00	0.10	1.60
7	18	12.00	6.00	36.00	0.05	1.80
				Var_A	=	8.40

$$\sigma_A \quad = \quad \sqrt{8.40} \quad = \quad 2.90\%$$

Standard Deviation Asset B

i	r_i	r	$r_i - r$	$(r_i - r)^2$	$P(r_i)$	$(r_i - r)^2 \times P(r_i)$
1	8	10	−2	4	0.25	1
2	10	10	0	0	0.50	0
3	12	10	2	4	0.25	1
				Var_B	=	2

$$\sigma_B \quad = \quad \sqrt{2} \quad = \quad 1.41\%$$

SUMMARY	A	B
E(r)	12.00%	10.00%
Var	8.40%	2.00%
σ	2.90%	1.41%

Exercise 3: For Assets A and B the coefficient of variation (CV) is calculated as:

		Asset A	Asset B
Expected return, E(r)		12%	10%
Standard deviation, σ		2.9%	1.41%
Coefficient of variation (CV)	=	2.9÷12	1.41÷10
	=	0.24	0.14

Asset B would be the preferred investment as it has the lower coefficient of variation: it is the less risky investment. However the final decision would depend on the investor's attitude to risk.

Exercise 4: For the two asset portfolio A, B, invested in the proportions 60 per cent A and 40 per cent B, the expected return on the portfolio, $E(r_p)$, is calculated as:

	Asset A	Asset B
Expected return, E(r)	12%	10%
Standard deviation, σ	2.9%	1.41%

Proportion invested		0.6	0.4
Expected return on portfolio, E(r$_p$)	=	0.6(12%)+0.4(10%)	
	=		7.2%+4.0%
	=	11.2%	

Exercise 5: The graph below (Figure B.1) illustrates the correlation between the three potential investment projects. Projects 1 and 3 are perfectly positively correlated (ρ_{12}=1.0) as their cash flows both move together in the same direction at the same time and the proportionate or relative relationship between them remains constant throughout.

In contrast Projects 1 and 2, and Projects 2 and 3 are negatively correlated. They are almost perfectly negatively correlated (ρ_{12}=−0.93 for both pairs) as their cash flows both move in the opposite direction at the same time and the proportionate relationship between them remains almost constant throughout. To achieve diversification (risk reduction) it would be best to combine projects which are negatively correlated, that is Projects 1 and 2, and Projects 2 and 3.
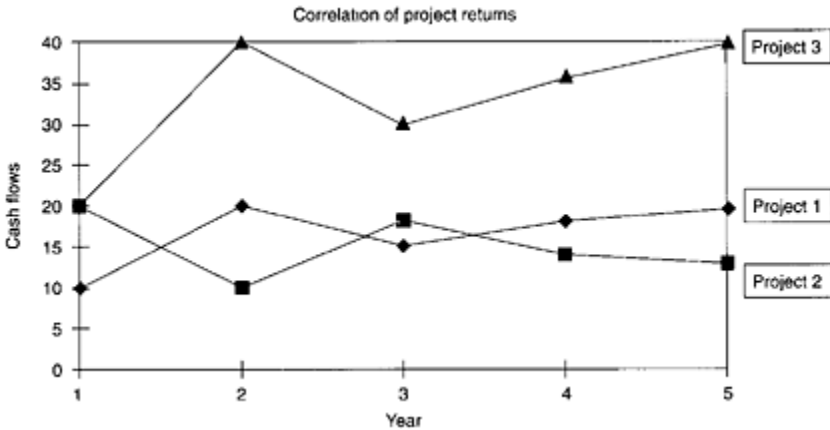
Figure B.1 Project correlations

Exercise 6: If the original portfolio asset weightings are reversed the risk reduces even further with perfectly negative correlation. There is also a greater proportion invested in the lower risk asset.

$$\sigma_p = \sqrt{(0.4)^2(9\%)^2 + (0.6)^2(7\%)^2 + 2[(0.4)(0.6)(-1.0)(9\%)(7\%)]}$$
$$= \quad 0.6$$

CHAPTER 7

Exercise 1: The shares can be broadly classified as follows:

Share	Industrial Sector	Beta	Category
Marks & Spencer	Retail, General	0.96	Neutral/Average
NatWest Bank	Banks, Retail	1.40	Aggressive
Shell Transport	Oil, Integrated	0.75	Defensive

The betas quoted are based on average historic data, they may well be different today. Remember that if a company's risk profile changes—because of, for example, a venture into a new unrelated business area—then its beta will also change.

Notice that the beta for the NatWest Bank is relatively high; it would be considered an aggressive share. Shares in the banking sector in general tend to have comparatively high betas as their performance is more vulnerable to changes in macroeconomic circumstances, such as changes in government policy on interest rates, inflation rates and exchange rates.

Because aggressive shares are riskier (more volatile) than the market average investors will require rates of return in excess of the market average return. Conversely defensive shares with a beta less than 1.0 will be expected to provide a rate of return lower than the market average.

Exercise 2:

(1) The expected returns are calculated as follows:

Security	R_f	+	$\beta_i(ER_m - R_f)$	=	$E(r_i)$
BG (British Gas)	6	+	0.93(17−6)	=	16.23%
Cadbury Schweppes	6	+	0.81(17−6)	=	14.91%
Granada	6	+	1.36(17−6)	=	20.96%
Diageo	6	+	0.88(17−6)	=	15.68%

(2) Calculating the portfolio beta, β_p:

Security	Beta	Weighting, W_i
BG (British Gas)	0.93	0.25
Cadbury Schweppes	0.81	0.35
Granada	1.36	0.20
Diageo	0.88	0.20

$\beta_p = 0.93(0.25) + 0.81(0.35) + 1.36(0.20) + 0.88(0.20)$

=0.96

The portfolio beta is very close to 1.0, the beta for the market portfolio. Movements in the portfolio returns are likely to mirror those of the market.

CHAPTER 8

Exercise 1:
1. The expected cash flows from asset 1 are in the form of a perpetuity, so the present value of the asset is given by applying the time value of money perpetuity formula:

$$V_0 = \frac{PP}{r} = \frac{£1,000}{0.13} = £7,692$$

2. In this case the cash flows are an expected value (EV) and as both valuations are considered equally likely the expected cash flow, EV_{CF}, is calculated as:

CF	p	CF×p
80,000	0.50	40,000
120,000	0.50	60,000
EV_{CF}	=	£100,000

There is a single cash flow which is expected in five years time, and applying the present value interest factor $(PVIF_{r,n})$ where r equals 18 per cent and n equals 5, the present value of the asset, V0, is calculated as:

$V_0 = £100,000 \times (PVIF_{18\%,5})$
$= £100,000 \times 0.437 = £43,700$

The total value of both assets=£7,692+£43,700=£51,392

Note that to value an asset its cash flows do not have to be in the form of a regular pattern.

Exercise 2: In this scenario the investor's required rate of return in the market has increased from 12 per cent to 14 per cent: an investor has the opportunity to earn a higher return of 14 per cent on other investments of similar risk. If returns are going up, the bond's value will be going down (other similar investments will be producing greater cash flow returns to the investor). This can be verified by calculating the bond's value using 14 per cent as the required return.

$$BV_0 = \frac{£12}{(1.14)^1} + \frac{£12}{(1.14)^2} + \dots + \frac{£12}{(1.14)^{15}} + \frac{£100}{(1.14)^{15}}$$

$$BV_0 = £12 \times (PVIFA_{14\%,15}) + £100 \times (PVIF_{14\%,15})$$
$$= £12 \times 6.142 + £100 \times 0.140$$
$$= £73.70 + £14$$
$$= £87.70$$

The bond's value has decreased significantly as the required rate of return has increased. The maximum price an investor should now pay to acquire the bond is £87.70. Note the inverse relationship between the required rate of return and value or price.

Exercise 3:

$$YTM \text{ (approximate)} = \frac{9 + [(100 - 108)/10]}{100 + 0.6(108 - 100)}$$
$$= 8.2/104.8$$
$$= 7.82\%$$

Exercise 4:

$$SV_0 = \frac{D_i}{r} = \frac{£0.35}{0.15} = £2.33$$

Exercise 5: First find the growth rate by determining the appropriate future value interest factor (FVIF). Thus:

$$(£0.35_{g,5}) = £0.25(1+g)^5$$
$$£0.35/£0.25 = (1+g)^5$$
$$1.4 = (1+g)^5$$

Next look in the $n=5$ row of the FVIF tables for a value of 1.4 which in this case lies in the 7 per cent column. The average annual growth rate therefore is 7 per cent. Applying this to our constant growth rate model:

$$SV_0 = \frac{£0.35(1.07)}{(0.15 - 0.07)} = \frac{£0.375}{0.08} = £4.69$$

With a constant growth rate of 7 per cent the share value is more than double the value as calculated in Exercise 4 above.

The model assumes, inter alia, that the future growth rate will replicate the past growth rate, and that the required rate of return has been accurately determined.

CHAPTER 9

Exercises 1–5: Bio-Tech Enterprises Ltd—Solution

Financial Ratio Analysis—Summary

	19×9	19×8	Increase/ −Decrease
Exercise 1: Profitability Assessment			
Return on Investment (ROI) % (1)	21.9	39.0	−17.1
Gross Profit %	43.0	48.0	−5.0
Net Profit % (1)	9.0	18.0	−9.0
Net Profit % (2)	3.7	10.6	−6.9
Return on Equity (ROE) %	20.5	43.3	−22.8
Earnings Per Share (EPS) (pence)	26.6	49.4	−22.8
Price Earnings (P/E) Ratio	11.3	7.1	4.2
Dividend Yield (net) %	3.5	5.7	−2.2
Dividend Yield (gross) %	3.9	6.3	−2.4
Exercise 2: Liquidity Assessment			
Working Capital (£000s)	282	121	161
Current Ratio	1.3	1.3	0
Acid Test Ratio	0.7	0.8	−0.1
Exercise 3: Assessment of Operational Efficiency			
Total Asset Turnover (times)	1.5	1.5	0
Fixed Asset Turnover (times)	3.0	2.4	0.6
Stock Turnover (times)	5.7[1]	5.9	−0.2
Cash Turnover (times)	88.2[2]	36.8	51.4
Debtor Days	62.0	45.6	16.4
Creditor Days	117.0[3]	74.8	42.2
Exercise 4: Capital Structure Assessment			
Gearing Ratio %	55.8	46.8	9.0
Debt-Equity Ratio %	126.5	87.9	38.6
Debt Ratio %	35.4	33.2	2.2
Interest Cover	2.3	5.2	−2.9
Dividend Cover	2.5	2.5	0

NOTES

1 Stock turnover=£2,036,000/[(£205,000+£509,000)72].

2 Cash turnover=£3,573,000/[£63,000+£18,000)/2].

3 As for the previous year, tax and dividends have been deducted from the creditors figure in the balance sheet as they are not trade creditors, thus [(£832,000−£49,000+£53,000)/£2,340,000]x 365=117. The purchases figure of

£2,340,000 has been obtained by adding the increase in closing stocks to the cost of sales, thus (£2,036,000+£509,000−£205,000).

Exercise 5: Commentary

1. Profitability. Bio-Tech's profitability has deteriorated significantly over the two-year period. Every single profitability measure has decreased. Shareholders would clearly be concerned at the substantial reduction in the return on equity ratio and in the dividend yield. All investors would be concerned at the decline in earnings per share. This deteriorating performance has been reflected to some extent in the decrease in share price from £3.50 to £3.00.

Even though sales have increased by 54 per cent, the gross profit margin has decreased by 10 per cent, suggesting that the firm may be 'chasing turnover' or trying to grow market share by perhaps offering greater discounts to customers to secure the business. Alternatively, the firm maybe facing increased competition and has had to reduce selling prices as a result.

There has been a dramatic reduction in net profit margins. They have decreased disproportionately in relation to the reduction in the gross profit margin, suggesting that operating costs have risen by an excessive amount. Although sales have increased by 54 per cent, operating costs have increased by 74 per cent, most noticeable of which is the 72 per cent increase in marketing and distribution costs. This may reflect the costs of introducing new products, entering new markets or setting up new distribution channels and perhaps the benefits of the increased marketing expenditures have yet to pay off. More information on the firm's marketing strategy would be helpful. In any event more effective cost control seems necessary.

Clearly remedial action by management is required to improve profitability.

2. Liquidity. Bio-Tech has invested an additional £161,000 in working capital (£282,000− £121,000), which has gone to finance increased stock holdings and debtors. In other words, for the year end 19×9 more of the firm's cash is tied up in stocks and debtors.

While the absolute amount of working capital has increased and the current ratio has remained unchanged, the acid test ratio has declined, indicating a change in the composition of current assets. At the end of 19×9 the less liquid asset of stocks forms a significantly higher proportion of the firm's current assets and there has been a significant decrease in the cash balance. The increased stock holdings may be in anticipation of future sales growth. Alternatively they may be the result of an overly ambitious marketing effort to boost sales.

This shift in the composition of current assets would warrant further investigation. Is it, for example, a temporary aberration or is it the emergence of a more serious downward trend in liquidity?

3. Asset Efficiency. Fixed asset turnover has improved but total asset turnover has declined, reflecting a deterioration in the turnover of current assets. There has been a substantial increase in investment in fixed assets during the year (£240,000, +25 per cent), which has not been matched by increased returns or profits—both ROI measures have diminished considerably. This does not suggest sound investment decision-making.

With regard to the management of current assets, there has been a substantial increase in the debtors' collection period (+16 days), suggesting a relaxation in credit control procedures, perhaps in an attempt to improve sales. However this has been offset by a considerable increase (+42 days) in the creditor payment period.

The sizeable increase in creditor days shows that the firm is also taking considerably longer (an additional 42 days on average) to pay its bills. Will suppliers tolerate such an increase? It is conceivable, but we cannot tell for certain, that the creditors figure in the balance sheet may include short-term bank borrowings and overdrafts etc. If this was the case then it would clearly reduce the creditor days ratio.

As was mentioned in 2 above, there has also been a minor reduction in stock turnover reflecting an increase in stock holdings in relation to sales. Stock figures should be analysed for slow-moving, obsolete and redundant items and in turn these should be disposed of for cash where possible.

4. **Gearing.** The firm's borrowings have increased substantially. Long-term loans have increased by £321,000, from £501,000 to £822,000, an increase of 64 per cent. This has been reflected in the significantly higher gearing and debt ratios, increasing the level of the firm's financial risk. The borrowings appear to have financed the increase of £240,000 in fixed assets and partly financed the increase of £161,000 in working capital. The increased investment in assets has not, as yet, yielded an improvement in returns.

As mentioned in 3 above we do not know if the current liabilities include short-term bank borrowings: if they did then this would increase the gearing ratio further.

Lenders may be concerned at the marked decline in interest cover. Loans and interest commitments have increased substantially while profits have decreased, reducing the firm's capacity to meet its financial obligations and thus increasing its financial risk.

Summary. The declining trend in profitability clearly needs to be addressed by the firm's management. There is also considerable scope for improvement in the management of working capital, that is, current assets and liabilities. For a more complete analysis and assessment of the firm's performance, information on the firm's marketing and investment strategies, figures for the previous year 19×7 and industry average figures would be helpful.

In conclusion, based on the information available, a combination of increasing financial risk and declining financial returns, is not an encouraging prospect for the firm's future.

On a final point, calculating Altman's Z score for 19×9 does not seem to offer any further insights.

Bio-Tech−Z score 19×9

X_1=working capital/total assets=282/(1,190+1,134)=0.12
X_2=retained earnings/total assets=150/(1,190+1,134) =0.065
X_3=EBIT/total assets=322/(1,190+1,134) =0.139
X_4=MVE/BV of total liabilities=1,500/(852+822)=0.896
X_5=Sales/total assets=3,573/(1,190+1,134)=1.5
=1.2(0.12)+1.4(0.065)+3.3(0.139)+0.6(0.896)+1.0(1.5)
=0.144+0.091+0.459+0.538+1.5

=2.73

Probability of failure is in the 'not clear' zone

CHAPTER 10

Exercise 1:

Payback period=(£12,000+£18,000+£26,000)+£29,000/£35,000
=3.8 years

Exercise 2: Machine B

Year	Cash Flow £	Depreciation £	Profit/ (Loss) £	Average Profit £	ARR
1	20,000	36,700[1]	(16,700)		
2	40,000	36,700	3,300		
3	90,000	36,600	53,400		
	150,000	110,000	40,000	13,333	24.2%

$$ARR = \frac{£13,333}{(£110,000 + £0)/2} \times 100 = 24.2\%$$

[1] Rounded to nearest £100.

For Machine B the initial investment of £110,000 (residual value £0) is similarly depreciated on a straight-line basis over three years, (£110,000−£0)/3 and the annual profit is the cash flow less the depreciation charge.

Applying the ARR would indicate that Machine B should be selected as it yields a higher accounting rate of return (24.2%) than Machine A (18.2%). You will notice that the decision as indicated by this method conflicts with the previous payback method. The ARR reveals that Machine B is the more profitable investment.

Exercise 3: Machine B

Year	Net Cash Flow (NCF) £	×	Discount Rate (r) (10%)	=	PV £
0	(110,000)		1.000		(110,000)
1	20,000		0.909		18,180
2	40,000		0.826		33,040
3	90,000		0.751		67,590
			NPV =		8,810

Applying the decision rule: both machines are acceptable as they both have positive NPVs when discounted at the company's cost of capital of 10 per cent. However as Machine B has the greater NPV it would be chosen in preference to Machine A. Investing in Machine B adds greater value to the business.

Exercise 4: The profitability index would be determined as:

$$\text{Machine B}$$
$$\text{PI} = \frac{£118,810}{£110,000}$$
$$= 1.08$$

When we compare this measure with the NPV we can see that it yields the same decision as the NPV—accept Machine B. Because these two criteria (NPV and PI) are essentially the same, they have consequently the same advantages when compared to other investment appraisal criteria. They both use discounted cash flows and both are consistent with the goal of the maximization of shareholder wealth.

Exercise 5: Machine B

Year	Net Cash Flow (NCF) £	×	Discount Rate (15%)	=PV £
0	(110,000) 1.000			(110,000)
1	20,000 0.870			17,400
2	40,000 0.756			30,240
3	90,000 0.658			59,220
	NPV		=	(3,140)

At a discount rate of 15 per cent Machine B also has a negative net present value of (£3,140) similarly indicating that the expected return lies between 10 and 15 per cent.

$$\text{IRR} = 10 + \frac{8,810}{8,810 + 3,140} \ (15 - 10)$$
$$= 10 + [(0.737)\ (5)]$$
$$= 10 + 3.685$$
$$= 13.685\% \qquad \text{say } 14\%$$

This degree of accuracy is sufficient for most practical purposes.

Machine B yields a return of 14 per cent, which is greater than the cost of capital of 10 per cent, therefore it is also acceptable using the IRR criterion.

Exercise 6: Calculating the discounted payback for Machine B gives:

Year	Net Cash Flow £	×Discount Rate (10%)	=PV £	Cumulative PVs (£)
0	(110,000)	1.000	(110,000)	(110,000)
1	20,000	0.909	18,180	(91,820)
2	40,000	0.826	33,040	(58,780)
3	90,000	0.751		

	67,590	8,810

$$NPV = \underline{\underline{8,810}}$$

Again by accumulating the discounted cash flows, we can see that payback for Machine B occurs some time during year 3; approximately when during year 3 we can determine using the same procedure as for Machine A.

The balance needed to make up the initial investment during year 3 is £58,780. We then express this as a proportion of the total cash flows for year 3, £58,780/£67,590=0.87 i.e. payback occurs just over 10 months into year 3. Thus the discounted payback period for Machine B=2.87 years

Machine A has the marginally shorter discounted payback period and if this was the sole investment criterion used, then Machine A would be chosen in preference to Machine B. For reasons which we have previously discussed, selecting A, however, would still be the inferior investment decision.

In our example the project rankings happen to be the same as under the non-discounted payback period. However, in many cases, discounted and non-discounted payback will produce conflicting rankings.

Exercise 7: The following table summarises the results of the various investment appraisal methods which we used to evaluate Turbocharge's mutually exclusive machine tool projects, A and B. Take a few minutes to study the summary before reading the answer which follows it.

Criterion	Machine A	Machine B
Payback period (PBP)	2.0 years	2.6 years
Accounting rate of return (ARR)	18.2%	24.2%
Net present value (NPV)	£2,600	£8,180
Profitability index (PI)	1.03	1.08
Internal rate of return (IRR)	12%	14%
Discounted payback	2.83 years	2.87 years

Both payback methods are the only techniques which suggests a different choice of machine. Relying on the payback techniques alone would not, in this case, lead to the wealth-maximising decision, Machine A would be selected; using any of the other techniques would, in this instance, lead to the correct wealth-maximising decision of investing in Machine B.

Exercise 8:
  (i) Payback period (PBP)

$$\frac{\text{Initial investment}}{\text{Operating cash inflows}} \quad \frac{£}{235,000} = 5.9 \text{ years}$$

*The cash flow profile is an annuity,

(ii) Accounting rate of return (ARR)

Using average investment:

		£
Total profits	=	250,000
Average annual profit	=	25,000
Investment	=	235,000
Average investment	=	(£235,000+0)/2
	=	117,500

$$\text{ARR} = \frac{25{,}000}{117{,}500} \times 100$$

$$= 21.3\%$$

Using initial investment:

$$\text{ARR} = \frac{25{,}000}{235{,}000} \times 100$$

$$= 10.6\%$$

(iii) Net Present Value (NPV)

Year	Net Cash Flow (NCF) £	×	Discount Rate (10%)	=PV £
0	(235,000)		1.000	(235,000)
1−10	40,000		6.145	245,800
10	5,000*		0.386	1,930
			NPV=	12,730

*Release of initial investment in working capital at the end of the project—treated as a terminal cash inflow.

(iv) Internal Rate of Return (IRR) The project has a positive net present value of £12,730 indicating that the discount rate of 10% is too low, that is the return would seem to be greater than the cost of capital of 10%. If a higher rate of, say, 15% is tried, the NPV would be:

Year	Net Cash Flow (NCF) £	×Discount Rate (10%)	=PV £
0	(235,000)	1.000	(235,000)
1−10	40,000	5.019	200,760
10	5,000	0.247	1,235
		NPV=	(33,005)

The discount rate has been increased to 15%, and the NPV has consequently been reduced to a negative figure of (£33,005). The IRR for this project apparently lies between 10% and 15%. We can obtain a close approximation of the rate by using

interpolation:

IRR = 10+[12,730÷(12,730+33,005)](15−10)
= 10+[(12,730÷45,735)(5)]
= 10+[(0.278)(5)]
= 10+[1.39]
≈ 11.4%

(v) Profitability Index

PV of cash flows	£247,730
Investment	£235,000
PI	= 1.05

(vi) Illusions Ltd—Summary of Results

The table below summarises the results of the various investment appraisal techniques for Illusions' project:

Criterion	Outcome
Payback period	5.9 years
ARR:	
−average investment	21.3%
−initial investment	10.6%
NPV	£12,730
IRR	11.4%
PI	1.05

The payback period of 5.9 years is just less than the six-year maximum set by management. The accounting rate of return, depending on which method is used, ranges from 10.6% to 21.3%, which indicates that the project is certainly profitable as it yields a positive return on investment. This ARR figure would be more meaningful if measured against some predetermined rate.

Net present value, using the cost of capital of 10%, is positive at £12,730; this is greater than zero. The IRR at around 11% is greater than the cost of capital of 10%, but only by a marginal amount.

Ignoring any assessment of risk, the results suggest that the project should be implemented as it satisfies all the financial decision criteria.

CHAPTER 11

Exercise 1:

MJM Enterprises—Sensitivity Analysis Summary

	Base Case NPV	Revised NPV	Increase (Decrease)	
Critical variable:	*£m*	*£m*	*£m*	*%*
(a) Sales revenue:				
5% Increase	0.48	1.23	0.75	156
5% Decrease	0.48	(0.28)	(0.68)	(142)
(b) Operating costs:				
5% Increase	0.48	(0.02)	(0.50)	(104)
5% Decrease	0.48	0.97	0.49	102

The base case NPV is calculated as a five-year, 10% annuity as follows:

Year	Net Cash Flow £m	× Discount Rate (10%)	= PV £m
0	(4.68)	1.000	(4.68)
1−5	1.36	3.791	5.16
		NPV	= *0.48*

Overall this project would appear quite risky, it seems highly sensitive to changes in both variables. However it seems particularly sensitive to changes in sales revenue. A relatively small change of ± 5% in sales will produce considerably magnified effects on the base case NPV. Assessing the probability of such changes occurring would be helpful.

In practice management may well refine the process by carrying out further tests (e.g. on the accuracy of key data estimates) before making a final decision.

As a further exercise you may wish to test the project's sensitivity to changes in its estimated economic lifespan, say±one year (i.e. ±20%).

Exercise 2:

Range=£75,000−£70,000=£65,000

Scenario	Outcome (NPV)	Probability (p)	NPV×p
Optimistic	£75,000	0.40	30,000
Most likely	£50,000	0.40	20,000
Pessimistic	£10,000	0.20	2,000
Expected Net Present Value (ENPV)		=	*£52,000*

On the basis of the information provided the project would appear a worthwhile investment. Management seems confident that the project will add value to the business, as even in the worst case scenario a zero or negative NPV is not anticipated.

CHAPTER 12

Exercise 1:
NPV at 10 per cent:
   Discounting the debenture's future cash flows at its coupon rate of 10 per cent, their present value will be equal to the debenture's par value of £100. For an investor to purchase a debenture now, the present value of the outlay would be £109, resulting in an NPV of −£9. More formally the NPV at 10 per cent is:

Year	Cash flow (£)	Discount rate 10%	Present value (£)
0	(109)	1.000	(109.00)
1−10	10	6.145	61.45
10	100	0.386	38.60
		NPV=	(8.95)(say−£9)

The 10 per cent discount rate is clearly too high, as the present value of the cash inflows to the investor are less than the initial cash outflow. The debentures are currently trading at a premium of £9.
   NPV at 8 per cent:

Year	Cash flow (£)	Discount rate 8%	Present value (£)
0	(109)	1.000	(109.00)
1−10	10	6.710	67.10
10	100	0.463	46.30
		NPV=	4.40

Interpolating

$$k_d = 8 + \frac{4.40}{4.40 + 9.00} (10 - 8)$$
$$= 8 + [(0.328)(2)]$$
$$\approx 8.7\%$$

The gross cost of the bond to the company is approximately 8.7 per cent. With a tax rate of 30 per cent, the after-tax cost of the debt, $k_d(1-T)$, would be:

$$k_d(1-T)=8.7(1-0.30)=6.09\%$$

Using the Hawinini/Vora approximation:

$$k_d = \frac{10 + [(100 - 109)/10]}{100 + 0.6(109 - 100)}$$

$$= 9.1/105.4$$

$$= 8.63\%$$

$k_d(1-T)=8.63(1-0.30)=6.04\%$

Exercise 2:

$$k_d = \frac{£7}{£96} \times (1-0.30)$$

$$= 0.051 = 5.1\%$$

Exercise 3:

$$k_e = \frac{£0.46}{£3.68} + 0.03 = 0.125 + 0.03 = 15.5\%$$

Exercise 4:

$k_e=7\%+1.1(15\%-7\%)=15.8\%$

The k_e estimates using the DVM and the CAPM are reasonably close. In this case, a simple average of the two methods might conceivably be used, producing $k_e=15.65\%$.

CHAPTER 13

Exercise 1: Using M&M's Proposition I (without taxes) the market value of Brewton would be calculated as:

$$V = \frac{EBIT}{k_a} = \frac{£3m}{0.18} = £16.67m$$

Exercise 2:
(1) Assuming Brewton can borrow at 10 per cent, then using M&M's Proposition II (without taxes) the cost of equity is calculated as:

$k_e=k_a+(k_a-k_d)\times(w_d/w_e)$
$k_e=18\%+(18\%-10\%)\times(0.3/0.7)$

$=18\%+(8\%)(0.43)$
$=21.44\%$

(2) The average cost of capital is calculated as:

$k_a=w_d{\times}k_d+w_e{\times}k_e$
$=(0.3)(10\%)+(0.7)(21.44\%)$
$=3.0\%+15.0\%$
$=18\%$

The WACC remains the same as before: it is unaffected by the change in capital structure.

(3) The value of the company is determined as:

$$V = \frac{EBIT}{k_a} = \frac{£3m}{0.18} = £16.67m$$

The value of the company is similarly unaffected by the change in capital structure.

Exercise 3:

(1) $V_u = \frac{EBIT(1-T)}{k_{eu}} = \frac{£3m(1-0.3)}{0.18} = £11.67m$

(2) $V_g=V_u+pvTD$
$=£11.67m+(0.3)(£5m)=£13.17$

Exercise 4: The market value of Brewton has been determined as £13.17m, of which £5m is the market value of the company's debt. Applying M&M's Proposition II (with taxes) and assuming an interest rate on the debt of 10 per cent, the cost of equity would be calculated as:

$k_{eg}=k_{eu}+(k_{eu}-k_d)(1-T)(w_d/w_e)$
$=18\%+(18\%-10\%)(1-0.3)(0.38/0.62)$
$=18\%+(8\%)(0.7)(0.61)$
$=21.42\%$

The relative debt—equity weightings are calculated as:

$w_d=£5m/£13.17m=0.38$
$w=£8.17m/£13.17m=0.62$

Exercise 5:

	Scenario 1 (Sales−10%) £	Base case £	Scenario 2 (Sales+10%) £
Sales	450,000	500,000	550,000
Variable costs	180,000	200,000	220,000
	270,000	300,000	330,000

Fixed costs	250,000	250,000	250,000
EBIT	20,000	50,000	80,000
Interest (I)	20,000	20,000	20,000
EBT	0	30,000	60,000
Tax	0	6,000	12,000
EAIT	0	24,000	48,000
EPS	*0.0*	*0.24*	*0.48*
EPS Change	*−100%*	*0*	*+100%*

$$\text{Degree of total gearing (DTG)} = \frac{\% \text{ change in EPS}}{\% \text{ change in Sales}}$$

$$= \frac{100\%}{10\%}$$

$$= 10$$

The DTG calculated by this method is the same, 10, (allowing for rounding) as we calculated previously using the DOG×DFG formula.

This company is highly geared overall and combines a significant degree of financial risk with a high degree of operating risk. The company's EPS is highly sensitive to changes in sales, a ±10 per cent change in sales produces a magnified ±100 per cent change in earnings per share. Management would be concerned at the potential for even a small decrease in sales.

CHAPTER 14

Exercise 1: The dividend yields are calculated as:

$$1997 \quad \frac{22.50p}{622p} \times 100 = 3.62\%$$

$$1996 \quad \frac{21.25p}{487p} \times 100 = 4.36\%$$

The dividend yield, or return, on the share has fallen because of the significant increase (+27.7%) in the market value of the share. This exemplifies the inverse relationship between an asset's price in the marketplace and its return.

Exercise 2: Strictly adhering to a residual policy will probably over time produce an erratic dividend payout pattern, depending upon the annual investment needs and after-tax earnings of the firm.

In practice an erratic distribution pattern may not be favourably received by investors,

particularly in years when a cut in dividends may be required. Consequently this may be reflected in a higher cost of equity capital (compared to that of firms of similar risk but operating a more stable dividend policy) as shareholders may require a higher return to compensate for the uncertainty over dividend payments.

Adopting a residual policy may also mean that a company does not achieve, or perhaps may move away from, an optimal or target capital structure.

Exercise 3: The original shares were valued at £2.00 each. After the transactions each original shareholder now holds assets valued as follows:

1. Cash−dividend per share received (£10,000/30,000)	= £0.33
2. Share of company assets worth £50,000 (£50,000/30,000)	= £1.67
Value of assets per share	= £2.00

The total value per share remains unchanged. A proportion of the company's wealth has been transferred to shareholders in the form of a cash dividend payment. Each of the original shareholders has received a cash dividend per share worth £0.33 and now owns a smaller share in the company's assets.

CHAPTER 16

Exercise 1: The *expected value (EV)* of sales for Icarus Publications is:

$$EV_{(sale)} = 0.10(£40m) + 0.15(£45m) + 0.50(£50m) + 0.15(£55m) + 0.10(£60m)$$
$$= £50 \text{ million}$$

Exercise 2: Charts and Maps

Cash Receipts Schedule

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Sales (£000)	296	364	410	460	514	561
Cash sales	44.40	54.60	61.50	69.00	77.10	84.15
Credit sale collections						
One month		148.00	182.00	205.00	230.00	257.00
Two Months			103.60	127.40	143.50	161.00
Total cash receipts			*347.10*	*401.40*	*450.60*	*502.15*

CHAPTER 17

Exercise 1:

Working Capital Policy	Estimated Funding Short-term	Requirement Long-term
Conservative	£0	£31m[1]
Aggressive	£5m[2]	£23m[3]

[1](£20m+£5m+£6m).
[2][£3m+£2m(£5m×0.40)].
[3](£20m+£3m).

With a conservative policy all investment, permanent and temporary, will be provided from long-term sources, and this includes making provision for the peak seasonal requirement of £6m.

With an aggressive policy, finance for the average seasonal investment in current assets of £3m, plus £2m (£5m×0.40) of the permanent current asset investment, will be provided from short-term sources. The remaining investment (£20m+£3m) will be provided from long-term sources. Thus the costs of the respective policies are calculated as:

Costs:
  Conservative £31m×0.15=£4.65m
  Aggressive:

> S*hort-term* £5m×0.07=£0.35m
> L*ong-term* £23m×0.15=£3.45m=£3.80m

The conservative policy is substantially more expensive (+£0.85m, +22%) in terms of interest costs than the aggressive policy.

Risks:
  The key risk with the aggressive policy is its intense reliance on short-term financing throughout the year. Consequently the company could find it difficult when the time comes to raise sufficient short-term finance to cover the peak seasonal requirement of £6m in June. Quantum Industries like all other companies, will only have a limited amount of short-term borrowing capacity available, and if this is breached the company could experience considerable financial difficulty. In Quantum's case the company could find itself in difficulties should actual working capital requirements be higher than anticipated.

  In contrast, if a conservative policy is adopted the company will not utilise any short-

term borrowing capacity. Should actual working capital requirements be higher than anticipated the firm will have recourse to short-term borrowing.

As we do not have a detailed knowledge of Quantum Industries' circumstances, a definitive policy cannot be recommended. The policy finally implemented will depend upon an assessment of all the individual circumstances of the company, including its growth rate, borrowing capacity, market and competitive conditions, and the risk tolerance of management.

Exercise 2:

(a)

$$\text{EOQ} = \sqrt{\frac{2 \times 5,000 \times £12}{£10}}$$

$$= 110 \text{ pair (to nearest unit)}$$

(b)
=5000/110
≈46 orders during the year.

(c)
Total cost (TC)=(O×U/Q)+(C×Q/2)
=£12×(5,000/110)+£10×(110/2)
=£552+£550
≈£1,102

The minor difference between the total ordering costs (£552) and the total carrying costs (£550) is due to roundings.

Exercise 3:

Reorder point=3×(5,000/365)≈41 pair
With safety stock=41+[(5,000/365)×2]≈68 pair

CHAPTER 18

Exercise 1:

$$= \frac{0.03}{0.97} \times \frac{365}{33}$$

$$= 0.0309 \times 11.06$$

$$= 34.18\%$$

Exercise 2:

$$ECQ = \sqrt{\frac{2 \times £3,500,000 \times £25}{0.09}}$$

$$\approx £44,096$$

(1) Thus the optimal quantity of cash to withdraw from marketable securities each time the cash balances reduces to zero is £44,096. In practice this figure is likely be rounded to £44,000.

(2) The number of conversion transactions each year equals £3,500,000/£44,096=79.4.

   (3) The average cash balance equals ECQ/2=£44,096/2=£22,048.

   (4) Total cash management cost=(£25×79)+(£22,048×0.09)=£3,959.

Exercise 3: The key ratios for 19×9 for Bio-Tech are:

  1. **Average inventory days**

$$\frac{\text{Average stock}}{\text{Cost of sales}} \times 365 = \frac{(£205 + £509)/2}{£2,036} \times 365 = 64$$

2. Average debtor days

$$\frac{\text{Debtors}}{\text{Credit sales}} \times 365 = \frac{£607}{£3,573} \times 365 = 62$$

3. Average creditor days

$$\frac{\text{Creditors}}{\text{Purchases}} \times 365 = \frac{£750}{£2,340^{a}} \times 365 = 117$$

Note

  a As for the previous year, tax and dividends have been deducted from the creditors figure in the balance sheet as they are not trade creditors, thus [(£852,000−£49,000+£53,000)/£2,340,000]×365 =117. The purchases figure of £2,340,000 has been obtained by adding the increase in closing stocks to the cost of sales, thus (£2,036,000+£509,000−£205,000).

  The cash cycle for Bio-Tech for 19×9 is as follows:

	Average inventory days	=	64
Plus	Average debtor days	=	62
	Operating cycle		126
Less	Average creditor days	=	117
	Cash cycle	=	*9days*

There has clearly been a significant reduction in the cash cycle between the two balance sheet dates: from 33 days to 9 days. The operating cycle has increased by 18 days and the average creditor payment period by 42 days. This would seem to indicate that Bio-Tech

is relying, perhaps excessively, on its suppliers to finance its operating cycle.

CHAPTER 19

Exercise 1:

$$\frac{0.03}{1-0.03} \times \frac{365}{40-10}$$

$$= \frac{0.03}{0.97} \times \frac{365}{30}$$

$$= 0.0309 \times 12.17$$

$$= 37.6\%$$

Exercise 2:
(1) Bank Overdraft
  Based on the average requirement of £125,000.
  Interest (10%+2%) compounded on a daily basis:

$$\text{Annualised rate (EAIR)} = \left[1 + \frac{0.12}{(365)}\right]^{365} - 1 \qquad = 12.75\%$$

				£
Interest cost	= £125,000	× 12.75%	=	15,938
Arrangement fee	= £150,000	× 0.5%	=	750
Commitment fee	= £25,000	× 0.25%	=	63
Total cost			=	16,751

(2) Short-term loan

				£
Interest cost of loan	= £150,000	× 13%	=	19,500
Less interest on investments	= £25,000	× 5%	=	1,250
			=	18,250
Arrangement fee	= £150,000	× 0.5%	=	750
				19,000

Although it is based more on average figures the overdraft would appear to be the more cost-effective financing option: it is approximately £2,250 (11.8%) cheaper than the short-term loan.

APPENDIX C
Suggested Answers to Selected Review Questions

Appendix C provides answers to selected end-of-chapter review questions. Answers are provided to the odd-numbered concept review questions, and practice questions. The answers are provided in 'suggested' form and are not intended as definitive solutions. It is conceivable that, particularly in the discursive type questions, other, equally acceptable, forms of answers are possible.

Suggested answers for all other questions and case studies are provided in the tutor's guide.

CHAPTER 1

Concept review questions

Q1. (a) Yes, **shareholder wealth maximisation** is considered a valid goal for a commercial firm, primarily because shareholders are the owners of the firm. Shareholders provide the essential risk capital and bear the risks of ownership. The decisions and actions of managers (including the financial manager) should be taken in the best interests of the owners, that is, with the objective of maximising their wealth.

(b) It is acknowledged that even a commercial, profit-seeking enterprise will in practice have **other objectives** in addition to maximising the wealth of its shareholders. These objectives may be *financial* (e.g. earnings per share (EPS) and return on investment (ROI)) and/or *non-financial* in nature. Non-financial objectives could be related to markets, customers, the local community, society at large and the environment. They could for example include:

- increasing market share and customer satisfaction;
- improving the quality of working life for employees;
- contributing to the well-being and prosperity of local communities;
- investing in measures to reduce environmental pollution.

The goals and aspirations of an organisation may even be expressed formally in the form of a *'mission statement'.*

(**c**) In the case of **not-for-profit (NPOs) and public sector organisations,** the concept of shareholder wealth is clearly not relevant. However, the notion of value maximisation is relevant in the sense that management is concerned with maximising the value of the organisation's outputs (e.g. health, education or social care) to the local community. In such organisations goals are often stated in terms of achieving maximum *value for money (VFM)* in the delivery of services.

For a not-for-profit organisation such as an NHS health care trust the goal can be stated in terms of maximising the value to the local community of the health care services (i.e. the outputs) which the trust is responsible for providing, normally from a limited budget. Similarly the goal for a charity, which may be charged with the responsibility of providing specific social and welfare needs, could be stated in terms of maximising the value of its outputs to its identified client group.

(**d**) For most **owner-managers of small business enterprises (SBEs),** the business tends to be their sole source of income. It provides them, and their families, with their livelihood. All the owners' wealth is normally tied up in the business and the value of the business is immensely important to the family as it is probably their main asset.

However, small business owners are acutely concerned with retaining ownership and control of the business and with passing it on to future generations. In the interests of retaining control they can make investment and financing decisions which are less than value maximising. For example, they may restrict the rate of growth and development of the business by not seeking additional equity or debt financing which would dilute their control.

Q3. The **fundamental concepts** which underpin financial management are: *(1) cash flow, (2) risk and return; (3) time value of money; (4) opportunity cost;* and *(5) value.*

It is the timing and riskiness of the firm's returns, measured in terms of cash flows, which determine the firm's value and thus the wealth of its shareholders.

The key concepts of cash flow, time value of money, risk—return and opportunity cost all combine to determine of the value of the firm in the following way:

- *Cash flows.* The greater the volume of positive cash flows the firm is expected to generate, the greater will be its value, all other factors remaining constant.
- *Time value of money.* The sooner cash flows are expected to be received, the greater will be their value, all other factors remaining constant.
- *Risk.* The more risky or variable cash flows are expected to be, the lower will be the value of the investment, again assuming all other factors remain constant.
- *Opportunity cost.* The lower the return an investment offers compared to similar investments of equal risk, the lower its value, all other factors remaining unchanged.

Q5. The financial manager will primarily be involved in making two main types of interrelated financial decisions:

1. **Investment decisions:** e.g. what assets should the firm invest in? and
2. **Financing decisions:** e.g. how should these investments be financed?

These decisions can be strategic or operational in character.

(**a**) **Strategic decisions.** These can be broken down into:

Strategic investment decisions (SIDs). These are decisions to invest in the long-term wealth creating assets of the business, such as investments in fixed tangible assets (e.g. land and buildings) or the acquisition of other businesses.

Strategic investment decisions will normally involve committing very substantial sums of money to selected investment projects for long periods into the future usually in the face of considerably risk and uncertainty. It is strategic investment decisions which create value for the business and thus wealth for its owners. It is these types of decisions which are absolutely crucial to the long-term success of a business.

Strategic financing decisions. These are decisions which concern the long-term financing arrangements for the firm. For example, what is the most appropriate *capital structure* for the firm? Deciding on the most appropriate capital structure, or the best mix of long-term financing, involves deciding what proportion of the firm's operations, present and future, should be financed by the owners, in the form of *equity financing* and what proportion should come from external borrowings, that is, *debt financing.* The firm will wish to maintain a healthy balance between these two forms of finance.

An important part of the strategic financing decision relates to **dividend policy,** sometimes referred to as *the dividend decision.* Dividend policy involves deciding how much of the firm's funds should be paid to shareholders as dividends in return for their investment in the firm and how much should be retained to finance investment plans.

(**b**) **Operational decisions.** These can similarly be broken down into:

Operational investment decisions. Typically these are decisions to invest in current or short-term assets such as inventories, debtors, bank and money market deposits. These are the investments in assets necessary for the firm to function on a day-to-day basis.

Operational financing decisions. These involve deciding how best to finance the firm's short-term assets/investments, for example deciding what is the appropriate level of working capital for the firm.

It can be seen that investment and financing decisions are related. The firm's asset or investment structure will influence its financing structure: long-term assets/investments require long-term financing and short-term investments require short-term financing.

CHAPTER 2

Concept review questions

Q1. (a) The **financial manager** will be concerned with all aspects of the financial management process: financial analysis, financial decision-making, financial planning and financial control. The financial manager is primarily concerned with financial decision-making, making investment decisions and financing decisions.

(**b**) All these activities should be guided by the goal of shareholder wealth maximisation. The skill and competence with which investment and financing decisions are made will distinguish the effective financial manager from the ineffective financial

manager, and it is the combined effect of these two main types of decisions which will determine the value of the firm.

Q3. **Stakeholder theory** looks beyond the two central stakeholder groups of owners and managers to include other groups, such as employees and the local community, that are considered to have a legitimate interest, or even a direct share, in the goals of the firm and who will benefit or suffer according to the fate of the firm.

In a commercial firm the owners are **the primary *stakeholders.*** Employees, lenders (other than creditors) and any others with a direct economic interest in the entity are *secondary stakeholders;* while potential investors and their advisers, stockbrokers, tax authorities, members of the public and other users of published accounts are classified as *tertiary stakeholders.*

Organisations which follow stakeholder theory consider it to be part of their 'social responsibility' and they prefer to believe that encouraging and actively promoting good stakeholder relationships is vital for the long-term benefit of the firm. For example, providing good value for customers enhances customer loyalty and improves competitiveness, which in turn creates value for the firm, allowing it to create even greater value (wealth) for its other stakeholders such as its employees. Stakeholder theory is reflected in the all-inclusive, 'partnership' approach taken by many organisations in their relationships with suppliers, customers and community groups.

Q5. In the business and financial world, **ethics** has become a major issue not only because of the numerous and dramatic cases of improper and corrupt behaviour of some company directors and managers, but also because in recent years there has been an ever increasing awareness and proactivity among consumers worldwide about the ethical conduct and values of companies.

CHAPTER 3

Concept review questions

Q1. (a) The financial environment is part of the overall business and economic environment within which the business firm operates. It consists of *financial markets, financial institutions and financial instruments,* all of which are interrelated.

(**b**) The financial manager will need to interact with the financial environment in performing the investing and financing activities of the firm, and therefore will require a clear understanding of its role and function.

The challenge for the financial manager is to respond and adapt effectively to changes in the financial environment, being able to *exploit profitable investment and financing opportunities* and *minimise risks.* The effective financial management of the firm therefore requires the financial manager to have a sound understanding and appreciation of today's complex international financial environment.

Q3. **Merchant and investment banks** operate as *wholesale banks* dealing mainly with the corporate and financial sectors. They include such firms as HSBC Investment

Banking and ING Barings. The key role of merchant and investment banks is in arranging finance to meet **strategic corporate financing** needs, they do not necessarily provide finance. However, as many merchant and investment banks are subsidiaries of the major clearing banks or securities houses they will usually arrange financing through their parent clearing bank. Merchant and investment banks provide a range of corporate financial services, including:

- *corporate financing*—they arrange financing for companies.
- *expert advice*—they provide expert investment and financing advice to their corporate customers.
- *investment fund management*—they manage investment funds on behalf of their clients (e.g. the management of pension funds).
- *investment analysis*—they help their customers analyse and evaluate investment opportunities.
- *merger/acquisition activities*—they advise clients on merger/acquisition deals (e.g. formulating takeover plans and bids or alternatively formulating takeover defence tactics).

A classic function of merchant and investment banks is to help companies raise capital (debt or equity) in the markets. Normally when a company needs to raise substantial additional finance through the capital markets it is likely to seek the expert help and advice of a merchant or investment banking firm. The role of the merchant or investment bank will typically involve:

- analysing the company's financial needs;
- advising on the appropriate means of financing;
- coordinating the role of other specialists such as accountants and corporate lawyers;
- syndicating the underwriting of any issue;
- advising on its price and timing;
- fulfilling the legal requirements; and
- promoting the issue and distributing it to subscribers.

Merchant and investment banks have developed into integrated *securities houses,* by taking over market-making and stockbroking firms, investment management firms and so on. They issue securities, underwrite security issues, buy and sell securities and advise on investment in securities.

The clearing, merchant and investment banks are actively involved as key players in the international banking, euro, and international financial markets and have a presence in most of the major international financial centres.

CHAPTER 4

Concept review questions

Q1. (a) Capital markets are for trading in ***long-term securities,*** that is, those which have a maturity of at least a year such as bonds, debentures, and shares. Thus they bring together demanders and suppliers of long-term capital.

 (**b**) The **primary role of capital markets** is to: (1) enable companies to raise essential long-term financing through issuing securities such as shares or debentures, and (2) provide a market in which these securities can be easily traded. If capital markets work efficiently, financial resources will be directed to their most productive uses in the economy and the securities of firms will be fairly valued.

 Q3. (a) **The London Stock Exchange's** stated *primary aim* is: *'to provide an environment in which both the domestic and international markets can flourish.'* It does this by ensuring that the necessary infrastructure is in place to regulate and operate its markets efficiently and to provide the required services to market users.

 The London Stock Exchange's *key activities* can be summarised as:

- helping companies to raise capital;
- organising and regulating the UK central market in securities;
- organising and regulating the international equity market in international securities;
- providing settlement facilities for transactions in UK equities.

(**b**) **Listing requirements.** The following are some of the key conditions which a company seeking a main market listing must fulfil:

1. *Incorporation.* An applicant must be duly incorporated.
2. *Accounts.* The company must have published audited and unqualified accounts which cover at least three years, with the latest accounts being less than six months old at the date of listing.
3. *Nature and duration of business activities.* The company must be carrying on a revenue-earning business and must have done so for the period covered by the accounts.
4. *Market capitalisation.* The aggregate market value of all securities listed must not be less than the minimum value specified by the Exchange. Although in some cases a lower value may be admitted if the Exchange is satisfied that there is an adequate market for the company's securities.
5. *Directors.* The directors of the applicant company must have collectively appropriate experience and expertise in the management of the business.
6. *Shares in public hands.* At least 25 per cent of the class of shares for listing must be in the hands of the public in one or more EU member states.

There are other conditions, for example, in relation to directors, management, and any

controlling shareholder.

In summary, the applicant company must have a successful trading history of at least three years, have a market capitalisation of at least the minimum Exchange requirement, and must make at least 25 per cent of its shares available to the public.

Q5. Member firms in the London Stock Exchange consist **of market makers** and **broker-dealers.** Broker-dealers can apply to the Exchange to register as market makers. The trading of shares on the Exchange is done through a system of competing market makers.

Market makers. Market makers must be members of the Stock Exchange and are broker-dealers in the securities in which they are registered. Market makers can act in the capacity of *principals* dealing in securities on their own behalf and in the capacity of *agents* dealing on behalf of clients—known as *dual capacity trading.* They are required to operate these two activities independently in their internal structural arrangements.

Market makers are obliged to make a market in the securities in which they deal by providing *continuous,* firm, two-way—that is, buying (bid) and selling (offer)—prices to the market throughout each trading day, *under any trading conditions.* This latter requirement is considered essential to maintain market liquidity.

Market makers derive their income from the difference (the bid-offer spread) between their buying (bid) and selling (offer) prices: this is their profit margin. They may deal with brokers acting on behalf of clients or they may deal directly with institutional investors. In effect market makers *make a book* in the securities in which they deal.

Market makers can also make money by speculating or taking a position in their securities. That is, they will sometimes buy securities and hold them in the hope of being able to sell them later at a profit, or alternatively they may sell securities which they may not have in the hope of being able to buy them later at a lower price in the market. This is where the risk lies for a market maker and is one reason why they are granted certain privileges for risking their capital in the business; they can, for example, delay disclosure of deals above a certain size for up to five days.

It is the consensus view of the market makers about a company's financial condition and future prospects which in effect determines the price of its securities in the market, as it is the market makers who possess the intimate knowledge of the market conditions (e.g. supply and demand) in relation to individual securities.

Broker-dealers. Broker-dealer firms must also be members of the London Stock Exchange. They provide advice to, and deal on behalf of, their individual clients through market makers: they can also deal on their own account. Unlike market makers, broker-dealers are not obliged to make a continuous market in shares. Broker-dealers who do not act as market makers and confine their activities to dealing exclusively on behalf of their clients, executing buy and sell orders with market makers and charging a commission, are known as *agency brokers,* that is, the activity which is still referred to as stockbroking.

CHAPTER 5

Concept review questions

Q1. (a) Cash inflows and cash outflows arising from the firm's investing and financing activities are most likely to occur over different time periods and it is the respective timings of these cash flows which affects their value and ultimately the value of the firm.

The sooner cash flows are expected to be received the more valuable they are, and conversely, the later they are expected to be received, the less valuable they are. There is a negative relationship between the timing of cash flows and their value: as the time before receipt increases the value declines. Thus timing directly affects value and this is what is meant by the time value of money.

(**b**) Financial managers constantly have to make decisions based on the time value of money concept. Whether it is decisions about in which projects the firm should invest its capital resources or about how the firm should raise the capital resources necessary for its activities, such decisions can only be made effectively, and increase the value of the firm, if the financial manager has a sound understanding of the time value of money concept.

Q**3.** The two perspectives on the time value of money are **future value (FV)** and **present value (PV).**

In terms of the time value of money, there are two ways of looking at an investment. We can say that if we invest £1,000 now in a savings account paying interest at 10 per cent, then this starting amount will grow to £1,100 one year from now. In other words, the *future value* of our £1,000 principal one year from now will be £1,100.

Alternatively, we can say that £1,100 to be received one year from now, at an opportunity cost of 10 per cent, is of equal value to £1,000 received today. Expressed in terms of the time value of money, the *present value* of £1,100 due one year from now, at an opportunity cost of 10 per cent, is £1,000.

The concepts of future value and present value are *inversely related:* future value relies on the concept of *compounding* and present value relies on the concept of *discounting.* Over time, future value will increase while present value will decline.

Q**5. (a) An annuity** is a special cash flow pattern in which, as its name implies, a constant annual amount is to be paid or received over a defined number of years. An annuity can be for any fixed annual amount and extend over any time period.

Annuities occur frequently in finance, particularly in the area of financial services (personal savings, investments, pensions and trust funds management).

(**b**) **A perpetuity** is essentially an annuity that has an *infinite life,* it continues to provide the investor or beneficiary with a fixed annual amount forever.

Perpetuities occur in many types of circumstances, for example they are common in the management of trusts and charitable fund investments where lump sum financial endowments and gifts are expected to provide a source of income over an infinite time horizon.

(**c**) The essential distinction is that a perpetuity has an infinite life, an annuity usually has a limited lifespan.

Practice questions

Q6. Future value and present value

(**a**) $FV_{10\%,10}=£5,000(1+0.10)^{10}=£5,000\times(2.594)=£12,970$

(**b**) $PV_{8\%,8}=£8,000\times(0.540)=£4,320$

(**c**) $FVA_{6\%,5}=£4,000(5.637)=£22,548$

(**d**) $PVA_{7\%,6}=£2,000(4.767)=£9,534$

(**e**) $FV_{r,n}=PV(1+r/m)^{mn}=$(i) $£5,000(1+0.06/2)^{2\times5}=£6,720$ =(ii) $£5,000(1 +0.06/6)^{6\times5}=£6,739$

(**f**) (i) $PP/r=£1,000/0.08=£12,500$

(ii) $PP/(r-g)=£1,000/(0.08-0.03)=£1,000/0.05=£20,000$

Q7. Present value

Deciding which option to choose involves comparing the present value of each, as follows:

(**i**) The present value of the 30 year, 5 per cent £30,000 annuity is given by:

$$PVA_n=£30,000(PVIFA_{5\%,30})=£30,000\times15.373=£461,190$$

(**ii**) The present value of the lump sum now$=£500,000$

Assuming a constant return and ignoring taxation and inflation etc., the better option would be to take the lump sum now. You would be better off, that is, wealthier by the amount of £38,810 (£500,000−£461,190).

CHAPTER 6

Concept review questions

Q1. (a) An investment's **expected return**—usually denoted E(r) or r   (referred to as 'r bar')—is the investment's most likely return and is measured in terms of the future cash flows, positive or negative, it is expected to generate. It represents the investor's best estimate of the investment's future returns.

The **required rate of return** is the *minimum rate* of return an investor requires an investment to earn, given its risk characteristics, for the investment to be considered worthwhile. The required rate of return is equal to the rate of return given by a risk-free, or safe, investment—such as a government treasury bill—plus a *risk premium.* The risk premium is necessary to compensate the investor for undertaking a risky investment.

Required rate of return, R(r)=risk-free return+risk premium

Once determined the required return can then be used as a benchmark against which an investment's expected return can be compared.

An investment's expected return may or may not be the same as the investor's required return. If the return which an investment is expected to yield is greater than the return the investor requires then the investment will be considered worthwhile. Should the expected return be less than the required return, then the investor will not consider the investment to be beneficial.

(**b**) In financial management **risk** can be defined as: *the chance that the actual return will differ from the expected return.* Clearly there is a chance that the actual return will be greater than, equal to, or less than the expected return. In financial decision-making it is this *potential variability of returns* that we call risk.

(**c**) Investment decisions will be influenced by the investor's **risk propensity** or the investor's *attitude to risk.* Investors who have a low risk propensity, in other words they have a preference for less risk, are said to be *risk-averse.* Whereas investors who have a high risk propensity, or a positive desire for risk, are referred to as *risk-taking* or risk-seeking. Other individuals may be *risk-indifferent,* or risk-neutral, that is, for an increase in risk, they do not necessarily require an increase in return.

(**d**) Before making investment decisions **the financial manager** will need to evaluate the risk-return characteristics of each potential investment and how they are likely to affect the risk-return characteristics of the firm overall. If investments are considered to increase the firm's risk then shareholders and other investors, who are generally considered to be risk-averse, will require a commensurate increase in return.

Q3. An **efficient portfolio** is one which will maximise return for a certain level of risk or alternatively minimise risk for a required level of return.

Practice questions

Q5. Calculation of return
The rate of return, r_t, earned on an investment is given by:

$$r_t = \frac{V_t - V_{t-1} + CF_t}{V_{t-1}}$$

Investment	r_t
1 [(11,000−10,000)+500]/10,000	15.0%
2 [(19,000−20,000)+500]/20,000	−2.5%
3 [(3,800−3,500)−100]/3,500	5.7%
4 [(131,000−123,000)+9,000]/123,000	13.8%
5 [(63,000−65,000)+1,100]/65,000	−1.4%

Q6. Risk and return
(**a**) *Expected return, E(r)*

Return, r_i	Probability, $P(r_i)$	$r_i \times P(r_i)$
5%	0.10	0.5
6%	0.20	1.2
7%	0.40	2.8
8%	0.30	2.4
	$E(r)=$	6.9%

(b) Standard deviation of return, σ_r

(1)	(2)	(3)	(2)−(3) (4)	(4)×(4) (5)	(6)	(5)×(6) (7)
i	r_i	r	$r-r$	$(r.-r)2$	$P(r_i)$	$(r_i-r)^2 \times P(r_i)$
1	5%	6.9%	1.9%	3.61%	0.10	0.36
2	6	6.9	0.9	0.81	0.20	0.16
3	7	6.9	-0.1	0.01	0.40	0.00
4	8	6.9	-1.1	1.21	0.30	0.36

$$\text{Var}_r = \sum_{i=1}^{3} (r_i - \bar{r})^2 \times P(r_i) = \underline{0.88\%}$$

$$\sigma_r = \sqrt{\sum_{i=1}^{3} (r_i - \bar{r})^2 \times P(r_i)} = \sqrt{0.88\%} = \underline{0.94\%}$$

The proposed investment has an expected return of 6.9 per cent and a standard deviation of 0.94 per cent. Compared with the return on the risk-free investment of 7 per cent, this investment would not be worthwhile. The expected return is marginally lower at 6.9 per cent and it is a risky investment.

CHAPTER 7

Concept review questions

Q1. (a) According to the capital asset pricing model (CAPM), the total risk (of a security or portfolio of securities) can be split into two specific types, **systematic risk** and **unsystematic risk.** This is sometimes referred to as *risk partitioning*.

- *Systematic (or market) risk* cannot be diversified away: it is the risk which arises from market factors. It is due to factors which *systematically* impact on most firms, such as general or macroeconomic conditions (e.g. balance of payments, inflation

and interest rates).

- **Unsystematic (or specific) risk** can be diversified away by creating a large enough portfolio of securities: it is also often called *diversifiable* risk. It is the risk which relates, or is unique, to a particular firm. Factors such as winning a new contract, an industrial dispute, or discovery of a new technology or product would contribute to unsystematic risk.

(b) For a rational investor it is often claimed that it is only systematic risk which is relevant, because, if the investor creates a sufficiently large portfolio of securities, unsystematic or company-specific risk can be virtually eliminated through diversification.

Q3. **(a)** When the CAPM equation is shown in graph form, the resultant straight line is referred to as **the security market line (SML).** It is the line which represents the positive relationship (correlation) between the risk of a security and its return.

On the security market line (SML) the *risk-free rate, R_f* is a constant and represents the vertical intercept, that is the point where the SML crosses the vertical axis, y. The x coordinate represents the systematic or market risk of a share, i, as measured by its beta, β_i, and the y coordinate represents the expected market return. The slope or gradient of the line, a, is represented by the market risk premium $(ER_m - R_f)$, *not* beta and indicates the level of risk aversion in the economy.

The SML represents the level of return expected in the market for each level of the share's beta (market risk).

(b) The security market line is not static, it is an expression or snapshot of the risk-return relationship at a particular point in time. In dynamic capital markets, which are constantly responding to new information, risk-return factors change continually thus the SML can and does shift over time. The two major factors which cause the SML to shift are **(1) inflation** and **(2) risk aversion.**

Q5. **The key underlying assumptions of the CAPM** are as follows:

1. **Historic data.** CAPM is *a future-oriented* model yet it essentially relies on historic data to predict future returns.
2. **Investor expectations and judgements.** The model includes the expectations and subjective judgements of investors about future asset or security returns and these are very difficult to quantify. The model also assumes that investor expectations and judgements are homogeneous.
3. **A perfect capital market.** CAPM assumes an efficient or perfect capital market. An efficient capital market is one where all securities and assets are always correctly priced and where it is not possible to outperform the market *consistently* except by luck. An efficient capital market implies that there are many small investors (all are price-takers), all of whom are rational and risk-averse; they each possess the same information and the same future expectations about securities. It also assumes that in the financial markets there are no transaction costs, no taxes and no limitations on investment.
4. **Practical problems.** There are also practical problems associated with the model such as difficulties with specifying the *risk-free rate,* measuring *beta* and measuring the *market risk premium.*
5. **One-period time horizon.** CAPM assumes investors adopt a one-period time

horizon. In practice investors are likely to have differing time horizons and again this would imply varying SMLs.

6. *Single factor model.* CAPM is a single factor model: it relies on the market portfolio to explain security returns. The rate of return on a security is a function of the security's beta times a risk premium, that is, $\beta(ER_m-R_f)$. Both beta and the risk premium are determined in relation to the market portfolio. Recall that each security's beta (risk factor) is derived by linear regression, plotting its return against the return from the market portfolio—the characteristic line.

Practice questions

Q6. The Capital Asset Pricing Model (CAPM)

$R(r_i)$	$=$	R_f	$+$	$\beta_1(ER_m-R_f)$		
A	$=$	7	$+$	$0.90(16-7)$	$=$	15.10%
B	$=$	7	$+$	$0.00(16-7)$	$=$	7.00%
C	$=$	7	$+$	$1.25(16-7)$	$=$	18.25%
D	$=$	7	$+$	$1.50(16-7)$	$=$	20.50%
E	$=$	7	$+$	$-0.75(16-7)$	$=$	0.25%

Note that Project B is not affected by market changes, its risk premium is zero. Project E has a negative beta of -0.75, indicating that it is 75 per cent sensitive to market changes but moves in the opposite direction! Its return is less than the risk-free asset but it correspondingly has a lower risk. This might still be an acceptable investment if its contribution to portfolio diversification is significant.

Q7. The Capital Asset Pricing Model (CAPM)

(a) $R(r_A)$	$= 5+1.25(10-5)$	$= 5+6.25$	$= 11.25\%$
(b) 16	$= 7+0.75(ER_m-7)$		
16–7	$= 0.75(ER_m-7)$		
9	$= 0.75ER_m-5.25$		
9+5.25	$= 0.75ER_m$		
14.25/0.75	$= ER_m$	$= 19\%$	
(c) 20	$= 8+\beta_c(17-8)$		
20−8	$= 17\beta_c-8\beta_c$		
12	$= 9\beta_C$		
β_c	$= 12/9$	$= 1.33$	
(d) 17	$= R_f+0.9(18-R_f)$		
17	$= R_f+16.2-0.9R_f$		

$$17-16.2 \qquad = 0.1R_f$$
$$R_f \qquad\qquad = 8\%$$

CHAPTER 8

Concept review questions

Q1. (a) The fundamental asset valuation model (FVM) defines the value of an asset in terms of the present value of all its expected future cash flows discounted at an appropriate rate of return.

(**b**) If the goal of the firm is the maximisation of shareholder value this can only be achieved if the financial manager is able to understand the process by which the markets value the firm's securities (shares and bonds). Understanding the valuation process will enable the financial manager to evaluate the effects of decisions on the value of the firm's securities.

Q3. (**a**) **The value of a bond** is influenced by two main factors:

(1) changes in the ***required rate of return*** which are in turn related to changes in the general level of interest rates; and

(2) the ***time to maturity*** of the bond. There is an *inverse relationship* between a bond's price and the required rate of return; as *the required rate of return decreases the bond's value increases and as the required rate of return increases the bond's value decreases.*

(**b**) The value of a bond also changes in relation to its time to maturity. As the time to maturity reduces, the gap between a bond's market value and its par value narrows. This reflects the tendency over time of a bond's value to change less in response to changes in required rates of return.

Shorter-term bonds are less responsive to changes in market rates of return (interest rates) than longer-term bonds. Expressed another way, shorter-term bonds (with the same par value, coupon rate and frequency of interest payments as their longer-term counterparts) have less *interest rate risk* than longer-term bonds.

(**c**) **Interest rate risk** is the degree to which the market price or value of bonds changes as interest rates in the economy change. As shorter-term bonds have a shorter time to maturity they are exposed to less interest rate risk (variability). Because of interest rate risk, longer-term bonds include a ***maturity premium*** that is, they require a higher return to compensate for the greater exposure to interest rate risk.

Q5. If we exclude for the moment any external or extraneous influences, the financial manager and the management team, before making any investment decisions, will evaluate the respective impacts of the various investment options on the firm's expected future returns and on its level of risk. Clearly any change in either of these two variables,

risk and return, will change the value of the firm's equity and thus the wealth of its shareholders.

If investors perceive an increase in the firm's level of systematic or market risk (i.e. its beta) as a result of management decisions (that is decisions which directly impact on the firm's sensitivity to changes in market conditions), they will require a higher return to compensate, as implied by the capital asset pricing model (CAPM).

Remember that in terms of the CAPM, the required rate of return, r, on a share S, is defined as:

$$r_s = R_f + \beta_s (ER_m - R_f)$$

With the market return ER_m and the risk-free rate R_f held constant, r_s becomes a direct function of the share's beta, β_s. Any change in the share's beta will affect the share's required return, r_s.

Implementing investment decisions which lead to a higher required return, r, will result in a lower market price or value for the firm's shares and vice versa.

Alternatively any investment decisions undertaken by management which investors perceive will produce improved future returns by way of enhanced dividend rates, and not at the same time alter the firm's systematic risk, will lead to higher share values as implied by the dividend valuation models. However, in reality, it is likely that increased returns will only be achieved at the expense of some increase in risk—the risk-return trade-off. Although it is possible for the increase in returns to exceed the increase in risk, resulting in a net increase in returns.

Clearly there is a direct connection between the financial decisions taken by the firm's management, the level of the firm's risk, its returns, and ultimately its share value.

Practice questions

Q7. Asset valuation. Assuming the asset would be sold at the end of 5 years its present value would be given by:

$$V_0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_n}{(1+r)^n}$$

$$= \frac{£1,250}{(1.07)^1} + \frac{£1,250}{(1.07)^2} + \frac{£1,250}{(1.07)^3} + \frac{£1,250}{(1.07)^4} + \frac{£1,250}{(1.07)^5} + \frac{£500}{(1.07)^5}$$

$$= £5.482$$

Alternatively applying the PVIFA formula at 7 per cent, which represents your client's opportunity cost of capital:

Year	Cash Flow (CF)	Discount rate (7%)	PV £
1–5	£1,250	4.100[1]	5,125
5	500	0.713	357

$$\underline{5,482}$$

$$_1\text{PVIFA}_{7\%,5}$$

Assuming the cash flow and risk estimates are accurate, and that the annual return remains constant at 7 per cent, then the maximum price your client should pay for the asset is £5,482.

Q8. Bond valuation. The respective bond values are as follows:

(a) (i)

$$BV_0 = £10(\text{PVIFA}_{8\%,15}) + £100(\text{PVIF}_{8\%,15})$$
$$= £10 \times 8.560 + £100 \times 0.315$$
$$= £85.60 + £31.50$$
$$= £117.10$$

In this case the bond is trading at a *premium.*

(a) (ii)

$$BV_0 = £10(\text{PVIFA}_{10\%,15}) + £100(\text{PVIF}_{10\%,15})$$
$$= £10 \times 7.606 + £100 \times 0.239$$
$$= £76.06 + £23.90$$
$$= £99.96$$
$$\approx £100$$

Here the bond is trading at *par* (allowing for minor roundings).

(a) (iii)

$$BV_0 = £10(\text{PVIFA}_{12\%,15}) + £100(\text{PVIF}_{12\%,15})$$
$$= £10 \times 6.811 + £100 \times 0.183$$
$$= £68.11 + £18.30$$
$$= £86.41$$

In this instance the bond is trading at a *discount.*

(b) If interest is paid semi-annually the value of the bond would be given by:

$$BV_0 = \frac{I/2}{(1 + r/2)^1} + \ldots + \frac{I/2}{(1 + r/2)^{2n}} + \frac{R}{(1 + r/2)^{2n}}$$

$$= \frac{£10/2}{(1 + 0.10/2)^1} + \ldots + \frac{£10/2}{(1 + 0.10/2)^{2 \times 15}} + \frac{£100}{(1 + 0.10/2)^{2 \times 15}}$$

$$= £5(\text{PVIFA}_{10\%/2,\ 15 \times 2}) + £100(\text{PVIF}_{10\%/2,\ 15 \times 2})$$

$$= £5(\text{PVIFA}_{5\%,30}) + £100(\text{PVIF}_{5\%,30})$$

$$= £5 \times 15.373 + £100 \times 0.231$$

=£76.87+£23.10
=£99.97
≈£100

(c) Yield to maturity (YTM)

$$£108.00 = \frac{£10}{(1+r)^1} + \frac{£10}{(1+r)^2} + \ldots + \frac{£10}{(1+r)^{15}} + \frac{£100}{(1+r)^{15}}$$

£108.00=£10(PVIFA$_{r\%,15}$)+£100(PVIF$_{r\%,15}$)

Since the bond is trading at a premium the return or yield must be less than the coupon rate. From (a) (i) above we know that at a rate of return of 8 per cent the value is £117.10, which is higher than the present market value, therefore we should try a rate of return higher than 8 per cent. We will try 9 per cent:

BV_0=£10(PVIFA$_{9\%,15}$)+£100(PVIF$_{9\%,15}$)
=£10×8.061+£100×0.275
=£80.61+£27.50
=£108.11
≈£108.00

To the nearest whole per cent the yield to maturity (YTM) is 9 per cent. Our answer is hardly surprising since at 10 per cent the bond's value would equal par and at 8 per cent its value, £117.50, would be above the current value of £108.00. Clearly the true yield therefore lies somewhere between 8 per cent and 10 per cent, but for our present purposes a figure of 9 per cent is sufficiently accurate.

Q9. Preference share valuation. The annual dividend is paid on the nominal value of the preference shares and is computed as £0.16 (£2.00×8%), therefore the value of the preference shares is determined as:

$$PV_0 = \frac{£0.16}{0.06} = £2.67$$

The shares would be trading at a premium to their par value. This is indicated by the fact that the dividend rate is higher than current market rates of return on similar type securities.

CHAPTER 9

Concept review questions

Q1. (a) Financial analysis can be defined as the evaluation of a firm's past, present and anticipated future *financial performance* and *financial condition.* Financial analysis is an essential first step towards gaining a sound understanding of a business—its financial strengths and weaknesses, its financial opportunities and risks. Its objectives are to identify the firm's financial strengths and weaknesses and to provide the essential foundation for financial decision-making and planning. Financial analysis is much more than a number-crunching exercise, it requires interpretative skills to assess future strategic potential as well as to evaluate past performance.

Financial ratios are the principal tools of financial analysis and they can be used by a variety of people to help diagnose the financial well-being of a firm.

(**b**) The various people who might be expected to employ financial analysis skills can be grouped as follows:

- *Analysts and advisers* (accountants, investment analysts, credit rating agencies);
- *Business contacts* (creditors, customers, employees, suppliers, trades unions);
- *Investors* (banks, debenture holders, financial institutions, shareholders);
- *Others* (competitors, government agencies e.g. tax authorities, other public bodies and society in general).

(**c**) Each of the parties will be interested in different aspects of the firm's finances. For example, *lenders* will be particularly interested in: (a) the firm's ability to meet loan repayments plus interest, in other words in the firm's *liquidity* and cash flow position; (b) the level of existing borrowings, that is in the firm's *gearing* position; and (c) the assets available as *security* for the loan.

In contrast, *employees* will be primarily interested in issues of job security and wage negotiations and *shareholders* will be concerned with the firm's ability to pay and grow dividends and increase the value of the firm's shares.

Q**3.** The main **limitations of financial ratios** can be summarised as follows:

Many ratios are available. It is important to be aware that there are many ratios available and even different methods of calculating the same ratios. The skill is in selecting those which are most appropriate and revealing for the purposes of the analysis.

Interpret with care. Financial ratios need to be used selectively for the purpose at hand and their results interpreted with skill and judgement.

Accounting policies and practices. The use of different accounting policies (e.g. depreciation and stock valuation policies) and practices, (e.g. different accounting periods), even between like firms may distort comparisons. Despite the existence of legal and professional accounting requirements, (e.g. *Financial Reporting Standards (FRSs)* and *Statements of Standard Accounting Practice (SSAPs)),* there still remains significant

discretion available to a company's directors in the public reporting of a company's financial position.

Consistency. Whatever method of calculating a ratio is chosen, it should be applied consistently to facilitate meaningful comparisons over time.

Information availability. The quality and amount of the financial information available will affect the quality of the ratios calculated and hence the analysis. For example, a firm's internal management will have access to a greater volume and much more detailed and commercially sensitive information than would be available to parties outside the firm—remember *information asymmetry* in relation to the agency problem. An external analysis therefore will by its nature be limited by the amount of information publicly available.

Historic. Ratios are static, historic, and retrospective and should be viewed in this context: they may not be appropriate as a basis for making future projections and forecasts.

Partiality. Financial ratios are partial. They only reveal part of a firm's overall performance, other non-financial measures e.g. on marketing, production, product quality, and human resource effectiveness are also required for a more complete appraisal—the *'balanced scorecard'* approach.

   Q5. The balanced scorecard is a weighted average score of various *financial and non-financial* performance measures.

Gearing. In a commercial company gearing measures the relationship between the amount of *debt finance* and *equity finance* in a company's capital structure. Gearing provides an indication of a firm's *longer-term solvency* and its degree *of financial risk,* thus the main focus here is on the firm's long-term funding arrangements. In basic terms, if the ratios of debt to equity finance appear too high this usually suggests over-dependence on external financing and the firm would be considered to be at risk financially.

Working capital. A firm's working capital (or net working capital) is found from its balance sheet by subtracting its current liabilities from its current assets.

> Current assets−Current liabilities=Working capital
> CA−CL=WC

> Working capital, also known as *circulating capital,* is the amount of money which a business needs to survive on a day-to-day basis, it should be sufficient to cover:

(i)   paying creditors (without difficulty);
(ii) allowing trade credit to debtors;
(iii) carrying adequate stocks.

Sufficient working capital is needed, not only to be able to pay bills on time (e.g. wages and suppliers), but also to be able to carry sufficient stocks and also to allow debtors a period of credit to pay what they owe. Working capital is the kind of short-term capital required to finance a firm on a day-to-day basis. It is also a key measure of business liquidity. The more working capital a firm has, the less risk there is of the firm not being

able to pay its creditors when the bills are due. Conversely the less working capital a firm has, the greater the risk of the firm not being able to pay its creditors when the bills are due.

Z scores. In the past research has been carried out to determine the usefulness and relevance of ratios as a tool to predict failure and today there are many models available which combine ratios into a single 'easy to use' score. These are often called 'Z' *scores*—such as Altman's Z score (1968)—and claim to provide a composite predictor of health or failure from a distillation of the company's available financial information.

Practice question

Q6. Financial Analysis—Ambitious Ventures Plc

Financial Analysis	19×9	19×8	Industry Average
1. Profitability Assessment			
Return on Investment (ROI) %*	19.7	18.0	18.0
Return on Equity (ROE) %	12.0	9.5	9.0
Gross Profit Margin %	34.9	33.0	37.0
Net Profit Margin %*	11.0	10.1	10.0
* Calculated using PBIT			
2. Liquidity Assessment			
Current Ratio	1.1	1.8	1.8
Acid Test Ratio	0.4	0.8	0.7
3. Operating Efficiency			
Stock Turnover (times)	2.3	2.8	3.0
Debtor Days	64.0	39.0	40.0
4. Capital Structure			
Gearing Ratio %	26.2	39.0	35.0
Interest Cover (times)	3.1	2.6	4.0

Commentary

1. Profitability. Based on the information provided the overall profitability of Ambitious Ventures seems healthy and indicates an improving trend over the previous year. Despite having a lower gross profit margin than the industry average, the firm's other profitability indicators are all superior to the industry average. While the lower gross margin suggests a higher than average cost of sales, the higher net profit margin suggests lower than average operating costs. Shareholders should be pleased with the return on equity performance; it has improved substantially over the previous year and is one-third greater than the average for the industry.

Profitability could be improved further by seeking to reduce the cost of sales to the level of the industry average.

2. Liquidity. In contrast to the encouraging trend in profitability, the liquidity position

of Ambitious Ventures has deteriorated. Both the current and acid test ratios for 19×9 are lower than the previous year and are significantly below the industry average.

3. **Asset Efficiency.** The firm is not managing its current assets in 19×9 as efficiently as it did the previous year, nor as well as the average firm in the industry. Stock turn for 19×9 has slowed significantly compared with the previous year and the debtor collection period has grown from 39 days for 19×8 to 64 days in 19×9—a 60 per cent increase. Both these areas of stock and debtor management need to be investigated and require remedial action. Taken together they are having an adverse impact on the firm's short-term liquidity position as more cash is being tied up in stocks and debtors

4. **Gearing.** The firm's long-term solvency position has improved compared with 19×8, thus lowering its level of financial risk. The gearing ratio has reduced since 19×8 and is now lower than the industry average. Interest cover ratio similarly shows an improving trend but is still inferior to the industry average.

Summary

Ambitious Ventures is achieving superior profitability performance but perhaps at the expense of liquidity. Profits are not cash flows and more cash is apparently being tied up in increased stock and debtor levels. The deterioration in the short-term solvency ratios requires investigation as does the decline in the operating efficiency ratios.

Limitations

The analysis has been performed on the basis of very limited financial information. For example, only two years financial history been provided and one of those, 19×8, is in ratio form. Complete financial accounts for the past three to five years together with current accounts and financial forecasts (if available) would be very helpful in such an analysis.

In relation to the industry averages these are useful performance benchmarks but have their limitations. Like the notion of the average family they are after all just averages and comparisons have to be made with care.

Industry averages may be based on a diverse range of individual performances and are likely to reflect differing accounting policies (stock valuation policies, depreciation and other provision policies) among firms in the same sector, but they are nonetheless a useful guide to stimulate debate and action.

Ratios are signposts or indicators, they point the way to areas needing further investigation and analysis, they help identify areas of financial strength and weakness, they raise issues and often raise more questions than answers. Ratios should be used as a tool for probing for explanations and for developing plans for performance improvement.

CHAPTER 10

Concept review questions

Q1. (a) Revenue expenditure, **(b)** Capital expenditure.

  Q3. (a) Typically investment decisions may be motivated by one or more of the following:

- *Competitiveness* (to improve competitive position/competitive advantage);
- *Expansion and growth* (new/additional facilities or capacity required);
- *Replacement* (old buildings and equipment need to be replaced);
- *Renewal* (rebuilding, overhauling or refitting existing buildings and equipment);
- *Acquisitions and mergers* (e.g. seeking growth by acquiring another company);
- *Foreign direct investment (FDI)* (e.g. building a factory in a foreign country).

(b) The nature of today's competitive business environment is such that it is *'intangible investments',* in areas such as maintaining brand image, research and development, information systems, marketing and training, that are needed to maintain and improve the firm's competitive position.

  Many of these expenditures possess the characteristics of capital investment; they involve very substantial outlays, have long-term payoffs and are vitally important for the survival and growth of a competitive firm. However, from a purely financial accounting perspective they are not viewed as capital investment: they are instead treated as revenue expenditures and are charged against profits as they are incurred.

  While investment decisions of this nature do not add to the stock of real corporate assets, they are none the less vitally important to the firm's long-term survival and growth. Therefore it is our contention that they should be subject to the same type of rigorous investment appraisal process.

  (c) Some capital investments will be **mandatory** that is management will have no choice but to undertake the investment (e.g. to comply with health and safety legislation or to stay up with the competition) in order to remain in business. Other investments can be categorised as **discretionary** as management will have a choice whether or not to undertake the investment depending on its business priorities and the availability of funds.

  (d) The typical **characteristics of investment decisions** include:

  • A commitment of resources into the future (long-term), frequently in the face of considerable uncertainty;

- Substantial expenditures are usually involved;
- Difficult and costly to reverse out of such a decision (i.e. there is a high 'crawl-out' cost);
- Intangible costs and benefits are difficult to evaluate;

• High level approval within the organisation is normally required.

Q5. When evaluating *independent projects* both the **net present value (NPV)** and **internal rate of return (IRR)** methods will indicate the same accept/reject decision. However, when deciding among *mutually exclusive projects,* especially projects differing in scale, size and/or cash flow timings, the decision should be guided by the NPV technique.

The NPV technique is always considered the preferred criterion, whether the IRR is modified or not. NPV is after all a *valuation technique* and as the primary goal of financial management is maximising the value of the firm, then *NPV is the only investment appraisal technique that is always consistent with this principal goal.* Maximising shareholder value can be achieved by maximising the net present value of all the firm's investment cash flows, subject to applying an appropriate discount rate.

Practice questions

Q6. Investment appraisal techniques—Comfy Hotels Ltd
(a) Payback period (PPB)

£125,000÷£27,500=4.5 years

(b) Average Accounting Rate of Return (AARR)

[£15,000÷(£125,000÷10)]×100=120%

Remember ARR is a profit, not a cash flow, based measure.
(c) Net present value (NPV)

Year	Cash Flow £	Discount Rate (12%)	Present Value (PV)£
0	(125,000)	1.000	(125,000)
1–10	27,500	5.650*	155,375
		NPV	30,375

*10 year, 12% present value annuity factor, from annuity tables.

(d) Internal rate of return (IRR)
As the NPV is positive at 12%, the IRR is greater than 12%: try 18%.

Year	Cash Flow £	Discount Rate (18%)	Present Value (PV)£
0	(125,000)	1.000	(125,000)
1–10	27,500	4.494*	123,585
		NPV	(1,415)

*10 year, 18% present value annuity factor, from annuity tables.

The NPV is marginally negative at 18%, implying that IRR is greater than 12%, but less than 18%.

Interpolating:

IRR=12%+[30,375÷(30,375+1,415)](18%−12%)
=12%+[(30,375(31,790)(6)]
=12%+[0.955×6]
=12%+5.73
=17.73%

(e) Financial acceptability. On purely financial grounds the project should be implemented. The payback period is less than the 6 year maximum, the ARR seems healthy at 120% (although we have no target or standard to compare this with), the NPV>0, and the IRR>the 12% cost of capital. The project is therefore expected to increase the value of the business.

Q7. Investment appraisal—Meadowvale Hospital. Both options involve an increase in cash outflows, so in this case we are trying to find the ***least-cost option.*** Looking at initial cost only, Option 1 would be selected. However, on closer inspection, we can see that the total lifetime costs of Option 1 are higher than Option 2, when the annual running costs are discounted:

	Option 1 £	Option 2 £
Initial investment	80,000	100,000
Increased running costs*	294,400	220,800
Total lifetime costs	374,400	320,800

*Applying 10 year annuity factor at 6%, from annuity tables (e.g. Option 1=£40,000×7.360).

From the financial analysis Option 2 is clearly the cheaper of the two (overall 14% less costly than Option 1) and financially would be the preferred option. However, there may be other, significant, non-financial factors, (e.g. clinical, technical, productivity, and safety-related factors) to be considered.

CHAPTER 11

Concept review questions

Q1. Risk can be defined as: ***the chance that the actual outcome will differ from the expected outcome.*** Risk is frequently measured in statistical terms by the standard deviation, denoted by σ, (the Greek letter small sigma), which is a measure of dispersion

or spread around an *expected or mean value,* assuming a normal distribution of returns. The greater the degree of dispersion σ around the mean, the greater the degree of risk.

In attempting to quantify risk we are concerned with measuring dispersion, good and bad, on either side of an expected value. The greater the overall *variability,* the greater the risk, and the greater the perceived risk, the greater the return investors will require. As risk and return are positively correlated, managers and investors who wish to gain greater returns will have to accept greater risk. Specifically in investment appraisal we are concerned with evaluating the riskiness of a project's future cash flows. We wish to evaluate the chance that actual cash flows will differ from expected cash flows, that the NPV will be negative, or that the IRR will be less than the cost of capital. In other words, the chance that the project will prove unacceptable because of *the potential variability of future cash flows.*

In the context of risk assessment, the decision-maker does not know exactly what the outcomes will be but it is possible to assign *probability weightings* to the various, potential outcomes. Thus *probability theory* underlies many of the approaches to risk analysis.

Uncertainty relates to the situation where a range of differing outcomes is possible, but it is not possible to assign probabilities to this range of outcomes. An uncertain situation is likely to be one where the proposal is *unique* or *unprecedented.* It is a situation which has not been faced or experienced before, such as the high degree of uncertainty faced when diversifying into a completely new area of business—travelling in uncharted waters!

Q3. (a) An important limitation of **sensitivity analysis** is that it *treats variables as if they are independent* and does not consider the interrelationships that might exist between key variables. In its most simple form it allows for a change in only one variable at a time while all others are held constant. It is important therefore that the interdependency between certain variables is recognised when using this approach.

Sensitivity analysis *does not formally attempt to quantify risk;* there is, for example, no assessment of the probability of changes in any of the variables occurring. However, on the other hand, simply because probability weightings are not required, sensitivity analysis is very useful in trying to develop a feel for a project's risk under conditions of uncertainty.

Finally, sensitivity analysis *does not provide any clear-cut decision rule* for management—managers do not know if their decisions should be altered as a result of the sensitivity of any variable. Based on the outcomes of the analysis they still have to exercise managerial judgement in arriving at a final accept/reject decision.

(**b**) **Simulation** is not always appropriate or feasible for risk evaluation. Simulation models require *accurate probability assessments* of the key variables which are subjective and difficult to estimate in practice.

It is also difficult for model builders to define exactly the nature of the relationships (correlations) between dependent variables. For example it may be known that there is a correlation between sales price and volume sold, but specifying with mathematical accuracy the nature of the relationship for model purposes can be problematic.

A simulated financial model can be time-consuming, costly and requires specialist skills to construct, it is therefore only likely to be used to analyse very important, complex and large-scale investment projects. Because of these factors, simulation

analysis is not as widely used in practice as sensitivity and scenario analyses.

Simulation analysis, like sensitivity and scenario analysis, focuses on a project's *stand-alone risk*. The techniques ignore the impact of diversification, that is, how a project's stand-alone risk, as derived from the model, will correlate with that of other projects within the firm and affect the firm's overall corporate risk.

Practice questions

Q5. Sensitivity Analysis—Illusions Ltd
(a)

		Income	
1. Revised Cash Flows		Increase	Decrease
		£	£
Increased annual revenue		88,000	72,000
−Annual running costs		55,000	55,000
=Operating profit after depreciation		33,000	17,000
+Depreciation		15,000	15,000
=Operating cash inflows		48,000	32,000

2. Revised Net Present Value

Year	Net Cash Flow £	× Discount Rate (10%)	=	PV £
0	(235,000)	1.000		(235,000)
1–10	48,000	6.145		294,960
10	5,000*	0.386		1,930
		NPV	=	61,890

Year	Net Cash Flow £	× Discount Rate (10%)	=	PV £
0	(235,000)	1.000		(235,000)
1–10	32,000	6.145		196,640
10	5,000*	0.386		1,930
		NPV	=	(36,430)

(b)

	Operating Costs	
1. Revised Cash Flows	Increase £	Decrease £
Annual revenue	80,000	80,000
−Increased annual running costs	66,000	44,000
=Operating surplus (profit) after depreciation	14,000	36,000
+Depreciation	18,000	12,000
=Operating cash inflows	32,000	48,000

2. Revised Net Present Value

Year	Net Cash Flow £	× Discount Rate (10%)	=	PV £
0	(235,000)	1.000		(235,000)
1−10	32,000	6.145		196,640
10	5,000*	0.386		1,930
		NPV	=	(36,430)

Year	Net Cash Flow £	× Discount Rate (10%)	=	PV £
0	(235,000)	1.000		(235,000)
1−10	48,000	6.145		294,960
10	5,000*	0.386		1,930
		NPV	=	61,890

(c) Project Life

Revised Net Present Value—Increase

Year	Net Cash Flow £	× Discount Rate (10%)	=	PV £
0	(235,000)	1.000		(235,000)
1−12	40,000	6.814		272,560
12	5,000*	0.319		1,595
		NPV	=	39,155

Revised Net Present Value—Decrease

Year	Net Cash Flow £	× Discount Rate (10%)	=	PV £
0	(235,000)	1.000		(235,000)
1−8	40,000	5.335		213,400
8	5,000*	0.467		2,335
		NPV	=	(19,265)

ILLUSIONS LTD—SENSITIVITY ANALYSIS SUMMARY

	Base Case NPV	Revised NPV	Increase (Decrease)	
Critical variable:	£000s	£000s	£000s	%
(a) Income:				
10% Increase	12.7	61.9	49.2	387
10% Decrease	12.7	(36.4)	(49.1)	(387)
(b) Operating costs:				
20% Increase	12.7	(36.4)	(49.1)	(387)
20% Decrease	12.7	61.9	49.2	387
(c) Estimated life:				
20% Increase	12.7	39.2	26.5	209
20% Decrease	12.7	(19.3)	(32.0)	(252)

(**d**) Overall the project appears to have a high degree of sensitivity to changes in all three

variables. It seems particularly sensitive to changes in income. If management were able to secure a 10 per cent increase in income this would produce a 387 per cent increase in NPV. In contrast, if management had to reduce contract prices for any reason (for example, as a result of increased competition) by a margin of 10 per cent the project would be clearly unacceptable. There does not appear to be much margin for error.

In practice, management may well refine the process by carrying out further tests (e.g. on the accuracy of key data estimates) before making a final decision. For example, what if the change in income is reduced to ±5%?, or what if the change in operating costs is reduced to ±10%? Applying probability estimates to the likelihood of such changes occurring would also be helpful.

The project has a high degree of cash flow variability and could be classed as risky, however the final decision will depend on the risk attitude of the company's management. Some other factors which management may consider are:

(i) Perhaps there is some compelling business reason why the project should be undertaken, for example to maintain a competitive advantage,
(ii) What alternative projects are available that might provide greater returns for the same or less risk?

CHAPTER 12

Concept review questions

Q1. The **cost of capital** can be defined as, *the minimum rate of return a firm is required to earn on its investments in order to satisfy investors and to maintain its market value,* in other words it is *the investor's required rate of return.*

The cost of capital is an important figure as it serves to connect the firm's long-term financing decisions directly to its long-term investment decisions and thus to the wealth of its shareholders. The firm's financing decisions will affect its cost of capital, which in turn will affect its investment decisions.

The cost of capital is the *discount rate* which is applied to investment cash flows, a discount rate which allows for the time value of money and project risk. To be considered acceptable investment projects must expect to earn a rate of return at least equal to the firm's cost of capital.

If a project yields a positive net present value (NPV) when discounted at the firm's cost of capital it is considered a worthwhile investment—it is expected to increase the value of the firm and the wealth of its shareholders. In other words, projects with positive NPVs earn a rate of return greater than the cost of capital. The cost of capital is therefore the minimum acceptable rate of return which an investment project must earn.

Q3. The after-tax cost of debt is calculated as, $k_d(1-T)$, where the before-tax cost of debt is k_d and T is the marginal rate of tax. The before-tax cost of debt, k_d, is adjusted to reflect the tax relief available on debt interest. As debt interest is a tax deductible

expense, the cost of debt capital to the firm will be reduced by the amount of tax relief currently available.

Q5. (a) The firm's overall cost of capital is traditionally viewed in terms **of a weighted average cost of capital (WACC),** which is denoted as k_a, and which is a simple weighted average of the cost of the individual capital components (equity, including retained earnings, preference shares, and after-tax debt) as follows:

$$k_a = w_d k_d(1-T) + w_p k_p + w_e k_e$$

The preferred method of calculation is to use valuations and weightings based on **market values.**

(**b**) The WACC is only appropriate as an investment discount rate when the investment project under consideration has a similar risk profile as a firm's existing operations. In many occasions this will be acceptable. For example, a food manufacturing company building additional production capacity to meet market demands for its existing products, or a food retailer opening another chain store.

On other occasions when the firm is presented with investment opportunities which differ in risk characteristics from its present range of activities, the WACC will not be suitable. In evaluating capital investment projects which differ in risk characteristics (i.e. possess different degrees of systematic risk) from current activities the WACC is not the appropriate investment criteria. In such circumstances it is an investment project's *systematic risk* which is relevant and the cost of capital for the project may be estimated using the CAPM.

Practice questions

Q6. Cost of redeemable debt—Carolynco Textile Systems

Year	*Cash now (£)*
0	96
1–20	(14)
20	(100)

First we need to find a discount rate which equates the present value of the bond's cash inflows with the present value of its outflows, that is, the bond's internal rate of return. If we try 16 per cent.

$$=£14(\text{PVIFA}_{16\%,20}) + £100(\text{PVIF}_{16\%,20})$$
$$=£14 \times 5.929 + £100 \times 0.051$$
$$=£83.01 + £5.10$$
$$=£88.11$$

As the present value is less than the market value of £96, the discount rate of 16 per cent is clearly too high. We also know that a discount rate of 14 per cent (the

bond's coupon rate) is too low as it will yield a present value of £100, the bond's par value. Thus the before-tax cost of the bond lies between 14 per cent and 16 per cent (approximately 15 per cent). We can determine the cost more accurately by interpolating as follows:

$$k_d = 14 + \frac{(100-96)}{(100-96)+(88.11-96)}(16-14)$$
$$= 14 + [(0.336)(2)]$$
$$= 14 + 0.672$$
$$= 14.67\%$$

With a marginal tax rate of 30 per cent the after tax cost of the debt, $k_d(1-T)$, would be:

=14.67(1−0.30)
=10.27%

Q7. Cost of preference share capital—Jain Medical Systems

The annual dividend is paid on the nominal value of the preference shares and is computed as £0.35 (£5.00×7%), therefore the cost of the preference share capital is determined as follows:

$$k_p = £0.35/(£5.60) = 6.25\%$$

Q8. Cost of equity share capital—Carolynco Textile Systems

$(FV_{r,n}) = PV(1+r)^n$
Substituting,
$D_{1999} = D_{1994}(1+g)^5$
$(£0.44_{g5}) = £0.30(1+g)^5$
$£0.44/£0.30 = (1+g)^5$
$1.467 = (1+g)^5$

From the n=5 row of the FVIF tables, the nearest value to 1.467 lies in the 8% column. The *average* annual growth rate, g, therefore is 8 per cent and the cost of equity is calculated as:

$$k_e = \frac{£0.44(1.08)}{£6.30} + 0.08 = 0.075 + 0.08 = 15.5\%$$

CHAPTER 13

Concept review questions

Q1. A firm's **capital structure** is the combination of debt and equity capital which it uses to finance its *long-term* operations. **Debt capital** is the firm's long-term borrowings and *equity capital* is the long-term funds provided by the shareholders, the firm's owners.

The **optimal capital structure** for a firm is one that minimises its cost of capital and maximises its market value.

Q3. (a) M&M's Proposition I: The market value of any firm is independent of its capital structure and is given by capitalising its expected return at the rate appropriate to its risk class. In other words, a firm's capital structure is irrelevant in relation to its value. According to M&M what essentially determines a firm's value is the earnings stream generated by its investments. In equation form the firm's value, V, is given by:

$$V = \frac{EBIT}{k_a}$$

Proposition II: The expected yield on a share of stock is equal to the appropriate capitalisation rate, k_a, for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-equity ratio times the spread between k_a and k_d. This essentially means that the required rate of return on a firm's equity capital will increase in direct proportion to any increase in its debt-equity ratio. Thus, according to M&M, the cost of equity capital is a *linear function* of its capital structure.

(**b**) **The assumptions of the M&M model** include:

- *Perfect capital markets,* that is, there are *no taxes (corporate or personal), no transaction costs* on securities, *investors are rational, information is symmetrical—* all investors have access to the same information and share the same expectations about the firm's future as its managers, and both *individuals and firms can borrow or lend at the risk-free rate.*
- The firm's investment decision is given and generates *no income growth.* All future income streams are therefore in the form of perpetuities.
- Firm's can only issue two classes of security, *risky equity* and *risk-free debt.*
- The shares of firms can be divided into certain *risk classes* and firms within a given risk class share the same expected return and the same probability distribution of expected returns. The only difference between firms included in a specified risk class is their scale of operation.

(**c**) When **corporate taxes** are introduced into the model, a firm can increase its value and reduce its cost of capital by utilising debt in its capital structure. As the ratio of debt to equity is increased, the value of the firm rises and the overall cost of capital reduces. The

value of the firm in a corporate tax environment is given by:

$$V_g = V_u + pvDT$$

The difference in value between a geared, V_g, and an ungeared firm, V_u, is the *present value* of the interest tax shield, pvDT.

Q5. (a) To eliminate, or at least minimise, the possibility of managers seeking to take advantage of lenders, for example, by using borrowed funds for a more risky investment than that disclosed in loan applications, lenders will typically insist on restrictive covenants and provisions in loan agreements to protect their interests.

These covenants or provisions may, for example, relate to limiting debt-equity ratios, dividend pay-out ratios, and other liquidity ratios. If these ratio limits are exceeded the firm will be in breach of its covenants and may incur significant financial penalties as a result.

The costs of all the protective arrangements imposed by lenders is an **agency cost,** a cost which is borne by the firm's owners when the firm uses debt in its capital structure. Clearly the more debt a firm employs the greater will be the debt related agency costs.

A firm which is facing bankruptcy as a result of not being able to pay its financial obligations will incur, not only the *direct bankruptcy costs* of the associated administrative and legal procedures, but also the *indirect bankruptcy costs* of uncertainty and upheaval for managers, employees, suppliers and other creditors. For example, the attention of managers and employees is likely to be directed away from the day-to-day operations of the firm and towards bankruptcy proceedings and perhaps the search for alternative employment.

While bankruptcy or liquidation may be viewed as the extreme and terminal case of **financial distress,** it is feasible for a firm to struggle through a period of financial distress or hardship without actually being wound up. During a period of financial distress, additional costs associated with the state of distress will be incurred.

The costs of financial distress can be considerable, and often difficult to quantify in money terms. For example, the climate of uncertainty which a period of distress will create is likely to affect the behaviour, performance and relationships of owners, managers, employees, suppliers, customers, creditors and so forth.

Many of the consequent costs of financial distress, such as the possible unpleasant behaviour on the part of managers or owners, the likely deterioration in employee morale, and the potential loss of supplier and customer goodwill, will be difficult to translate into monetary terms.

As with bankruptcy, the risks and potential costs of financial distress will increase relative to the volume of debt in the capital structure.

(b) Financial gearing refers to the way in which the owners of a firm can use debt finance to 'gear up' the assets and earnings of the firm. The greater a firm's borrowings the greater will be its financial gearing and its financial risk. **Operating gearing** refers to the proportion of fixed operating costs in a firm's total operating costs. The higher the proportion of fixed costs the higher the level of operating gearing and also the higher the firm's operating or business risk.

(c) Business risk arises from the nature of the firm's business environment and the

particular characteristics of the industry in which it operates: it is a variable which lies largely outside management's control. It is possible to measure a firm's business risk by the degree of variability of its earnings before interest and taxes (EBIT).

Financial risk, in contrast, represents the risk that arises from a firm's level of gearing and is a variable which is can be directly controlled by management. The more debt a firm introduces into its capital structure the greater the level of financial risk (that is the risk of the firm not being able to meet its financial obligations and experiencing financial distress) and the greater the return the equity shareholders require to compensate for the additional financial risk.

Practice questions

Q7. M&M's Proposition I—Bramble Food Processors

(**a**) The market value of Bramble Food Processors is calculated as:

$$V = \frac{EBIT}{k_a} = \frac{£2.5m}{0.12} = £20.83m$$

(**b**) According to M&M's Proposition I (with taxes), the market value of the geared company, V_g, will be equal to the value of the ungeared company, V_u, plus the *present value* of the tax shield, pvDT:

$V_g=V_u+pvDT$
$=£20.83m+(0.3)(£5m)$
$=£22.83m$

Q8. M&M's Proposition II—Winger Toys

(**a**) $k_e=k_a+(k_a\text{-}k_a)\times(W_d/w_e)$
$=18\%+(18\%-9\%)\times(0.5/0.5)$
$=18\%+9\%$
$=27\%$
(**b**) $k_{eg}=k_{eu}+(k_{eu}\text{-}k_d)(1\text{–}T)(w_d/w_e)$
$=18\%+(18\%-9\%)\times(0.7)\times(0.5/0.5)$
$=18\%+6.3\%$
$=24.3\%$

The cost of equity has reduced due to the effect of the tax shield on debt. The financial risk premium associated with using debt is correspondingly reduced from 9 per cent to 6.3 per cent.

Q9. Financial gearing—Eden Enterprises

	Scenario 1 (EBIT–20%) £	Base case £	Scenario 2 (EBIT+20%) £
EBIT	144,000	180,000	216,000

Interest (I)	60,000	60,000	60,000
EBT	84,000	120,000	156,000
Tax	21,000	30,000	39,000
EAIT	63,000	90,000	117,000
EPS	1.26	1.80	2.34
EPS Change	–30%	0	+30%

A ±20 per cent change in the base case EBIT produces a magnified change of ±30 per cent in EPS, where EPS is calculated as EAIT/50,000 ordinary shares. The company's degree of financial gearing is calculated as:

$$\text{DFG} \quad = \quad \underset{\text{Scenario 1}}{\frac{-30\%}{-20\%}} \qquad \underset{\text{Scenario 2}}{\frac{+30\%}{+20\%}}$$

$$= \quad 1.5 \qquad\qquad 1.5$$

Clearly Eden Enterprises is financially geared, and the higher the ratio the more vulnerable is the firm's EPS to a drop in the firm's earnings before interest and tax.

The degree of financial gearing could also have been found more directly from the following formula:

$$\text{DFG for base case EBIT} \quad = \quad \frac{\text{EBIT}}{\text{EBIT} - \text{I}}$$

$$\text{DFG} \quad = \quad \frac{£180,000}{£180,000 - £60,000}$$

$$= \quad 1.5$$

CHAPTER 14

Concept review questions

Q1. (a) The dividend decision is allied to the firm's financing decision. It essentially involves a firm's directors deciding how much of the firm's earnings, after interest and taxes (EAIT), should be distributed to the firm's ordinary shareholders in return for their investment in the firm, and how much should be retained to finance future growth and development. The objective of the firm's dividend decision, like all financial decisions, should be the maximisation of shareholder wealth.

(**b**) A firm's **dividend policy** is the plan of action adopted by its directors whenever the dividend decision is to be made. In practice a range of factors (e.g. profitability, liquidity, legal and contractual) will restrict a firm's dividend policy options. Whether a

firm's dividend policy actually has any bearing on its share value, is an unsolved puzzle in financial management.

(**c**) If dividend policy is considered relevant, then it follows that (just as in the capital structure debate) there must be an **optimal dividend policy,** that is, one which, by providing the optimum balance between dividend payout and earnings retention, maximises a firm's share value.

If an optimal dividend policy does exist, then managers should clearly concern themselves with its determination: if it does not, then any dividend policy will do, as one policy will be equal to another.

Q3. Miller and Modigliani's dividend irrelevancy theory contends that, *in perfect capital markets,* the value of a firm is not affected by its dividend policy but by the quality of its investment decisions and its level of risk. It therefore does not matter how a firm divides its earnings between dividend payments to shareholders and internal retentions. In the M&M view, the dividend decision is one over which managers need not agonise, trying to find the optimal dividend policy, because an optimal dividend policy does not exist.

M&M suggested that the change in share price following a change in dividend payment is due to the **informational content** of the dividend payment, rather than the dividend payment itself.

M&M also argued for the existence of a **clientele effect,** where the nature of a firm's dividend policy will attract a particular clientele of shareholders.

Q5. A firm's owners will incur **agency costs** whenever they introduce procedures and mechanisms aimed at reducing the potential for conflict between the personal objectives of managers and the objectives of the owners. Incurring agency costs has the effect of reducing shareholder value.

In the context of dividend policy, if, as a consequence of the firm's dividend payout policy, managers need to make periodic equity issues to finance the firm's investments, each fresh equity issue will expose the firm's managers and finances to the scrutiny of the investment community (bankers, financiers, underwriters, institutional investors and so forth).

Seeking additional equity from the financial markets requires managers to justify the reasons for the equity issue. This process is helpful to owners and reduces their agency costs, as managers are less likely to engage in activities which are not consistent with shareholder wealth maximisation if they know that the firm will be regularly exposed to this type of external scrutiny.

In this context, where the payment of dividends (like the raising of debt finance in the capital structure debate), at least in an indirect way, leads to the activities of managers being subjected to closer external investigation, then dividend (and financing) policy may indeed have a beneficial effect on the value of the firm.

The mainstream, modern view of dividend policy emphasises the valuable role of dividend policy in helping to resolve the agency problem, and thus in enhancing shareholder value.

Q7. Share repurchase or buyback schemes are often promoted by companies as a means of returning value, in the form of excess cash, to shareholders. Under a share repurchase scheme, a company returns surplus cash to its shareholders by buying back

some of its shares—from those shareholders who are willing to sell. Some of the main motives for share repurchases include:

Utilisation of idle cash. Companies which have accumulated cash balances, substantially in excess of any future investment needs, may find a share repurchase scheme an effective method of returning the cash to shareholders.

Enhanced share price. Companies which undertake share repurchase programmes generally experience an increase in the market price of their shares. This may be partly explained by the increase in earnings per share, having less shares available to trade in the market and/or a positive market signalling effect that the shares are undervalued.

Reduced takeover threat. A share buyback reduces the number of shares in circulation and also the number of 'weak' shareholders, that is those shareholders who have no strong loyalties to the company, as buybacks will induce them to sell. This helps to reduce the threat of an unwelcome takeover, as it makes it more difficult for a predator company to gain control. This is sometimes referred to as reverse dilution.

Practice questions

Q9. Dividend ratios—Java Paper & Packaging Company

(a)	Number of shares in issue	= £5m @ 25p	= 20m
	DPS	= £0.95m/20m	= 4.75p
(b)	EPS	= £2.89m/20m	= 14.45p
(c)	Payout ratio	= (4.75p/14.45p)×100	= 32.9%
(d)	Retention ratio	= 100%−32.9%	= 67.1%
(e)	Dividend cover	= £2.89/£0.95	= 3
	Alternatively	= EPS/DPS	= 3
(f)	Dividend yield (gross)	= 4.75p×1(1−0.20)	= 5.94p
		= (5.94p/£2.75)×100	= 2.16%

The company seems to be following a high retentions policy by retaining a relatively large proportion of its earnings and maintaining a healthy cover ratio.

Only one year's results are available and several previous years would be useful to determine trends. Similarly, some industry figures would be helpful in assessing the company's policies and performance. For example, it would be helpful to compare the dividend yield with that of other similar companies.

Q10. Evaluation of dividend policies—Energy Systems

(**a**) In the scenario presented, the dividend per share (DPS) and payout ratios are calculated as follows:

Year	Forecast EPS (pence)	DPS (pence) Policy		Payout ratio % Policy	
		1	2	1	2
Current	9.80	3.92	3.92	40	40
1	11.90	4.76	4.70	40	40
2	10.10	4.04	5.64	40	56

3	13.305.32	6.77	40	51
4	14.505.80	8.13	40	56
5	17.406.96	9.75	40	56

The dividend per share for the current year is calculated as 3.92p (1.02p interim plus 2.09p final). With earnings per share (EPS) of 9.80p expected in the current year, the payout ratio for the current year would be 40 per cent (3.92p/9.80p).

Policy 1. If the company adopted policy number 1 and maintained a constant 40 per cent payout ratio over the five years, the dividend is forecast to fall from 4.76p in year 1 to 4.04p in year 2, a reduction of 15 per cent. The reduction in dividend per share follows directly from the projected fall in earnings per share, and would conflict with the managing director's objective of avoiding any cut in dividends. No information is given on the reason for the forecast fall in earnings, although this should be available internally to the board.

Policy 1 highlights one of the drawbacks of following a constant dividend payout ratio—dividend payments will fluctuate directly in line with earnings. Payouts will increase in years of high earnings and fall in years of lower earnings. A dividend payout which is likely to fluctuate in this way may not appeal to some of the company's shareholders.

Policy 2. With policy number 2, maintaining a compound growth rate in dividends of 20 per cent per year might seem ambitious and demanding, in view of the company's growth aspirations.

However, based on the information provided, the policy is achievable over the planning period. In addition, should the company adopt policy number 2, no reduction in dividend payments is forecast. This would comply with the managing director's objective.

It is noted that sustaining an annual growth rate of 20 per cent in dividends will significantly increase the payout ratio (up to 56 per cent for three of the five years) and lower retentions. The dividend cover would be reduced from 2.53 times in years 1 and 2 to 1.78 times in years 4 and 5. While a cover ratio of 1.78 might still be considered adequate, some of the directors and other investors may not be comfortable with such a reduction.

Such a policy may please some shareholders (e.g. financial institutions) and perhaps raise their expectations about future dividend payments, but there is no information provided on the structure of share ownership.

The directors should really consider if this policy is affordable in relation to the company's investment needs. The company is reported to be growing rapidly and has ambitious growth plans. How are these to be financed? Unfortunately this cannot be determined, as there is no information given concerning the company's investment plans.

Based on the information provided, which is limited, it appears the directors could feasibly adopt either policy. For policy number 1 they could simply adjust the payout ratio in year 2 to maintain a consistent and increasing dividend per share payment. Adopting policy 1 would leave the company with higher internal financing than policy 2 and may be more appropriate in relation to its strategic growth objectives.

Without further information on shareholder clienteles and company investment plans, it is not possible to arrive at a definitive policy recommendation.

(**b**) The directors are implying a residual approach to dividend policy, where the amount of dividend is being determined as a residual after the company's investment financing requirements have been met.

Year	EPS (pence)	Investment financing	Maximum dividend (pence)	DPS (pence) Policy 1	Policy 2	Variance Policy 1	Policy 2
Current	9.80	5.88	13.92	3.92	3.92	0	0
1	11.90	8.33	3.57	4.76	4.70	-1.19	-1.13
2	10.10	7.07	3.03	4.04	5.64	-1.01	-2.61
3	13.30	9.31	3.99	5.32	6.77	-1.33	-2.78
4	14.50	7.25	7.25	5.80	8.13	1.45	-0.88
5	17.40	8.70	8.70	6.96	9.75	1.74	-1.05

[1] For the current year, the maximum dividend is the dividend actually proposed, and investment financing is the EPS of 9.80p less the proposed dividend of 3.92p.

With the exception of the current year, the company's investment needs have been calculated as a percentage of the forecast earnings per share. For example, in year 1 the company's investment needs are equivalent to 8.33p per share (11.90p ¥ 0.7). This would leave a maximum residual dividend of 3.57p per share available in year 1. Whether the company would wish to use all of this for dividends and leave no reserves is another matter. This would have implications for the company's capital structure.

Adopting a purely residual approach will produce an initial decline in the pattern of dividend payments, from the current year's proposed dividend of 3.92p through to the dividend in year 2 of 3.03p. The level of dividend per share is not expected to return to current levels until year 4. After which time, there would seem to be scope for a substantial increase in dividends.

Shareholders may not react favourably to a decline in their dividends. Although, if they are informed of the company's plans they may be prepared to accept an initial dividend reduction, if they are persuaded this policy will produce higher future dividends through the profitable investment of the retained earnings.

In relation to the two dividend policies originally proposed, it is evident that the directors would not be able to adopt either policy, given the constraint on additional financing. With policy 1, financing would be needed during years 1 to 3, and policy 2 could not be achieved without significant additional financing over the five years.

CHAPTER 15

Concept review questions

Q1. Planning and control can be categorised as ***strategic, tactical*** or ***operational,*** according to certain characteristics such as *timeframe, level of aggregation* and *scope.* The key characteristics of each

1. ***Strategic planning.*** This is *long-term* e.g. four to five years ahead; *highly aggregated in* the sense that it deals with very summarised information, goals and plans; and *broad in scope* as the focus is on the entire organisation, or a very large part of it, and how it relates to its environment. It is usually decided at a *high organisation level* such as board level and involves a high degree of risk and uncertainty.

2. ***Tactical planning.*** This has a *medium-term* timeframe e.g. two to three years ahead; deals with *moderately aggregated* information, goals and objectives; is *medium scope;* and essentially serves to integrate and link together the two more extreme ends of the planning continuum i.e. the strategic and the operational. The focus here is on clarifying and shaping goals, objectives and plans with a view to their implementation at the operational level. It is usually the function of 'middle' management in the organisation.

3. ***Operational planning.*** This is characterised by *short-term* timeframe e.g. usually up to one year ahead; *disaggregated* because it deals with very specific and detailed information, plans and targets; and *narrow in scope,* focusing only a part of the organisation.

While it is helpful to our understanding to distinguish different types of planning, it should be remembered that planning is, or should be, a *dynamic activity* and that the various types will inevitably overlap and interact.

Q**3.** A management control system should have at least four elements:

1. A ***detector* or *sensor,*** which is a measuring device that identifies what is actually happening in the process being controlled.

2. An ***assessor,*** which is a device for determining the significance of what is happening. Usually, significance is assessed by comparing the information on what is *actually happening* with some standard or expectation of what *should be happening.*

3. An ***effector,*** which is a device that alters behavior if the assessor indicates a need for doing so. This device is often called 'feedback'.

4. A ***communications network,*** which transmits information between the detector and the assessor and between the assessor and the effector.

CHAPTER 16

Concept review questions

Q1. Short-term financial management involves financial decision-making, planning and control at the operational level of managing the firm's short-term assets, liabilities, and cash flows. It is concerned with how decisions and plans affect the structure of the firm's short-term (current) assets, liabilities, and cash flows.

Short-term is taken to mean that the decisions and plans will have an effect on the firm's finances within a one-year time horizon, that is, the assets being managed will be converted into cash, or the liability will be paid, within the timeframe of a year.

Because it is concerned with the management of current assets and current liabilities, short-term financial management is also very often referred to as *working capital management.*

Q3. (a) Short-term financial planning will typically involve the preparation of detailed financial plans for a time horizon of one year ahead—although less detailed plans may also be prepared for a further year ahead.

It is difficult to overstate the importance of short-term financial planning, particularly cash planning—for any organisation, profit-oriented or non-profit-oriented. Many organisations, commercial and non-commercial, have collapsed or come very near to collapsing as a result of weak and ineffective day-to-day financial planning arrangements.

Short-term financial and other operating plans will be prepared in the context of the organisation's long-term or strategic plans. It is only through maintaining effective short-term financial planning systems and procedures that any organisation's longer-term objectives and plans can be realised.

(**b**) The two critical elements in financial planning are **cash (or liquidity) planning** and **profit planning.**

Cash planning will show the potential effects of planning decisions on the firm's *liquidity* and *cash flow* position. It will include the preparation of cash flow forecasts and cash budgets. Profit planning will show the potential effects of planning decisions on the firm's financial returns and profitability. It will include the preparation of forecast or budget profit and loss statements and balance sheets. The budget or forecast balance sheet will also indicate the potential effects of decisions on the firm's level of *financial risk.*

Q5. (a) In cases where the cash budget reveals an expected cash surplus over the budget period, then, after allowing for an appropriate 'safety margin', the firm can invest any surplus cash on a short-term basis, that is for a period of up to one year.

Short-term investment opportunities would typically include:

(*i*) *Short-term interest-earning deposits.* These are available with financial institutions, foreign or domestic. There are a multitude of options available (e.g. overnight deposits, 30, 60, 90 day bank deposits, offering fixed or variable rates of interest).

(*it*) *Marketable securities.* These are short-term, easily liquidated, interest-earning government and non-government money market instruments. Examples include Treasury bills and certificates of deposit (CDs).

(*iii*) *Payments in advance* . Payments can be made in advance to creditworthy suppliers enabling discounts to be negotiated. The benefits of paying in advance would clearly have to be weighed against the cost of any interest lost from investing the funds.

Short-term investment criteria. The short-term investment decisions would be guided by the following investment criteria:

Liquidity: Investments should be *easily liquidated* or *realised* in the event of sudden adverse changes or set-backs in business conditions.

Maturity: Investments should have a *short-term to maturity,* usually less than one year, thus investing in a five-year bond would be inappropriate in this context.

Risk and Return: Any short-term investments should have a *low default risk* (the risk that interest and principal will not be paid when due) and should earn *a fair rate of return* commensurate with the risk involved. High risk, speculative investments should be avoided.

Cost: Investment set-up, administration and arrangement costs should be low.

Taxation: Investments should be tax-efficient.

(**b**) **Short-Term Financing.** Should the cash budget reveal a need for short-term financing at some stage during the budget period some of the short-term financing options available are:

(*i*) *Trade credit.* It may be possible to stretch the current period of credit taken from suppliers. However, *supplier goodwill* and tolerance should not be compromised as essential supplies may be withheld. It would also not be advisable to forgo *cash discounts* from suppliers for early settlement as this is a very expensive form of short-term financing.

(*ii*) *Bank overdrafts and short-term loans.* These may be *secured* or *unsecured.* A *bank overdraft* allows a business to draw on short-term funds as and when required up to a limit previously agreed with the bank. Interest is charged on the portion of the overdraft actually used.

Short-term bank loans can normally be arranged at fixed or variable rates of interest. The firm is required to take the full amount of the loan on which interest is periodically charged. This tends to make term loans more expensive than overdraft facilities. In both cases arrangement and administration costs will be involved.

An overdraft facility would perhaps be the more flexible and cheaper of the two financing arrangements.

Practice questions

Q7. Cash Budget—Rock Solid Music
(**a**)

CASH BUDGET
Rock Solid Music Sales Receipts Schedule

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Sales (£000s)		32.00	36.00	36.00	36.00	42.00	55.00	70.00	24.00
Cash sales			28.80	28.80	28.80	33.60	44.00	56.00	
Credit sales			6.40	7.20	7.20	7.20	8.40	11.00	
			35.20	36.00	36.00	40.80	52.40	67.00	

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Purchase Payments Schedule									
Purchases (£000s)	19.20	21.60	21.60	21.60	25.20	33.00	42.00	14.40	
Payments									
Cash				2.16	2.16	2.52	3.30	4.20	1.44
One month credit				10.80	10.80	10.80	12.60	16.50	21.00
Two months credit				7.68	8.64	8.64	8.64	10.08	13.20
				20.64	21.60	21.96	24.54	30.78	35.64

CASH BUDGET

Receipts (£000s)	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Sales	35.20	36.00	36.00	40.80	52.40	67.00
Grant aid	3.00					
1. Total	38.20	36.00	36.00	40.80	52.40	67.00
Payments (£000s)						
Purchases	20.64	21.60	21.96	24.54	30.78	35.64
Wages	3.60	3.60	3.60	4.20	5.50	7.00
Rents, rates etc.	7.00	7.00	7.00	7.00	7.00	7.00
Advertising	1.60	1.80	1.80	1.80	2.10	2.75
Drawings	2.00	2.00	2.00	2.00	2.00	2.00
Taxes	3.00		4.00			
2. Total	37.84	36.00	36.36	43.54	47.38	54.39
3. Net Cash Flow (1–2)	0.36	0.00	−0.36	−2.74	5.02	12.61
4. Opening balance	−3.00	−2.64	−2.64	−3.00	−5.74	−0.72
5. Closing balance (3+4)	−2.64	−2.64	−3.00	−5.74	−0.72	11.89

The cash budget reveals an expected negative cash flow for five out of the six months of the budget period, although at no time is it expected to exceed the permitted overdraft facility of £8,000.

There is a substantial positive cash flow generated during December, presumably related to the Christmas season. Will this be sufficient to cover the early months of the next financial year when traditionally retail sales are expected to be at their seasonal low?

As the overdraft facility is due for review by the bank in December it would be beneficial to extend the budget period beyond December, perhaps even prepare a rolling six-month cash budget on a regular basis.

Some of the options open to Jennifer in trying to improve her operating cash flows would essentially include efforts to improve cash inflows (e.g. sales) and/or Jennifer

could seek to reduce her outgoings. For example:

- could advertising expenses be reduced, in the short term, without adversely affecting sales?
- is there scope for savings in wage costs, e.g. reducing overtime or actual hours worked?
- can personal drawings be reduced?
- is it possible to eliminate credit sales without affecting total sales?
- could cash purchases be acquired on credit terms?

(b) Sensitivity analysis could be used to test how the net monthly cash flow and the closing cash balances would change in response to changes in key variables. Sales is clearly a key variable and it would be helpful to test the effect of changes on cash flows. For example:

- what if monthly sales were 5% or 10% higher (or lower) than estimated?
- what if payments to suppliers could be delayed by another month?

Q8. Avionics Ltd—Forecast Cash Flow Statement

	£m
Operating profit	1.02
Depreciation	0.65
Increase in stocks	(0.13)
Increase in debtors	(0.22)
	1.32
Increase in creditors	0.12
Net cash inflow from operating activities	*1.44*
Interest payable	(0.07)
Taxation	(0.22)
Dividends	(0.08)
Free cash flow	*1.07*
Changes in cash during the period	
Opening cash balance	0.06
Free cash flow for period	1.07
Closing cash balance	*1.13*

The forecast cash flow statement suggests that the company is able to generate substantial cash flows (£1.44m) from its trading activities. The company is essentially a cash generator. Overall, the forecast financial picture seems healthy. The company is expected to generate cash flows substantially in excess of its outstanding commitments and consequently the cash balance is expected to increase by £1.07m.

On the basis of the forecast the financial manager and the management team can formulate appropriate decisions and plans.

Preparation of forecast cash flow statement

Starting with the forecast operating profit for the year of £1.02m, depreciation for the year of £0.65m is added back as it is not a cash flow item. The investments in the current assets of stock and debtors are forecast to increase over the previous year, by £0.13m and £0.22m, respectively. Creditors are also expected to increase by £0.12m over the previous year. The result of these transactions is a forecast net cash inflow from operating activities of £1.44m.

However, the company has also had to pay interest charges for the year of £0.07m, this is deducted from the net cash inflow of £1.44m.

Avionics Ltd is seemingly not planning to purchase or dispose of fixed assets. The value of tangible assets on the balance sheet has only changed (reduced in this case) by the amount of depreciation (£0.65m) charged in the profit and loss account.

During the year the company has to pay out tax of £0.22m and dividends of £0.08m.

After making all these adjustments, the free cash flow amounts to a positive figure of £1.07m. Note that the cash balance in the forecast balance sheet is shown to increase by this amount, (£1.13m−£0.06m).

CHAPTER 17

Concept review questions

Q1. (a) A firm's **working capital** (or net working capital) is the difference between its current assets and its current liabilities. It is the investment which a business needs to make in its day-to-day operations which is necessary to: *(i) carry adequate stocks, (ii) allow a period of credit to customers,* and *(iii) pay creditors (without difficulty).*

(b) Investment in working capital should produce cash *returns* that add to the market value of the firm and thus to the wealth of its shareholders. However, excessive investment in working capital will depress returns by increasing the opportunity costs of having funds unnecessarily tied up in current assets.

Alternatively insufficient investment in working capital increases the firm's *risk* of financial distress or insolvency by not having sufficient funds available to pay creditors when the bills become due. A constant preoccupation of the financial manager will be trying to establish in working capital management the risk-return trade-off which maximises the market value of the firm.

Q3. For a manufacturing company the **operating cycle** is the length of time it takes, usually expressed in terms of days, to complete the cycle of the firm's manufacturing, distribution and selling operations. It is the time it takes to convert raw materials into finished product, for the finished product to be sold to customers and for the appropriate customer payment to be collected.

The time interval between placing the order with a supplier and the physical receipt of goods is not part of the operating cycle.

The more extended the operating cycle, the greater the investment in working capital required and consequently the longer the cash cycle. The goal of the financial manager will be to minimise the length of the operating cycle without detriment to the firm's operations.

Q5. In theory **the optimal level of investment in current assets** is the level which minimises total working capital costs which consist of ordering costs and carrying costs. *Ordering costs* are the costs of actually procuring current assets and are usually expressed as £s per order. *Carrying costs* include costs such as storing, handling, insuring, damage, deterioration, theft and financing of current assets. They represent the *variable* or incremental costs of carrying an item in stock. Carrying costs are typically stated as £s per unit per period.

Ordering costs increase as the number of orders increases and carrying costs increase as the volume of current assets held increases. There is an inverse relationship between ordering costs and carrying costs: as ordering costs go down, carrying costs go up. The objective is to achieve a balance between these two types of costs which will minimise the total cost of investing in current assets.

Q7. **Outsourcing** of stocks and supplies is advanced as a means of improving efficiency and adding value in the management of the supply chain. Instead of making its own components or supplying its own services in-house a company arranges to contract them from an external specialist source. Outsourcing thus reduces the investment needed in working capital.

Practice questions

Q8. Stock turnover—Harry's Bar and Restaurant

	Current year	*Previous year*
Average stock	= (36,634+34,982)72	(31,246+36,634)/2
	= £45,808	£33,940
Cost of sales	£1,099,660	£1,132,980
Stock turnover	= (1,099,660/45,808)	(1,132,980/33,940)
	= 24 times	33.4 times
Inventory days	= 360/24	360/33.4
	= 15 days	10.8 days

Harry does not seem to have managed his stocks in the current year as efficiently as he did in the previous year. Stock turnover has declined from 33.4 times in the previous year, to 24 times in the current year, and the average number of days stock being carried has increased by almost 40 per cent. Harry should determine the reason for the increase in stock levels and review his stock control procedures.

Q9. Brandon Clothing Company—Operating Cycle

		Days
Raw material storage	=	5
Conversion time	=	7
Finished product storage	=	4
Delivery time	=	3
Credit period	=	40
Operating cycle	=	59

The interval between placing an order for raw materials and actual delivery is not included in the operating cycle.

Q10. The City Bakery

$$EOQ = \sqrt{\frac{2 \times 10,800 \times £10}{£5}} = \sqrt{43,200}$$

(a) $= 208kg$

(b) **Reorder point**

(i) D=10,800−360=30kg
RP=LT×D=3 days×30kg per day
=90kg
(ii) RP=LT(D)+SS
=90kg+(30×2)kg=150kg

CHAPTER 18

Concept review questions

Q1. (a) The level **of investment in debtors** will be influenced by many variables such as:

1. individual firm's line of business;
2. ratio of credit sales to total sales;
3. sales growth rate;
4. credit policies of the firm's competitors;
5. individual firm's credit policies.

(b) For many firms the investment in debtors constitutes the largest single element of current asset investment. An increase in debtor levels as a result of changes in any of the variables mentioned in

(a) above has to be financed, either by internally generated funds or externally with borrowed money on which interest and other charges will be paid. The money used to finance debtors cannot be used elsewhere in the firm.

Clearly the efficient and effective management of the investment in debtors is vital in

maintaining a firm's sound financial health.

(**c**) The greater a firm's investment in debtors, the greater the risk of default (non-payment) by customers and consequently the greater the risk of the firm's own illiquidity.

Q3. The key features of a **credit management system** include:

- *Credit selection.* This is the process of selecting the customers who will be granted credit and determining their individual *credit limits.* Usually a set of criteria or checklists will be available to perform the initial credit screening.
- *Credit standards.* These will specify the minimum acceptable standards of *financial viability* and *creditworthiness* which a customer must reach before credit is allowed. It is essentially an assessment of a potential customer's *credit quality.*
- *Credit terms.* These will set out the *credit period* allowed and any *discount terms* for early payment.
- *Collection policy.* This refers to the company's systems and procedures for collecting payment from customers when it becomes due.

Overall, credit policy needs to be operated in a balanced way. If it is operated too tightly sales and profits will be lost. If it is operated too leniently then the risk of non-payment and bad debts increases.

Q5. The **Baumol model** makes essentially the same assumptions as the EOQ stock management model, that is, certainty and constancy of demand. The model assumes an initial stock of cash is drawn on at a constant rate until it is fully consumed, at which point it is replenished immediately and in full.

The Baumol model thus assumes the rather simplistic scenario that cash flows into and out of a business at constant predictable rates. Such would be the case if, for example, all transactional cash inflows to the business, including any withdrawals from marketable securities, occurred, say, on the first of the month. This initial 'stock' of cash is then consumed at a constant daily rate during the month only to be replenished in full and immediately on the first of the next month.

Practice questions

Q6. Debtor ratios—Nirvana Food Products

		Current year (£)		Previous year (£)	
$\dfrac{\text{Trade debtors}}{\text{Credit sales}}$	$\times\ 360\ =$	$\dfrac{373{,}247}{4{,}265{,}684}$	$\times\ 360$	$\dfrac{315{,}960}{3{,}791{,}720}$	$\times\ 360$
Debtor days	=	31.5 days		30 days	

It would appear that debtors are being managed relatively effectively. There has been a marginal increase in debtors days (up 5 per cent), compared with an increase in credit sales of 12.5 per cent. Credit control systems should be continually monitored to ensure that credit management does not become lax, particularly when a growth in sales is being experienced.

Q7. Cash turnover—Harry's Bar and Restaurant

	Current year	*Previous year*
Average cash balance	= (24,663+22,124)/2	(36,498+24,663)/2
	= £23,394	£30,581
Sales	£1,832,766	£1,888,300
Cash turnover	= (1,832,766/23,394)	(1,888,300/30,581)
	= 78 times	62 times
Cash days	= 360/78	360/62
	= 4.6 days	5.8 days

Cash turnover has increased from 62 times in the previous year, to 78 times in the current year, and the average number of days cash being carried has reduced by just over a day.

Q8. Cash and operating cycle—O'Malley Enterprises

		Current	*Previous*
(1)	Inventory days	79	76
(2)	Debtor days	56	46
	Operating Cycle	*135*	*122*
(3)	Creditor days	42	42
	Cash Cycle	93	80

There has been an increase of 13 days in the operating and cash cycles over the two years.

However, remember that in using figures from company accounts most companies will give their accounts a financial 'makeover' for the year end and try to ensure that their relevant ratios appear in the best possible light. For example, when a company is approaching its year end, stocks may be deliberately run down, debtors more actively chased for payments, and creditors paid more promptly: all designed to improve the look of the relevant year-end ratios.

Q9. Miller-Orr cash model—NewPort Transport

(1) *The target level cash balance.*

Substituting into the Miller—Orr equation yields:

$$TL = \sqrt[3]{\frac{3 \times £25 \times £500^2}{4 \times 0.00025}} + £5,000$$

$$= \sqrt[3]{\frac{18,750,000}{0.001}} + £5,000$$

$$\approx £2,657 + £5,000$$

$$\approx £7,657$$

Thus the optimal or target cash balance is £7,657.

(2) *The upper control limit UL*

$$UL=3TL-2LL=(3\times£7,657)-(2\times£5,000)=£12,971.$$

Observe that the target cash balance of £7,657 is one-third of the way between the lower limit of £5,000 and the upper limit of £12,971.

(3) *The average cash balance (ACB)*

$$ACB = \frac{4TL-LL}{3} = \frac{(4\times £7,657)-£5,000}{3}$$
$$= £8,543$$

The implications of the model for the financial manager of NewPort Transport are that £5,134 (£12,791− £7,657) should be invested in short-term marketable securities when the cash balance climbs to £12,791. Conversely, the treasurer should cash in £2,657 (£7,657− £5,000) worth of marketable securities when the cash balance drops to £5,000.

CHAPTER 19

Concept review questions

Q1. In choosing an appropriate source of finance the key decision variables are: **duration, cost, borrowing capacity, risk, flexibility, availability** and **terms and conditions.**

Duration. According to the maturity matching principle asset and liability maturities should be matched and finance should be raised according to the maturity of the asset(s) to be purchased. For example, fixed assets such as land and property should be financed from long-term sources of finance such as equity or mortgage debentures, and peak, cyclical current asset requirements should be financed from short-term sources such as a bank overdraft.

Cost. In determining the cost of borrowing the financial manager needs to consider not only the *direct costs* of interest, charges and fees but also *opportunity costs.* For example, simply deciding to extend the creditor payment period rather than borrow from the bank may be cheaper in terms of direct costs by avoiding bank interest and charges, but if the practice persists the company's credit rating and its ability to negotiate favourable deals from suppliers may suffer. In the longer term these opportunity costs may prove more expensive than the direct costs of borrowing.

Borrowing Capacity. This is the firm's ability to borrow additional short- and medium-term finance. Any assessment of borrowing capacity will consider the level *of existing bank borrowings* and other financing commitments (e.g. leasing and hire purchase obligations) and the availability of assets to offer as *security.*

For a limited company borrowing limits are likely to be specified in its Articles of Association.

Risk. In analysing risk we distinguish between two types of risk, business risk and financial risk. *Business risk* is the risk inherent in the type of industry in which the firm operates.

If a firm with relatively high business risk relies heavily on short-term debt it may find itself in severe financial difficulties during an economic recession when interest rates are rising and financial institutions are imposing tight restrictions on lending.

Financial risk or gearing arises from the amount of debt finance in a company's capital structure and is measured as the ratio of debt to equity finance. Stated simply, the more debt finance a company raises, the higher its gearing or financial risk. Debt increases financial risk because the obligations for interest and principal payments are fixed, they must be paid irrespective of whether a company is trading profitably or not.

Any increase in a firm's risk will require a commensurate increase in return.

Flexibility. Financing requirements will change over time and even in the short term there can be significant changes, good and bad, in a firm's financing requirements. For example, even if a firm's fortunes should significantly improve with the result that it can repay all or a substantial proportion of short-term borrowings, it may still wish to retain access to its full borrowing facilities for precautionary and/or speculative motives. Alternatively, if business conditions deteriorate a firm may need access to increased credit facilities quickly.

A bank overdraft is perhaps the most flexible form of short-term finance as the facility need only be utilised, within the agreed limits, as and when required.

An astute combination of various sources of short- and medium-term finance will increase a firm's financial flexibility.

Availability. Firms will be limited in their access to finance by virtue of their size or industry. For example, the range of financing sources available to small firms is much more restricted than for large firms. For instance, large firms with good credit ratings may create their own sources of short-term financing for example, through issuing commercial paper, such facilities are not available to small firms.

In addition long-term debt such as bonds and debentures is expensive to raise and is usually beyond the means of small firms. Thus for many small firms long-term debt is simply not an option. Financial institutions are very reluctant to provide long-term debt finance to small companies due to the costs and risks involved. All this makes small firms highly dependent on access to short-term debt.

Terms and conditions. Loan agreements invariably come with strings attached. Agreements may have stringent terms and conditions or restrictive covenants which the firm will need to observe. Usually terms and conditions on short-term loans will be less stringent than on long-term loans.

Q3. The key advantages and disadvantages of **bank overdrafts** are:

Advantages

Easily arranged or renewed. Bank overdraft facilities can usually be arranged very speedily and if operated satisfactorily are fairly easy to renew.

Flexible and cost effective. The facility is very flexible in that it need only be drawn on when and to the extent needed. It is also one of the most cost-effective sources of finance available in that charges are directly related to usage, although there is usually a fixed

arrangement fee. Interest and bank charges are also a tax deductible expense.

Disadvantages
Risk. With an overdraft there is always the risk of volatility in interest rates and that the overdraft can technically be withdrawn or restricted with little or no notice.

Term Loans
The respective advantages and disadvantages of term loans can be summarised as follows:

Advantages
Risk. Once agreed, the loan is guaranteed for a defined period of time. It cannot therefore be withdrawn at short notice, assuming of course that the borrower continues to comply with the terms and conditions. It may also be possible to arrange a fixed rate of interest for the term. This guaranteed source (and possibly cost) of financing provides a greater degree of certainty and financial stability than reliance on a bank overdraft.

Flexibility. Term loans can be tailored to individual company requirements. For example arrangements can be made to draw down the loan in tranches rather than in one initial lump sum and the method of repayment can be flexible.

Cost. Similar to a bank overdraft the interest charges and arrangement expenses are tax deductible.

Disadvantages
Cost. A term loan is usually more expensive than a bank overdraft. It is more expensive and time-consuming to arrange and interest is normally charged at one or two percentage points above the overdraft rate. In addition if the full loan is drawn down initially then interest will be charged on the full amount. However, depending on individual circumstances it may be possible to arrange more favourable terms.

Excess funding. If the loan has to be drawn down in one initial lump sum this may lead to a temporary excess of funds as the full amount of the loan may not be required immediately. The excess funds may be put on deposit to earn some interest, this will help offset the cost of the loan. However, the rate of interest earned on deposits is likely to be substantially less than that charged on the loan.

Terms and conditions. Term loans may have *restrictive covenants* attached. For example, depending on the size and term of the loan and the company's relationship with its bank (s), the loan agreement may require the company to maintain minimum liquidity ratio levels and/or not to exceed specified maximum dividend payout and gearing ratios.

The borrower may even be required to maintain a *compensating balance* on deposit with the lender. This gives the lender some recourse in the event of default but increases the cost of the arrangement for the borrower. The greater the proportion of compensating balance required, the greater the cost to the borrower.

While such restrictions may offer greater protection to the lender they do limit the company's financial freedom and flexibility in its financing policies. In negotiating with lenders the financial manager will try to minimise such restrictions.

Q5. Loan application—Growfast Ltd
The application will need to be supported by relevant information typically in the form

of a **business case** for the loan, setting out the purpose of the loan, proposed method of repayment and so forth. Just how much information a potential lender will require will depend on the applicant's existing relationship, if any, with the lender and the amount and term of the loan. In this case the loan is said to be 'substantial' so a lender would be looking for quite a detailed range of information.

Information requirements

In assessing Growfast's loan application a lender will typically require the following information from the applicant:

- *purpose and period* of the loan indicating proposals for repayment;
- *audited accounts* for at least three years;
- *management accounts* showing current up-to-date financial and operating position;
- *financial analysis* detailing appropriate ratios;
- *cash flow projections* including a detailed cash budget for three years ahead;
- *financial projections* including projected profit and loss accounts and balance sheet for three years ahead;
- *business plan* stating background to the application, summary business strategy, key business objectives, marketing and economic assessments including different scenario analyses, the relevance of the loan to the business plan and so on;
- *curriculum vitae* of directors and senior managers showing relevant experience and qualifications if this information is not already known to the lender;
- *bank and trade references* if the applicant is new;
- *assets available* as security. For a substantial loan adequate security may be a prerequisite.

Practice question

Q6. Factoring services evaluation—Craft Catering

			£
Projected annual credit sales	=£8,000,000×0.8	=	6,400,000
Factoring service:			
Fees	=£6,400,000×1.5%	=	96,000
Financing	=£6,400,000×0.75×(30/365) ×0.09	=	35,507
Annual cost			131,507
Bank overdraft[1]	£6,400,000×0.25×(30/365) ×0.08	=	10,521
			142,028
Less: Administrative saving			20,000
Net cost of factoring			122,028
Present arrangement:			

Bank overdraft	=(£6,400,000×70/365)×0.08	=98,192	
Bad debts	=£6,400,000×0.01	=64,000	162,192
Net benefit of factoring			40,164

1 With a factoring service the business will still need to finance 25 per cent of its credit sales for 30 days.

By entering into a factoring arrangement the company would save £40,164 per year.

With an overdraft the company would need to be able to borrow £1,227,397 (£6,400,000× 70/365) at an interest rate of 8 per cent. This is a very substantial amount for a small enterprise and may well be beyond the company's borrowing capacity. The bank would inevitably require security for a loan of this amount. This may not be available, or if it is, John may wish to reserve it for other purposes.

With a factoring arrangement the company would seem to need access to borrowings of £131,507 [£6,400,000×0.25×(30/365)]. For a company of this size this would appear to be a more reasonable amount.

GLOSSARY OF KEY FINANCIAL TERMS

A-B

Accounting rate of return (ARR). The return on investment as measured by relating a capital project's average accounting profits to its average (or initial) investment.

Agency costs. The costs that arise as a result of conflicts of interest between a firm's owners and its agents (i.e. its directors and managers). Agency costs reduce the value of the firm.

Agency problem. In financial management this refers the potential conflict of interest between a firm's owners and their agents (i.e. the firm's directors and managers).

AIM. The London Stock Exchange's Alternative Investment Market for smaller companies.

Annuity. A cash flow pattern in which a constant annual amount is to be paid or received over a defined number of years.

Arbitrage. The process of trying to make a riskless profit by exploiting the price differences in assets in different markets.

Arbitrage pricing theory (APT). An alternative risk-return model to the CAPM which attempts to relate the returns on securities to multiple independent risk factors, such as industrial production and inflation, each with its individual beta (risk premium).

Beta coefficient (β). Used to measure the *systematic* or *market risk* of an individual share or portfolio of shares. Beta measures the volatility of an individual security's or portfolio's return relative to changes in the overall capital market return.

Bill of exchange (BOE). A short-term negotiable instrument, rather like a post-dated cheque or IOU, used by traders to settle trade payments.

Bond. A generic term for a long-term debt security issued to raise large sums of loan capital.

C

Capital allowances. A scheme of taxation allowances which a company is entitled to claim, in lieu of depreciation, when it invests in certain types of fixed assets.

Capital asset pricing model (CAPM). An asset pricing model which states, in equation form, that the required return on an asset, (r), is equal to the risk-free rate (R_f), plus a risk premium, $\beta(ER_m - R_f)$ expressed as: $r = R_f + \beta(ER_m - R_f)$. The CAPM is the equation of the security market line (SML).

Capital gain (loss). A capital gain arises when the current market value of an asset exceeds its original cost. If the current market value of an asset is less than its original cost, a capital loss is incurred.

Capital markets. Financial markets dealing in long-term securities.

Cash conversion cycle. Defined as the firm's operating cycle (average inventory days plus average debtor days) minus average creditor payment days. It represents the amount of time, usually days, that cash is tied up from when the company pays for its inputs from its suppliers and in turn receives payment from its customers for the sale of the same inputs converted into finished product.

Certainty equivalent (CE). An approach to investment risk analysis in which the original risky cash flows of a project are converted to equivalent riskless amounts, reflecting the decision-maker's attitude to risk. The converted cash flows represent the amounts the decision-maker would be prepared to accept for certain in place of the original risky cash flows.

Certificate of deposit (CD). A short-term maturity, negotiable instrument certifying that a firm has deposited money with a bank.

Characteristic line. The 'line of best fit' which relates the returns of a firm's share to market returns. Beta is the slope of the line.

Convertible debt. Offers the holder the option to convert the debt into equity at some time in the future, under specified terms and conditions.

Cost-benefit analysis (CBA). A comprehensive form of (public sector) investment appraisal which defines costs and benefits in very broad terms and adapts traditional investment appraisal techniques to its needs. The objective of CBA is to assess the overall net cost or benefit *to society* of a public sector investment.

Cost effectiveness analysis (CEA). A limited form of cost-benefit analysis which is concerned with evaluating and comparing only the costs of alternative ways of producing the same or a similar result or of achieving the same objective. The aim is to find the least cost solution to meeting a given objective.

Cost of capital. The rate of return that must be earned on investments in order to satisfy the rate of return required by investors. It is the *discount rate* used to evaluate the firm's capital projects.

Coupon rate. The fixed rate of gross interest on a bond or loan stock, expressed as a

percentage of its par value.

Credit risk. The risk that a customer or borrower will not pay their financial obligations.

Currency risk. The risk arising from the effect of changes in foreign exchange rates.

D

Debenture. A long-term debt instrument issued by companies to raise loan capital. Debentures may be secured or unsecured on the assets of the company. When debentures are divided into smaller tradeable units and sold in the stock market, this is referred to as debenture loan stock.

Deep discounted bonds. Bonds which do pay an annual coupon rate to investors but the rate is at a substantial discount to prevailing market rates of return. However, the bonds will be redeemable at or above par on maturity.

Derivatives. Financial instruments whose value is derived from underlying or primary assets such as shares, bonds, commodities (e.g. coca and copper) and property. When the value of the underlying or primary asset changes so too does the value of the derivative. Financial futures and options are examples of derivatives.

Discount rate. The rate of return used to calculate the present value of an investment's expected future cash flows.

Discounted cash flow (DCF). An investment appraisal technique which values an investment by discounting its expected future cash flows at an appropriate discount rate.

Disintermediation. The dispensing with financial intermediaries and having a direct relationship between borrower and lender.

Diversifiable risk. That part of an asset's risk which can be eliminated by holding the asset in a large portfolio of assets. Also called *company-specific* or *unique risk.*

Dividend. A payment made by a company to its shareholders, either from earnings or reserves and paid in the form of cash or shares. Dividends are usually paid in cash twice a year, an *interim dividend* based on half-year performance and a *final dividend* based on full-year performance.

Dividend constant growth model. A method of share valuation in which dividends are assumed to grow at a constant rate in perpetuity. The share value is calculated as the dividend next period, (D_1), divided by the rate of return, (r), minus the growth rate, (g). Also known as the *Gordon growth model.*

Dividend cover. A financial ratio which assesses the firm's ability to pay dividends to shareholders from its after-tax profits. It indicates the vulnerability of dividend payments to a drop in profits. The ratio is calculated as profit *after* interest and tax (PAIT) divided by dividends payable.

Dividend valuation model (DVM). A method of share valuation which determines the value of a share as the present value of all the share's future dividend cash flows discounted at the investor's required rate of return.

Dividend yield. The dividend per share divided by the market price of the share. May be calculated on a gross (before tax) or net (after tax) basis.

E

Earnings per share (EPS). The profit *in pence* attributable to each equity share after deduction of tax, minority interests, extraordinary items and preference dividends. It is calculated in pence as the net profit attributable to ordinary shareholders divided by the weighted average number of ordinary shares outstanding during the period.

Economic order quantity (EOQ). A stock control model which is used to determine the quantity of units per order which minimises total stock costs.

Economic risk. The risk arising from the effect of changes in foreign exchange rates on the value of the firm's future cash flows.

Efficient financial market. A financial market in which the price of a security at any time incorporates available information and reflects a fair value of that security.

Efficient market hypothesis (EMH). The theory that argues that capital markets, such as the London Stock Exchange, are efficient.

Efficient portfolio. A portfolio that maximises return for a certain level of risk or minimises risk for a certain level of return.

Equity. The ownership interest in a company, represented by the company's issued ordinary share capital plus reserves. Alternatively it is calculated as total assets minus total liabilities. Also referred to as *net worth*.

Eurobond. An international bond raised and underwritten by an international group or syndicate of lenders. As it is 'euro' the bond will be sold outside the country in whose currency it is denominated.

Eurobond market. The international capital market in which eurobonds are traded.

Eurocurrency. A short- to medium-term money market in which an easily convertible currency (e.g. sterling, US dollar, D-mark, Japanese yen) can be held outside that currency's country of origin.

Euromarkets. International financial markets in which borrowers and lenders can trade in currencies outside their country of origin.

European Union (EU). Austria, Belgium, Britain, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and Sweden.

Exercise price. The price at which a specified underlying asset or security can be bought or sold by the option holder. Also known as the *strike price*.

F-H

Factoring. A method of financing debtors offered by subsidiaries of the major banks and other specialist finance companies, in which they advance a substantial proportion of the debt to the company. It can improve a company's cash flow by freeing cash normally tied up in debtors. (See also *invoice discounting .)*

Financial intermediary. An individual or institution which brings borrowers and lenders of finance together to trade.

Financial risk. The ratio of debt to equity finance in a firm's capital structure. Usually the higher the level of debt in relation to equity, the higher the firm's financial risk.

Foreign exchange rate risk. The risk of adverse movements in exchange rates between currencies.

Futures. A future is a contract between two parties (a buyer and a seller) to exchange a specified asset (e.g. a commodity, a financial instrument or currency) on an agreed date in the future for a price which is agreed now. These contracts can then be traded in recognised futures exchanges such as LIFFE and IFOX which form a *futures market.*

Gearing. The ratio of debt finance to equity finance in a company's capital structure.

Goal congruence. The process of seeking harmony between the goals of the organisation as a whole, and the goals of the organisation's agents (e.g. its directors and managers).

Hedging. The processes and techniques adopted to reduce or minimise exposure to risk.

Hurdle rate. The minimum level of internal rate of return (IRR) that investment projects must attain.

I-L

Incremental cash flows. The difference between a firm's total cash flows with and without an investment project.

Initial public offering (IPO). The first issue of shares by a company which is made available to the public. Also referred to as an *unseasoned offer.*

Interest cover. Gives an indication of a firm's longer-term solvency and level of financial risk by assessing its ability to meet interest commitments from profits. It indicates the vulnerability of interest payments to a drop in profits and is calculated as profit *before* interest and tax (PBIT) divided by total interest payable.

Internal rate of return (IRR). The discount rate which when applied to an investment's expected future cash flows yields a net present value of zero.

Invoice discounting. An alternative method of financing debtors offered by subsidiaries of the major banks and other specialist finance companies. The technique can improve a company's cash flow by freeing cash normally tied up in debtors. (See also *Factoring*).

Junk bond. A bond which pays a high coupon but correspondingly has a high risk of default.

Just-in-time (JIT) manufacturing systems. A management system designed to improve the efficiency of production and operations systems.

LIBOR. The London Inter-Bank Offer Rate, which is the benchmark or reference rate for sterling wholesale money transactions in the inter-bank market.

LIFFE. The London International Financial Futures and Options Exchange where the prices that will apply to future transactions (say, three months from now) can be fixed today.

Liquid assets. These consist of cash plus marketable securities.

Liquidity. A measure of how easily an asset can be converted into cash without significant loss in value.

M-N

Management buy-out (MBO). Occurs when a firm's existing managers raise capital to purchase all or part of a firm from its owners.

Market portfolio. In financial theory the notion of a value-weighted index of all available securities. In practice a stock market index such as the FTSE All-Share index is used as a surrogate.

Market risk. That part of an asset's risk which cannot eliminated by diversification. Also called *nondiversifiable* and *systematic risk.*

Market risk premium. The difference between the risk-free rate of return (e.g. on treasury bills) and the market return. It is the additional return above the risk-free rate which investors require for holding a highly diversified portfolio of assets called the *market portfolio.*

Marketable securities. Short-term, easily liquidated, low risk, interest-earning financial assets.

Maturity matching (or hedging) principle. A risk mitigation technique in which the maturity term of an asset is matched with the same maturity term of finance used to acquire the asset. Thus long-term assets are financed with long-term sources of finance and short-term assets are financed with short-term sources of finance.

Merchant banks. Also known as ***investment banks,*** they operate as wholesale banks dealing mainly with the corporate and financial sectors. They provide services such as *corporate financing, expert advice, investment fund management, investment analysis,* and *merger/acquisition activities.* The key role of merchant and investment banks is in arranging finance to meet strategic corporate financing needs, they do not necessarily provide finance.

Money markets. Financial markets for trading in securities with a short-term to maturity (usually under a year).

Net present value (NPV). The difference between the present value of future cash inflows and the present value of the investment's cash outlays discounted at the firm's cost of capital.

Netting. A treasury management technique which multinational companies use to minimise the amount of funds transferred between subsidiaries by setting one subsidiary's credit balances against a corresponding subsidiary's debit balances in another country.

O-Q

Offer for sale. An offer to the public and to investing institutions to purchase shares which are already in issue, new capital is not being raised.

Offer for subscription. An offer to the public and to investing institutions to subscribe for shares which are *not already in issue.* In this case *new capital is being raised* and all the company's shares (new and existing) will now be listed on the market, if the offer succeeds.

Operating cycle. The time which elapses, usually expressed in terms of days, from when raw materials are delivered until the cash for the finished goods made from the same materials is received from customers.

Opportunity cost. The value of the next best alternative forgone when an investment decision is made.

Opportunity cost of capital. The next best rate of return available to an investor for a certain level of risk.

Options. An options contract gives the holder the right, but not the obligation, to buy or sell a specified asset at an agreed price on or before a specified expiration date. With an options contract the buyer or holder has a choice, he/she can exercise or not exercise the options as desired. An option to buy is termed a *call option* and an option to sell is termed a *put option.*

Over-the-counter (OTC) market. An unregulated capital market for the purchase and sale of securities and operated independently of any official stock exchange.

Overtrading. Carrying on a level of business activity which cannot be supported

financially.

Payback period (PBP). The length of time it will take to recover the initial cash outlay on an investment from the investment's cash flow returns.

Perfect market. A market where there are *no taxes (corporate or personal), no transaction costs* on securities, *investors are rational,* and *information is symmetrical*— that is all investors have access to the same information and share the same expectations about a firm's future as its managers.

Perpetuity. A cash flow pattern in which a constant annual amount is to be paid or received *infinitely.*

Placing. Involves the marketing of shares already in issue but not listed, or not yet issued, to *specified investors,* typically private clients of the company's sponsor. The shares are not initially offered to the general public or existing shareholders.

Political risk. The risk that a firm's value will be affected by political actions.

Post-implementation audit. Part of the investment appraisal process designed to test if a project (in whole or in part) has lived up to management's original expectations and has delivered the benefits forecast.

Price/earnings (P/E) ratio. A key investment ratio used to evaluate the earnings growth potential of a company and is related to the earnings per share (EPS). It shows the number which the EPS must be multiplied by to arrive at the share's current market price. The P/E ratio is determined by dividing the market price of the company's ordinary share by the EPS.

Profitability index (PI). The ratio of the present value of all future net cash inflows (benefits) to the initial outlay (costs) and can be expressed as, present value of benefits divided by present value of outlay.

R

Required rate of return. The minimum return an investment must provide in order to be of interest to investors.

Return on equity (ROE). A measure of the return the firm is earning on the equity funds invested by its shareholders. It is calculated as profit after interest and tax divided by ordinary shareholders' funds.

Return on investment (ROI). A measure of the overall return the firm is generating on the amount of money invested in its assets. It can be calculated as profit before interest and tax divided by investment (total assets—current liabilities). Also referred to as the *primary,* or *return on capital employed (ROCE), ratio.*

Rights issue. A preferential offer of shares in which the shares are first offered to existing shareholders to subscribe for further shares in a company in proportion to their existing shareholding. Also referred to as a *rights offer.*

Risk-adjusted discount rate (RADR). An approach to project risk analysis in which a project's discount rate is modified to incorporate a risk premium. The risk premium is defined as the difference between the risk-free rate and the project's required rate of return.

Risk averse. A term used to describe the attitude to risk of an investor who will only accept additional risk in return for a compensating increase in expected return.

Risk-premium. The additional return which a risky investment or asset must offer to compensate investors for accepting additional risk.

Risk-return trade-off. The relationship between risk and return, indicating that additional risk must be rewarded with additional expected returns.

S-T

Scenario analysis. An approach to project risk analysis in which a range of different business case scenarios is created based on different assumptions about future business conditions. In each case an estimate is made of the project's expected outcome (NPV, or possibly IRR) most likely to occur given each scenario's particular set of assumptions and judgements.

Securities. A generic term for stocks and shares. Security holders (e.g. shareholders and bondholders) will have a claim on the firm's assets or cash flows.

Securitisation. The process where a company creates and issues its own securities, usually marketable debt, for example eurocommercial paper, (which may be secured against the company's assets—*asset securitisation*—or against future earnings) through intermediaries to investors.

Security market line (SML). When the CAPM equation is shown in graph form, the resultant straight line is referred to as the security market line (SML). It is the line which exhibits the positive relationship (correlation) between the systematic risk (β) of a security and its expected return.

Sensitivity analysis. A risk analysis technique which tests the sensitivity of a project's expected outcome (NPV, or possibly IRR) to changes in project variables such as sales volume, sales price and unit costs. The objective is to identify those variables to which the expected outcome is most sensitive to changes.

Simulation. A statistically-based approach to project risk analysis which makes use of *random numbers* and *preassigned probabilities* to simulate a project's outcome or return. The technique requires a sophisticated computing package to operate effectively (e.g. Monte Carlo simulation).

Systematic risk. That part of risk in respect of an asset or investment which cannot be reduced by diversification.

Time value of money (TVM). The timing of cash flows directly affects their value as the

sooner cash flows are expected to be received, the more valuable they are. Cash flows received today are worth more than the equivalent amount at a later date as today's cash flows can be profitably invested.

Transfer price. The price at which different units of the same entity account for transactions in goods or services between them.

Treasury bill. A short-term, normally risk-free, marketable security issued only by governments as a means of raising finance.

V-Z

Value for money (VFM). Ensuring the achievement of economy, efficiency and effectiveness in the performance of an activity or service.

Venture capital. High risk capital normally provided by venture capital companies (VCCs) at the early stage of a company's life. Venture capitalists will require a high return and normally an equity stake or holding in the company.

Warrant. Options giving the holder the right to purchase a specified number of equity shares at a predetermined price over a defined period of time. If the option to purchase is exercised, the holder subscribes additional cash to the company.

Weighted average cost of capital (WACC). The average cost of capital of the firm's existing operations. It is calculated by weighting the cost of each individual source of capital (debt, equity, etc.) in proportion to the total market value of the firm.

Working capital (or net working capital). The capital required to finance a firm's activities on a day-to-day basis. It is the difference between a firm's current assets and its current liabilities. It is an important measure of a firm's liquidity.

Writing down allowance (WDA). See 'Capital allowances'.

Zero coupon bonds. Bonds which have no coupon rate and therefore pay no interest during their lifetime. They are usually issued at a substantial discount to their par or redeemable value and the yield to maturity can therefore be very attractive.

Z-score. Altman's model used to predict corporate failure.

SELECTED EQUATIONS AND FORMULAE

Accounting Rate of Return (ARR):

$$\frac{\text{Average accounting profit}}{\text{Average investment}} \times 100$$

Acid Test (or Quick) Ratio:

Quick assets*: current liabilities e.g. 1:1
*(Quick assets=current assets minus stocks.)

Beta of a Portfolio:

$$\beta_p = w_1\beta_1 + w_2\beta_2 + w_3\beta_{3...} + w_n\beta_n$$

Capital Asset Pricing Model (CAPM):

$$E_{(r)} = R_f + \beta(ER_m - R_f)$$

Cash Flow:

Cash flow=Operating profit+ depreciation±other non-cash items
Free cash flow=Cash flow−(investment expenditures+ taxes)

Coefficient of Variation:

$$CV = \frac{\sigma_r}{\bar{r}}$$

Cost of Capital:
Redeemable debt
Before-tax cost of debt, $k_d = YTM$
Yield approximation formula

$$k_d = \frac{I + [(P - NPD)/n]}{P + 0.6(NPD - P)}$$

After-tax cost of debt$=k_d(1-T)$

Irredeemable debt

$$k_d = \frac{I}{BV_0} \times (1-T)$$

Preference shares

$$k_p = \frac{D_p}{P_0}$$

Equity

  (i) Constant Dividend Growth Model

$$k_e = \frac{D_1}{SV_0} + g$$

(ii) CAPM

$$E(r_s) = R_f + \beta_i(ER_m - R_f)$$

Weighted average cost of capital (WACC)

$$k_a = w_d k_d(1-T) + w_p k_p + w_e k_e$$

Creditor Days (payment period) Ratio:

$$\frac{Creditors}{Purchases} \times 365 = \dots \text{ days}$$

Current Ratio:

Current assets:Current liabilities e.g. 2:1

Debtor Days (collection period) Ratio:

$$\frac{Debtors}{Credit\ Sales} \times 365 = days$$

Dividend Cover:

$$\frac{\text{Profit } after \text{ interest and tax (PAIT)}}{\text{Dividends payable}} = \text{times}$$

Dividend Yield:

$$\frac{\text{Dividend per ordinary share}}{\text{Market price per ordinary share}} = \%$$

Earnings Per Share (EPS):

$$\frac{\text{Net profit attributable to ordinary shareholders}}{\text{Weighted average number of ordinary shares outstanding during the accounting period}} = \text{pence}$$

Economic Order Quantity

$$\text{EOQ} = \sqrt{\frac{2 \times U \times O}{C}}$$

Expected Return on an Asset:

$$E(r_a) = r_1 P(r_1) + r_2 P(r_2) + \ldots + r_n P(r_n)$$

Expected Return on a Portfolio:

$$E(r_p) = w_1 r_1 + w_2 r_2 + \ldots + w_n r_n$$

Future Value:

$$(FV_{r,n}) = PV(1+r)^n$$

Gearing Ratio:

$$\frac{\text{Total debt capital}}{\text{Total debt capital + equity shareholders' funds}} \times 100 = \%$$

Gross Profit (GP) Ratio:

$$\frac{\text{Gross profit}}{\text{Sales (Turnover)}} \times 100 = \%$$

Interest Cover:

$$\frac{\text{Profit } \textit{before} \text{ interest \& tax (PBIT)}}{\text{Total interest payable}} = \text{times}$$

Net Present Value:

$$NPV = I_0 - \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}$$

Net Profit Ratio:

(1) $\dfrac{\text{Profit } \textit{before} \text{ interest and tax (PBIT)}}{\text{Sales}} \times 100 = \%$

(2) $\dfrac{\text{Profit } \textit{after} \text{ interest and tax (PAIT)}}{\text{Sales}} \times 100 = \%$

Payback Period (PBP):

$$\textit{With annuity} \quad \frac{\text{Initial investment}}{\text{Annual cash inflows}}$$

Without annuity Accumulate annual cash inflows until they equal initial investment

Present Value:

$$PV_{r,n} = FV_{r,n}[1/(1+r)^n]$$

Price Earnings (P/E) Ratio:

$$\frac{\text{Market price of share}}{\text{Earnings per share (EPS)}}$$

Profitability Index (PI):

$$\frac{\text{Present value of cash inflows}}{\text{Initial investment}}$$

Reorder point (RP):

$$RP = LT \times D$$

Reorder point (RP) with safety stock (SS):

$$RP = LT \times D + SS$$

Return on Equity (ROE), or Return on Shareholders' Funds (ROSF):

$$\frac{\text{Profit } \textit{after} \text{ interest and tax (PAIT)}}{\text{Ordinary shareholders' funds*}} \times 100 = \%$$

(*Ordinary share capital+reserves.)

Return on Investment (ROI):

$$\frac{\text{Profit before interest and tax (PBIT)}}{\text{Investment (total assets} - \text{current liabilities)}} \times 100 = \%$$

Standard Deviation of Returns:

$$\sigma_r = \sqrt{\sum_{i=1}^{n}(r_i - \bar{r})^2 \times P(r_i)}$$

Standard Deviation of a Two-asset Portfolio:

$$\sigma_p = \sqrt{(w_1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2(w_1 w_2 \rho_{12}\sigma_1\sigma_2)}$$
$$= \sqrt{\text{Var}_p}$$

Stock Turnover Ratio:

$$\frac{\text{Cost of sales}}{\text{Average stock*}} = \dots \text{ times}$$

*Average stock=(opening stock+closing stock)/2.

Total Asset Turnover Ratio:

$$\frac{\text{Sales}}{\text{Total assets (fixed} + \text{current)}} = \dots \text{ times}$$

Value of an Asset:

$$V_0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots + \frac{CF_n}{(1+r)^n}$$

Value of an Equity Share:
Zero dividend growth

$$SV_0 = \frac{D_1}{r}$$

Constant dividend growth

$$SV_0 = \frac{D_1}{(r-g)}$$

P/E ratio

$SV_0 = EPS \times P/E \text{ ratio}$

Value of an Irredeemable Bond:

$$BV_0 = \frac{I}{r}$$

Value of a Preference Share:

$$PV_0 = \frac{D_p}{r}$$

Value of a Redeemable Bond:

$$BV_0 = \frac{I_1}{(1+r)^1} + \frac{I_2}{(1+r)^2} + \dots + \frac{I_n}{(1+r)^n} + \frac{P_n}{(1+r)^n}$$
$$= I \times (PVIFA_{r,n}) + P \times (PVIF_{r,n})$$

Variance of Returns:

$$Var(_r) = \sum_{i=1}^{n}(r_i - \bar{r})^2 \times P(r_i)$$

Variance of Returns for a Two-asset Portfolio:

$Var_p = (w1)^2(\sigma_1)^2 + (w_2)^2(\sigma_2)^2 + 2(w_1 w_2 \rho_{12}\sigma_1\sigma_2)$

Working Capital:

Working capital=Current assets−Current liabilities

Yield Approximation Formula:

$$YTM \text{ (approximate)} = \frac{I + [(P-BV_0)/n]}{P + 0.6(BV_0 - P)}$$

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