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Financial Development, Institutions, Growth and Poverty Reduction

Edited by

Basudeb Guha-Khasnobis and
George Mavrotas

Studies in Development Economics and Policy

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List of Abbreviations

AFA	advantage of flexibility argument
AREAR	*Annual Report on Exchange Arrangements and Exchange Restrictions* (IMF)
BSE	Bombay Stock Exchange
CGE	computable general equilibrium
CIDCM	Center for International Development and Conflict Management
CIS	Commonwealth of Independent States
CMIE	Centre for Monitoring Indian Economy
CVA	cost of volatility argument
DMBs	domestic money banks
DVP	Delivery Versus Payment
EPR	estimated panel result
ESRC	Economic and Social Research Council (UK)
EU	European Union
FDI	foreign direct investment
FIIs	Foreign Institutional Investors
FINSAP	financial sector adjustment programme
FSD	financial sector development
GDP	gross domestic product
GLSS	Ghana Living Standards Survey
HIPCs	heavily indebted poor countries
ICICI	Industrial Credit and Investment Corporation of India
ICRG	*International Country Risk Guide*
IDBI	Industrial Development Bank of India
IFPRI	International Food Policy Research Institute
IPOs	initial public offerings
IRIS	Centre for Institutional Reform and Informal Sector, University of Maryland
ISMR	*Indian Securities Market: A Review* (National Stock Exchange)
ISSER	Institute of Statistical, Social and Economic Research
LDCs	least developed countries
MDGs	Millennium Development Goals

MENA	Middle East and North Africa
MPC	Monetary Policy Committee
NABARD	National Bank for Agriculture and Rural Development
NBFI	non-banking financial institutions
NSDL	National Securities Depository Ltd (India)
NSE	National Stock Exchange (India)
OCAs	optimal currency areas
OECD	Organization for Economic Cooperation and Development
PMG	pooled mean group
PPP	purchasing power parity
PRS	Political Risk Services
PRSPs	poverty reduction strategy papers
PSU	Public Sector Units
QIRMPs	quality of institutional rules and macroeconomic policies
RBI	Reserve Bank of India
REER	real effective exchange rate
SAM	social accounting matrix
SAP	Structural Adjustment Programme
SEBI	Security and Exchange Board of India
SLR	statutory liquidity ratio
SOAS	School of Oriental and African Studies, University of London
TOT	terms of trade
TFP	total factor productivity
TPR	trade portfolio risk
VECM	vector error correction model

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1
Introduction and Overview

Basudeb Guha-Khasnobis and George Mavrotas

The effective mobilization of domestic savings for private investment plays a crucial role in achieving growth and poverty reduction. This is demonstrated by the historical experience of the now developed countries as well as East Asia. Low-income countries have undertaken considerable financial reform over the last decade, including financial market liberalization (the lifting of direct quantitative controls), bank privatization and efforts to build the capacity of central banks and financial authorities to conduct prudential regulation and supervision of the liberalized financial system; the same has been true in the transition economies, which have undertaken wholesale institutional reform to build a market-orientated financial system – see Caprio *et al.* (2001) and Abiat and Mody (2005) for a comprehensive discussion.

Yet two problems have become apparent. First, the construction of regulatory and supervisory capacity has often lagged behind liberalization, and a number of low-income and transition countries have experienced major bank crises (which in turn have destabilizing macroeconomic effects). Second, the domestic investment response to financial liberalization has often been disappointing; savings mobilization has continued to be low, and the newly liberalized systems have often not effectively intermediated savings into new and higher levels of domestic investment. Moreover, lending to domestic investors continues to be focused overwhelmingly on larger borrowers, with small and medium-sized enterprises continuing to have inadequate recourse to formal financial lending.

For these reasons the effectiveness of financial reform in achieving higher levels of investment and growth remains in doubt. Moreover, the contribution of the financial sector to the achievement of faster poverty reduction (through the achievement of higher wage-employment growth and self-employment in small and medium-sized enterprises) appears to be meagre at best in many countries. And financial crises, in endangering macroeconomic stability, contribute to higher unemployment and poverty when they result in recession. In general, we have only a limited understanding of the channels through which the financial sector affects investment behaviour, its effects on savings rates, and the interaction between domestic financial flows and external financial flows. This is a critical issue in the light of post-Monterrey initiatives to encourage the flow of private capital to developing countries, and its effective use for investment and pro-poor development.

Although the research and policy interest in the overall finance–growth relationship is not by far new, in the 1990s a new group of empirical studies using large cross-section datasets emerged, with a particular focus on the empirics of the finance–growth relationship – see Hermes and Lensink (1996), Arestis and Demetriades (1997), Levine (1997), Demirgüç-Kunt and Levine (2001), World Bank (2001), Green and Kirkpatrick (2002), Goodhart (2004), Wachtel (2004), Mavrotas and Son (2006) and Mavrotas (2008) among others, for comprehensive reviews of this literature.

While the important link between financial development and growth has been explored for many years, recent research attention has focused on the 'follow-up' link between financial development and poverty reduction. This has occurred especially since recent developments in international development theory and practice (such as the consensus on the Millennium Development Goals (MDGs), the establishment of PRSPs, and so on) have re-established poverty reduction as the central goal of development efforts. In this context, it is crucial to shed light on the channels through which financial development can promote poverty reduction. On top of the important, more 'indirect' link through the promotion of economic growth, one can think of trying to make financial development more pro-poor in a direct way, and/or make the economic growth resulting from it more pro-poor. Promising recent work in this area seems to confirm the extreme importance of strengthening the link between financial development and poverty reduction (see, for example, Beck *et al.*, 2004; Honohan 2004; Green *et al.*, 2005; Claessens and Feijen, 2006). As such, it is indeed extremely useful to have more in-depth analysis on this issue, including individual country case studies, and work that details the exact transmission mechanisms through which financial development can enhance pro-poor development, in order to derive best practices in this field.

Research findings are ambiguous when it comes to the relationship between financial development and changes in poverty and income distribution. According to some models, financial market imperfections – such as asymmetric information, transactions and contract enforcement costs – are more binding on poor entrepreneurs who lack collateral, credit histories and connections. These credit constraints thus impede the flow of capital to under-privileged individuals with high-return projects, thereby reducing the efficiency of capital allocation and worsening income inequality. Viewed from this angle, financial development can reduce poverty by relaxing credit constraints on the under-privileged classes, thereby improving the allocation of capital and accelerating growth. Others question whether financial development reduces poverty, citing that the poor primarily rely on informal sector and family connections for capital. Therefore, improvements in the formal financial sector do not necessarily benefit the poor. Accordingly, empirical evidence is needed to distinguish among competing theoretical predictions. Existing empirical evidence generally supports the first hypothesis, though researchers have often found a bi-directional causality between growth and the depth of financial intermediation.

At the same time, institutions have an important role to play in the overall finance–growth–poverty reduction nexus. See Chang (2007) for a recent comprehensive discussion of the role of institutions in development, Kayizzi-Mugerwa (2003) with a special emphasis on Africa, and Esfahani and Ramirez (2003) on the impact of institutions on growth via infrastructure projects among others. There is also a burgeoning literature on the deep-determinants of growth, stressing that the ultimate cause of long-term growth lies in well-functioning institutions – see, for example, Acemoglu *et al.* (2005), Easterly and Levine (2003) and Rodrik *et al.* (2004). This crucial dimension is also stressed (and tested, where appropriate) either directly or indirectly in some of the chapters in the present volume.

Against this background, in this volume we bring together a collection of essays exploring these various linkages between financial development, institutions, growth and poverty reduction in low-income and transition countries. It is the result of a two-year research project undertaken by UNU-WIDER entitled ‘Financial Sector Development for Growth and Poverty Reduction’. The different chapters of the volume, in sum, present a wide variety of experiences in this important research area. The volume covers both cross-country or panel study results, with country case studies from Africa and Asia (for example, Ethiopia, Ghana, India). Theoretical models are also complemented with applied cases and evidence draws both on more macro, as well as micro, household-level data. Furthermore, a number of chapters in the present volume focus on identifying key transmission mechanisms between financial development and (pro-poor) development. Finally, the volume, taken together, presents an interesting blend of different (quantitative) research methodologies (panel data analysis micro-econometric analysis using household data, model-driven comparative static analysis, cointegration analysis and so on). We see the book as an important companion for professionals and policy-makers engaged in policy reforms in this area, and also a vital reference source for students on undergraduate and graduate courses in development, finance and economics.

In what follows, we summarize the rest of the chapters in this volume. Chapter 2 by Svetlana Andrianova and Panicos Demetriades draws on recent literature to argue that institutions and political economy factors hold the key to understanding why some countries have succeeded in developing their financial systems while others have not. New evidence is reviewed that suggests institutional quality may influence the effectiveness of financial development in delivering economic growth. These new findings highlight the possibility that poor countries may be stuck in a bad equilibrium, in which weak institutions inhibit growth both directly and indirectly, through under-developed, low-quality finance. The chapter identifies a number of unanswered questions in the financial development literature, including the precise role of important institutions such as law in finance and the influence of geographical factors.

George Mavrotas and Mansoob Murshed develop a short-run model of a small open economy in Chapter 3 in order to look at the impact of macroeconomic policies and financial deepening upon poverty, emphasizing the fact that an expansion in certain sectors may cause greater poverty reduction. The model involves a non-traded and a traded sector on the formal side of the economy. The former is capital intensive, while the latter is unskilled labour-intensive. Increased employment in the traded sector is more pro-poor compared to a similar rise in the non-traded sector, as the former draws workers out of poverty in the informal sector. The model analyses short-run effects of devaluation, a rise in the money supply induced by financial deepening, and taxation to discourage non-traded goods consumption. Financial deepening can induce greater output and reduce poverty. The chapter also attempts to differentiate between the stylized experiences of East Asia and Latin America. East Asian economies have relied more heavily on labour-intensive manufactured exports, whereas Latin America has had a relatively greater share of capital intensive and natural resource-based exports. In recent decades, countries in these two regions have had differing experiences in poverty reduction with, arguably, a greater decline in poverty in East Asia.

In Chapter 4, Alemayehu Geda, Abebe Shimeles and Daniel Zerfu, by using the rich household panel data of urban and rural Ethiopia that covers the period 1994–2000, attempt to establish the link between finance and poverty in Ethiopia. The results show that access to finance is an important factor in the smoothing of consumption and, hence, poverty reduction. There is also evidence of a poverty trap due to liquidity constraints that limit the ability of rural households to smooth consumption. The empirical findings from this study could inform financial development policies aimed at addressing issues of poverty reduction.

Peter Quartey, in Chapter 5, investigates the interrelationship between financial sector development and poverty reduction in Ghana using timeseries data spanning the period 1970–2001. The main findings are that even though financial sector development does not Granger-cause savings mobilization in Ghana, it induces poverty reduction. Savings do Granger-cause poverty reduction in Ghana. Also, the effect of financial sector development on poverty reduction is positive, but insignificant. This is due to the fact that financial intermediaries in Ghana have not adequately channelled savings to the pro-poor sectors of the economy because of government deficit financing, a high default rate, lack of collateral and lack of proper business proposals. Another interesting finding is that there is a long-run cointegrating relationship between financial sector development and poverty reduction.

Chapter 6, by Pranab Kumar Das and Basudeb Guha-Khasnobis, is an attempt towards an integration of financial development and its effect on the real sector via the transmission mechanisms prevalent in India. The authors find two co-integrating relations between financial development: output growth and allocation of credit, which makes sense from the standpoint of economic theory. The relations, however, are not similar across the broad sectors of the economy and, thus, have separate policy implications for different sectors. The general strategy in the empirical literature on finance and growth has been to test the hypothesis of association between the level of financial development and the growth rate of GDP or GNP. The econometric tests are employed for cross-section, time-series and panel data. What is lacking in the literature is the transmission mechanism relating to how the financial system actually translates into higher growth in the real sector. This chapter tries to fill that gap.

Fabrizio Carmignani and Abdur Chowdhury, in Chapter 7, estimate the effect of financial openness on economic integration for two clusters of countries: the formerly planned economies of Eastern Europe and Central Asia (emerging market economies) and certain western advanced economies. The authors focus on two dimensions of economic integration: convergence of per capita incomes across countries and trade integration. They subsequently employ both single-equation estimation and system estimation to account for endogenous links between trade integration and income convergence. Results show that, in the cluster of emerging market economies, financial openness is a powerful instrument of economic integration. In the group of advanced economies, financial openness effectively facilitates income convergence, but its impact on trade integration is ambiguous.

The aim of Chapter 8, by Niels Hermes and Robert Lensink, is to investigate the relationship between financial liberalization and saving, investment and economic growth, by using a new dataset for measuring financial liberalization for a sample of 25 developing economies over the period 1973–96. The authors find no evidence that financial liberalization affects domestic saving and total investment (although there are some signs that liberalization may actually reduce rather than increase domestic saving), whereas it is positively associated with private investment, as well as with per capita GDP growth. There is also a negative relationship between financial liberalization and public investment. These results suggest that financial liberalization leads to a substitution from public to private investment, which may contribute to higher economic growth.

Basudeb Guha-Khasnobis and Saibal Kar, in Chapter 9, study the choice of optimal capital structure of the Indian corporate sector post-liberalization. Traditionally, firms in India have shown a low preference towards debt financing, despite its advantages. Using panel data from 450 firms during 1992–3 and 2003–4, the authors attempt to identify factors that could explain the pattern of financing of manufacturing firms in India and the key determinants of their debt structure. The chapter also examines the roles of age of the firm, long-term borrowing and net sales in affecting its debt structure.

Chapter 10, by Marco Mazzoli, focuses on another important dimension in the finance-growth literature at the firm level. The author looks inside the firm and focuses on the interaction between finance and investment decisions. When product innovation is performed by firms issuing securities in financial markets, the process of spreading information affects capital gains (losses) and might reduce the cost of external finance. In this context, the chapter introduces a discrete-time intertemporal investment model where the flow of profits affects the firm's financial structure – hence the risk premium on the cost of finance – and, as a consequence, the rate of discount of future profits. While public investments are the main means by which to obtain product innovation, the model is used to comment on and interpret the potential use of another, secondary, public policy, consisting of tax incentives for firms performing R&D expenditures and issuing securities in the stock market. Associating public policies for innovation to the stock market might contribute to a reduction in the problems of discretionality and monitoring of public expenditure employed to finance R&D and technical innovation.

Recent years have witnessed important structural changes around the world as a result of the globalization process, the creation of new economic blocks and the liberalization of the financial sector in many countries. Many sectors of the industrialized countries have gone through major deregulatory changes to acclimate themselves to new environments. At the same time, many countries have undertaken institutional reforms to build a market-orientated financial system in the hope that transition towards market economy will improve productivity. In the face of uncertainty resulting from changes in regulatory structure and the development of financial institutions to foster market economy, many countries may not be able to achieve their maximum growth potential. In other words, productivity growth is likely to depend on the development of financial institutions and the stage of economic development. That is, a low-income country is likely to benefit more (in terms of output growth rate) from the development of financial institutions than a developed economy with well-developed financial institutions. In Chapter 11, Subal Kumbhakar and George Mavrotas document this by using data covering 65 countries, varying substantially in terms of level of development and geographic location, and spanning the period 1960–99.

Finally, Leonardo Becchetti and Iftekhar Hasan, in Chapter 12, analyse two potential effects arising from regional (and with EU) integration – increased quality of institutions (including the quality of financial institutions), and economic policies and reduced multilateral exchange rate volatility – in a conditional convergence growth framework for MENA countries. The authors argue that the exchange rate volatility index is a financial indicator that is highly affected by the shape and rules of domestic financial institutions since exchange rate agreements and monetary policies are crucial in determining its pattern. The index of institutional quality they employ documents that financial institutions and rules are a crucial part of a domestic governance that functions well. A methodology that implements the traditional bilateral exchange rate measures to test effects of multilateral exchange rate volatility on growth of per capita GDP is outlined. The estimates show that both factors (quality of institutions and reduction of multilateral volatility) significantly and positively affect growth and conditional convergence. MENA countries are not far from EU and OECD countries in terms of exchange rate volatility, but much below in terms of institutional quality. Simulation of the potential effects of an improvement in institutional quality in MENA countries on their process of growth and conditional convergence reveals that regional integration may be highly beneficial for such countries, mainly because of its effects on institutional quality.

References

Abiat, A. and A. Mody (2005) 'Financial Reform: What Shakes it? What Shapes it?', *American Economic Review*, 95 (1): 66–88.

Acemoglu, D., S. Johnson and J.A. Robinson (2005) 'Institutions as the Fundamental Cause of Long-Run Growth', in P. Aghion and S. Durlauf (eds), *Handbook of Economic Growth*, 1 (1) (Amsterdam: Elsevier): 385–472.

Arestis, P. and P. Demetriades (1997) 'Financial Development and Economic Growth: Assessing the Evidence', *Economic Journal*, 107 (442): 783–99.

Beck, T., A. Demirgüç-Kunt and R. Levine (2004) 'Finance, Inequality and Poverty: Cross-country Evidence', Policy Research Working Paper 3338 (Washington, DC: World Bank).

Caprio, G., P. Honohan and J. Stiglitz (eds) (2001) *Financial Liberalization: How Far, How Fast?* (Cambridge: Cambridge University Press).

Chang, Ha-Joon (ed.) (2007) *Institutional Change and Economic Development* (Tokyo: United Nations University Press for UNU-WIDER).

Claessens, S. and E. Feijen (2006) *Financial Sector Development and the Millennium Development Goals* (Washington, DC: World Bank).

Demirgüç-Kunt, A. and R. Levine (eds) (2001) *Financial Structure and Economic Growth: A Cross Country Comparison of Banks, Markets, and Development* (Cambridge, MA: MIT Press).

Easterly, W. and R. Levine (2003) 'Tropics, Germs and Crops: How Endowments Influence Economic Development', *Journal of Monetary Economics*, 50: 3–39.

Esfahani, H.S. and M.T. Ramirez (2003) 'Institutions, Infrastructure, and Economic Growth', *Journal of Development Economics*, 70 (2): 443–77.

Goodhart, C. (ed.) (2004) *Financial Development and Economic Growth: Explaining the Links* (Basingstoke: Palgrave Macmillan).

Green, C. and C. Kirkpatrick (2002) 'Finance and Development: An Overview of the Issues', *Journal of International Development*, 14 (2): 207–10.

Green, C., C. Kirkpatrick and V. Murinde (2005) 'How Does Finance Contribute to the Development Process and Poverty Reduction?', in C. Green, C. Kirkpatrick and V. Murinde (eds), *Finance and Development: Surveys of Theory, Evidence and Policy* (Cheltenham: Edward Elgar).

Hermes, N. and R. Lensink (eds) (1996) *Financial Development and Economic Growth: Theory and Experiences from Developing Countries*, Routledge Studies in Development Economics (London: Routledge).

Honohan, P. (2004) 'Financial Development, Growth and Poverty: How Close are the Links?', in C. Goodhart (ed.), *Financial Development and Economic Growth: Explaining the Links* (Basingstoke: Palgrave Macmillan).

Kayizzi-Mugerwa, S. (ed.) (2003) *Reforming Africa's Institutions: Ownership, Incentives and Capabilities* (Tokyo: United Nations University Press for UNU-WIDER).

Levine, R. (1997) 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35 (2): 688–726.

Mavrotas, G. (ed.) (2008) *Domestic Resource Mobilization and Financial Development* (Basingstoke: Palgrave Macmillan for UNU-WIDER).

Mavrotas, G. and S.-I. Son (2006) 'Financial Sector Development and Growth: Re-examining the Nexus', in M. Bagella, L. Becchetti, and I. Hasan (eds), *Transparency, Governance and Markets* (Amsterdam: Elsevier).

Rodrik, D., A. Subramanian and F. Trebbi (2004) 'Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development', *Journal of Economic Growth*, 9 (2): 131–65.

Wachtel, P. (2004) 'How Much Do We Really Know About Growth and Finance?', *Research in Banking and Finance*, 4: 91–113.

World Bank (2001) *Finance for Growth: Policy Choices in a Volatile World* (New York: Oxford University Press).

2

Sources and Effectiveness of Financial Development: What We Know and What We Need to Know

Svetlana Andrianova and Panicos Demetriades

Introduction

There is a broad consensus in the finance-growth literature that, with few exceptions, there exists a positive long-run association between financial development and economic growth. This relationship is fairly robust to how financial development is measured – be it using indicators of banking or capital market development – and estimated; the latter ranging from cross-country to time-series and panel data techniques. Importantly, financial development has been shown to be one of the most robust determinants of economic growth, alongside most of the alternatives (for example, King and Levine 1993). Thus, financial development may hold the key to economic prosperity and may, consequently, be a powerful mechanism for reducing poverty worldwide.[1] As a result of this widespread consensus, the finance-growth literature has recently begun to shift its attention towards understanding why some countries have been able to develop their financial systems, while some others have not.

Interestingly, both the strength and the causal nature of the relationship between financial development and growth appear to vary substantially both across countries and over time.[2] Thus, if international policy-makers are looking for easy solutions that work in all countries and at all times ('one-size fits all' type answers), they are likely to be disappointed. An important, albeit disturbing, example of this is recent findings by Rioja and Valev (2004) and Demetriades and Law (2004) that suggest that the relationship between finance and growth is very weak in low-income countries. Thus, financial development may well be ineffective in promoting growth and, because of this, may be ineffective in alleviating poverty in those countries where poverty is particularly concentrated or acute. However, even in these cases it is important to understand why financial development is ineffective, which may help inform policy-making.

This chapter aims to improve our understanding of both the sources and effectiveness of financial development, with due consideration to how both may vary across countries and over time. To do so, the chapter takes stock of what we already know and identifies areas where further research is needed.

Sources of financial development

It is instructive to categorize the likely sources of financial development as follows:

- policy measures, such as financial liberalization and bank privatization
- institutions, such as rule of law and prudential regulation
- political economy factors, such as opposition to reform and openness of industrial and banking incumbents.

While the above taxonomy is somewhat arbitrary – for example, some political economy factors may well be the reason why some countries choose not to liberalize their financial systems – it is still helpful to utilize it for expositional purposes, while recognizing that there may well be inter-linkages between the various sources.

Policy measures

The early literature on financial development (for example, McKinnon 1973 and Shaw 1973) highlights ill-conceived government interventions – such as interest rate controls, high reserve requirements and capital controls – as the main source of financial under-development. Both McKinnon and Shaw argued that ceilings on deposit and/or lending rates, because of high inflation rates, frequently resulted in negative real rates of interest, discouraging saving and leading to an excess demand for loanable funds. Consequently, the volume of investment declined. The problem was exacerbated by governments that interfered in credit allocation, providing credit to ‘priority sectors’, frequently a euphemism for cronyism and corruption. Thus, the productivity of capital declined. Governments also imposed excessively high reserve requirements on banks, usually at low or even zero interest rates, in order to finance their own deficits cheaply. This acted as a tax on the banking system, resulting in further depression of deposit rates, thereby creating greater disincentives for financial saving. Removing interest rate ceilings, reducing reserve requirements and abolishing priority lending – in other words, freeing the financial system from government interventions – was seen as critical in delivering financial development. For a time, these policies became the mantra of the IMF and the World Bank, whose officials prescribed (and frequently imposed) 'financial liberalization' to many developing countries.

The reality of financial liberalization in the 1970s and early 1980s was, however, different from what was predicted by the McKinnon and Shaw literature. Real interest rates soared to unprecedented levels (sometimes in excess of +20 per cent) as a result of fierce competition for funds and excessive risk-taking by both firms and banks. When borrowers became unable to repay their loans, many banks failed. Governments were therefore forced to (re-)nationalize them, resulting in considerable fiscal costs. Instead of greater financial development, there was financial fragility; instead of more prosperity, there was more poverty. In a classic paper entitled 'Good-bye Financial Repression, Hello Financial Crash', Diaz-Alejandro (1985) provides a first attempt at analysing the failure of financial liberalization in Latin America. Subsequent analysis of what went wrong in these reforms (Villanueva and Mirakhor 1990) highlights adverse preconditions, such as macroeconomic instability (large fiscal deficits and high inflation) and inadequacies in banking supervision. McKinnon (1991) suggests that incorrect sequencing of reforms was at the root of the problem. He suggests that financial liberalization should be preceded by real sector reforms, including privatization of state enterprises, aimed at ensuring that relative prices adequately reflect economic scarcities. He also advocates reducing deficits and inflation before embarking on reforms, so that price distortions that may be associated with high inflation are removed. At the same time, domestic financial liberalization (that is, interest rate deregulation and lowering of reserve requirements) should precede liberalization of capital flows, with restrictions on long-term flows (such as foreign direct investment) being lifted first, those on volatile short-term flows being lifted last.

McKinnon (1991) also suggests that adequate regulation and supervision of banks is necessary in order to contain moral hazard problems in the banking system. Adverse selection and moral hazard problems are exacerbated in the aftermath of interest rate liberalization, especially when banks are not sufficiently well capitalized. Under-capitalized banks have incentives to take excessive risks, especially if they are protected by government safety nets. It is often believed that such safety nets encourage banks to behave imprudently, since they allow them to benefit from a one-way (unfair) bet against the government. By making speculative loans at very high interest rates, they stand to make very large profits, assuming of course that the borrowers do not default: if the borrowers do default, the banks will not suffer the full cost of these defaults if they are bailed out by the government. Even if the banks are allowed to fail, the depositors may not suffer if they are protected by deposit insurance. Thus, depositors have no incentives to monitor bank managers when they are protected by deposit insurance. Bank shareholders have no incentive to monitor bank managers either, when they do not have much capital at stake. In the extreme, bank shareholders may even benefit from managers' gambling behaviour, if they have little or no capital at stake (that is, when the bank has little or no net worth). In such circumstances, it might be in their interests to instruct bank managers to gamble (with taxpayers' money): this is sometimes referred to as 'gambling for resurrection' (Llewellyn 1999).

Several papers provide empirical evidence that substantiates the uncanny relationship between financial liberalization and financial crises. Demirgüç-Kunt and Detragiache (1998) analyse the determinants of the probability of banking crises in 53 countries during the period 1980–95. They find that financial liberalization has a very large and statistically significant positive effect on the probability of a banking crisis, even after controlling for many other possible determinants of banking crises. The magnitudes are quite startling: the probability of a banking crisis increases up to five times following financial liberalization. The increase in this probability is lower in more developed economies or when institutional quality is high. Their institutional quality indicators include law and order, bureaucratic delay, contract enforcement, quality of bureaucracy and corruption. The authors argue that the influence of financial liberalization on financial fragility works its way through reduced bank franchise values. Financial liberalization intensifies competition, which reduces the value of a banking licence to shareholders and exacerbates moral hazard in the form of excessively risky lending. They also present evidence that suggests that while financial liberalization has a positive effect on financial development, banking crises have a negative effect. They find that the two effects offset each other in countries that liberalize from a position of positive real interest rates while, in those that started from a repressed position, the effect of financial liberalization on financial development outweighs that of the banking crisis. They conclude by arguing in favour of gradual financial liberalization, to be accompanied or preceded by institutional development.

Kaminsky and Reinhart (1999) carry out an empirical analysis of the 'twin' – banking and currency – crises, in which they argue that financial liberalization and/or increased access to international capital markets played a major role in the first phase of such crises. Specifically, they examine the empirical regularities and the sources of 76 currency crises and 26 banking crises. They find that banking and currency crises are closely linked in the aftermath of financial liberalization, with banking crises beginning before currencies collapse. Currency collapse exacerbates the problems in the banking system further, making the 'twin crises' a lot more severe than crises that occur in isolation. Financial liberalization or increased access to international capital markets fuel the boom phase of the boom–bust cycle that precedes crises. This phase is associated with increased access to financing and the formation of asset price bubbles. The bust is attributed to overvalued exchange rates, declining exports and a rising cost of credit, all of which create vulnerabilities in the financial system. The authors see the draconian reductions in reserve requirements that accompany financial liberalization as one of the main factors that trigger lending booms. They also suggest that high interest rates result in increased risk-taking, in line with earlier literature. The authors conclude that there is a compelling case for strengthening banking regulation and supervision to 'allow countries to sail smoothly through the perilous waters of financial liberalization'. And that the Asian crisis of 1997–8, as earlier crises, 'remind[s] us that capital inflows can on occasion be too much of a good thing' (Kaminsky and Reinhart 1999: 496).

Stiglitz (2000) offers further insights into the Asian financial crisis of 1997–8, as well as on other recent crises, including Russia and Latin America, drawing on his experience as Chief Economist of the World Bank. He suggests that premature financial and capital market liberalization – in the sense of not first putting in place an effective regulatory framework – was at the root of these crises. He also suggests that global economic arrangements are fundamentally weak. Stiglitz's analysis highlights some of the difficulties that the sequencing literature has in explaining the East Asian crisis, which ensued soon after these countries liberalized their financial systems. By conventional definitions, these countries had good economic policies and sound financial institutions. They did not have fiscal deficits; they enjoyed very high growth rates for long periods, and their inflation rates were low. Their macroeconomic fundamentals were (or at least appeared to be) very strong. They were also thought to have reasonably respectable systems of banking regulation and supervision. Stiglitz emphasizes the destabilizing influence of short-term capital flows in his analysis, arguing that 'there is not only no case for capital market liberalization, ... there is a fairly compelling case *against* full liberalization' (Stiglitz 2000: 1076). His analysis of why capital market liberalization produces instability, not growth, identifies the following fallacy in the pro-liberalization arguments; namely, that 'financial and capital markets are essentially different from markets for ordinary goods and services'. He points out that capital and financial markets are 'information-gathering' markets, which means that standard results for competitive markets derived from models with perfect information are not applicable. He also argues that capital flows are pro-cyclical; therefore, the argument that the opening of capital markets would allow diversification and enhance stability is deficient. Finally, he challenges the notion that any destabilizing effects emanating from capital account liberalization are transitory – while the benefits are permanent – by alluding to the unit root literature, which suggests that shocks to output can be long-lasting. The debate has now shifted, Stiglitz argues, to the type of interventions that might be necessary in order to stabilize short-term capital flows, rather than their desirability as such, with these actions being endorsed by the IMF itself.

Stiglitz (1999) elaborates on the weaknesses of the institutional financial architecture, which amplifies the destabilizing effects of financial liberalization. Specifically, he highlights the role of the tight monetary policies recommended by the IMF to Asian crisis countries, in the aftermath of the crisis. Moreover, these policies, which were aimed at stabilizing exchange rates, had the opposite effect. This was because high interest rates raised the probability of corporate bankruptcies. This, in turn, made international lenders more reluctant to renew or roll over their loans to highly leveraged East Asian corporations. There have been several attempts to address the issue of weak financial architecture, many of these from World Bank and IMF economists. However, a major empirical issue that needs to be tackled when addressing this question is that, in any reasonable economic model, interest rates and exchange rates are simultaneously determined. Hence, identifying the effects of the tightening of policy is extremely difficult. Caporale *et al.* (2005) exploit the heteroscedasticity properties in the relevant time-series for these variables, in order to identify the system. Using a bivariate vector autoregression model, they find that while tight monetary policy helped to defend the currencies concerned during tranquil periods, it had the opposite effect during the Asian crisis.

A number of authors continue, however, to propagate the benefits of financial liberalization, focusing primarily on the effects of capital account liberalization on stock returns and the cost of equity capital, using event studies. Bekaert and Harvey (2000), for example, measure how capital account liberalization has affected the equity return-generating process in 20 emerging markets. They use a variety of methods to determine liberalization dates, including official liberalization dates, dates of first issues of country funds or American Depository Receipts (which may signal a change in access to international capital markets) and econometric methods to identify structural breaks in the series. They find that dividend yields decline after liberalizations, but the effect is always less than 1 per cent on average. They also find that, there, liberalization has no significant impact on unconditional volatility. In a series of other studies (see Bekaert and Harvey 2003), they challenge Stiglitz's critique of capital account liberalization, dubbing as 'odd' the whole discussion concerning increased volatility. They review evidence that suggests that the ratio of investment to GDP increases following liberalization, while the ratio of consumption to GDP does not increase. Durham (2000), however, finds that many of the results in this literature are sensitive to: (i) alternative liberalization event dates; and (ii) conditioning on other determinants of stock returns suggested by the literature on stock market anomalies.

Evidence from time-series studies on the effects of financial liberalization on financial development is mixed. While it is quite common to find that the real interest rate has a small positive effect on financial development, there is also evidence to suggest that the direct effects of 'repressive' policies on financial development are sometimes positive and quite large. Demetriades and Luintel (2001) provide time-series evidence from South Korea – one of the fastest-growing economies in the world – in which an index of financial repression is found to have a large positive effect on financial development. They explain this finding by arguing that the Korean banking system behaved like a cartel when interest rates were deregulated. Using a monopoly-bank model, they show that mild repression of lending rates increases the amount of financial intermediation. It is also worth noting that domestic financial liberalization in South Korea was not followed by financial instability. The Korean crisis occurred well after domestic interest rates were liberalized; it followed the opening up of short-term capital flows, which destabilized the banking system. In sharp contrast to their findings on South Korea, in an earlier study of the Indian banking system, Demetriades and Luintel (1997) find that financial repression had large negative effects on financial development, over and above the retarding influence of low real rates of interest. The difference in results is attributed as reflecting institutional differences and differences in the severity of repression. While mild financial repression may turn out to have positive effects under certain conditions, severe financial repression is likely to result in financial under-development, not only due to large negative real interest rates, but also because of other disincentive effects. This is also further evidence that 'one-size fits all' may not work: policies that promote financial development in a certain context may not work in other contexts.

Another form of government intervention in the financial system that may have implications for financial development and growth is government ownership of banks. Government-owned (henceforth 'state') banks provide an effective means for politicians to influence the allocation of credit, allowing them to support firms and enterprises that may further their political interests. This view, known as the 'political view of state banks', has a clear policy implication: privatizing state banks can improve the efficiency of credit allocation and, consequently, can have positive effects on the quality and quantity of investment. Privatization of state banks is also likely to promote financial development, since private banks would be in a better position to attract funds into the banking system than inefficient state banks. La Porta *et al.* (2002) examine the relationship between government ownership of banks, financial development and economic growth using a cross-country dataset. They find that government ownership of banks is negatively correlated with both financial development and growth. The estimated coefficients are quite large: they suggest that a 10 per cent reduction in the share of banking assets owned by the government is associated with an increase in growth by 0.25 per cent per annum. Assuming that the relationships are causal, the clear policy implication is that the privatization of government-owned banks would yield very large benefits in terms of additional financial development and economic growth. La Porta *et al.* also report bivariate regressions that suggest that government ownership of banks is higher when institutional indicators, including property rights and government efficiency, are weak. However, this highlights the possibility of reverse causation: if government ownership of banks is the result of institutional weaknesses, then lower growth rates and financial under-development may be the result of the same institutional weaknesses. Thus, privatizing state banks without addressing the institutional deficiencies that brought them about may not have the positive effects of growth predicted by La Porta *et al.* (2002).

Andrianova *et al.* (2008; henceforth ADS) provide further insights into the relationship between institutions, state banks and financial development using a locational model of banking in which there are two types of private banks – 'honest' and 'opportunistic' – and a state bank. Private banks are assumed to offer more competitive interest rates to depositors than the state bank and, in the absence of deposit contract enforcement problems, they are therefore always preferred by depositors. However, if deposit contract enforcement is weak and the number of opportunistic banks is large, then some depositors would prefer to place their savings in the state bank, which offers a risk-free, albeit lower, rate of return. ADS derive three types of equilibria in their model: (i) a 'high' equilibrium in which institutions are strong, only private banks exist and opportunistic banks honour their contract; (ii) an 'intermediate' equilibrium in which private banks and the state bank coexist and opportunistic banks find it profitable to breach their deposit contracts, because of relatively weaker contract enforcement; and (iii) a 'low' equilibrium in which only the state bank exists because contract enforcement is weak and the proportion of opportunistic banks is high. They show that, in the intermediate region, the proportion of state bank deposits declines when institutional quality increases. They also show that privatization of the state bank in the low equilibrium region results in financial disintermediation; that is, no private bank would emerge to fill the gap, as depositors will not trust it. ADS extend their model to allow for politically motivated subsidies to the state bank. They show that the higher the level of these subsidies, the smaller the 'high' equilibrium region. Thus, state banks may feature in equilibrium, even when there are no enforcement problems, because they are able to offer more competitive deposit rates than some private banks. ADS also provide a variety of empirical tests of the relationships predicted by their model, using data from 83 countries. They find that institutional quality indicators – including financial regulation, rule of law and disclosure rules – are much more strongly and robustly correlated to the share of state banks than proxies for politically driven subsidies. They conclude that the privatization of state banks is, at best, unnecessary, since it is better to build institutions that foster the development of private banks and remove subsidies from state banks. At worst, it is detrimental since, when institutions are weak, it will almost certainly lead to financial disintermediation.

The conclusion that may be drawn from the analysis of policy measures is that the case for less government intervention in the financial system resulting in greater financial development is far from proven. It presupposes the presence of an institutional framework that aims at containing market imperfections, such as moral hazard and adverse selection. Thus, institutions and political economy factors, rather than less government intervention, may well be the true fundamental determinants of financial development.

Institutions

An effective system of financial regulation and supervision would ensure that banks have adequate risk management systems and that bank shareholders are penalized if banks take excessive risks. Capital requirements that accurately reflect risk-taking by banks are one mechanism for achieving this. Increased transparency regarding banks' risk management systems, as well as increased disclosure concerning exposure to large risks, can help to increase market discipline on bank managers and may well contain such risk-taking. Institutions such as contract enforcement and the rule-of-law also matter, since they have implications for the protection of investors' property rights. Much of the literature on institutions, however, examines their effects on growth, rather than on financial development.[3]

La Porta *et al.* (1998; henceforth LLS), examine legal rules covering the protection of (minority) shareholders and creditors, and the quality of their enforcement in 49 countries. They draw on the work of comparative legal scholars, who classify national legal systems into major families of law, even though national differences remain within the same families. These scholars identify two broad legal traditions: civil law and common law. The civil law tradition, which is the oldest and most influential, originates in Roman law. It relies heavily on legal scholars to ascertain and formulate rules, statutes and comprehensive codes as a primary means of settling disputes. Within the civil law tradition, there are three common families of laws: French, German and Scandinavian. The French Commercial Code was written in 1807 and was 'exported' by Napoleon's armies to other countries in central Europe; eventually it was also exported to French colonies in Africa, Asia and the Caribbean. The German Commercial Code, written in 1897, had an influence in Central and Eastern Europe, Japan, Korea and Taiwan. The Scandinavian family, considered less a derivative of Roman law than French and German law, is considered sufficiently distinct from the other families by legal scholars, but has no influence outside the Nordic countries. The common law family, which originates in the law of England, is formed by judges in the resolution of specific disputes. Precedents from judicial decisions, rather than contributions by scholars, form the basis of common law. Common law has spread to the former British colonies, including the United

States, Canada, Australia, India, South Africa, Nigeria, Kenya, Ireland, Hong Kong, and so on. LLS find that common law countries generally have the strongest shareholder protection, while civil law countries have the weakest. Within the civil law group, French civil law countries offer the worst legal protection to shareholders. Similar results are found for the protection of creditors. French civil law countries compensate for weak investor protection through a mandatory dividend to shareholders and legal reserves. LLS also find that legal origins have a significant influence on legal enforcement, with common law countries and Scandinavian civil law countries having the best quality of law enforcement, French civil law countries having the worst. They do, however, find that the main determinant of legal enforcement is GDP per capita: richer countries have higher quality of law enforcement. Thus, rich countries within the French civil law group, such as France and Belgium, could well offer better law enforcement than poor common law countries.

La Porta *et al.* (1997) examine the influence of legal origins on financial development, mainly focusing on the development of capital markets. They use the same sample of 49 countries as LLS and find that French civil law countries have the least developed capital markets, especially compared to common law countries. Their indicators of financial development include: stock market capitalization/GNP, number of firms relative to population size, initial public offerings (IPOs) relative to population and debt/GDP. Their empirical findings suggest that civil law countries have lower levels of capital market development than common law countries. However, there are no significant differences in relation to banking sector development. In the regressions that use debt/GDP as the dependent variable, once the authors control for creditor rights, only the Scandinavian civil law dummy is negative and statistically significant at conventional levels.

What might be concluded from La Porta *et al.* (1997, 1998) is that civil law countries, which seem to offer less legal protection to minority shareholders and creditors, have less developed capital markets and a greater concentration of ownership at both industry and firm levels. However, the implications of legal origins for the development of the banking system, which is perhaps the most important part of the financial system for many developing countries, are less clear-cut. Indeed, Rajan and Zingales (2003) find that French civil code countries were no less financially developed in 1913 and 1929 than common law countries, and only started to lag behind after the Second World War. Moreover, legal traditions may themselves be determined by historical, cultural, socio-economic and political factors, so it is not easy to draw out any policy implications from these results. Legal origins are, in fact, highly correlated with a number of other institutional quality indicators – including the efficiency of the judiciary, bureaucratic quality, generalized level of trust and so on – so it is difficult to disentangle the effects of legal origins on financial development from those of other institutions (Zingales 2003). Finally, even if we were to accept that it is the legal system that determines financial development – and ultimately growth, there remains the question of how to transform a legal system from the supposedly inferior French civil code to the supposedly superior common law code. There are, therefore, many unanswered questions as regards the relationship between law and finance, offering fertile ground for more research.

Political economy factors

The key to solving the puzzle of why many countries remain financially under-developed, according to Rajan and Zingales (2003), is the lack of political will, or the capture of politicians by interest groups opposed to financial openness. In other words, financial development comes about only if welcomed by the ruling elite. The economic argument constructed by Rajan and Zingales in support of this conjecture is as follows. Openness to either international trade or international capital, while beneficial for the country's welfare in stimulating the development of its financial and product markets, breeds competition and thus threatens the rents of incumbents. When financial markets are under-developed, two types of incumbents enjoy rents and therefore may oppose openness and financial development. Established industrial firms, or 'industrial incumbents', are in a privileged position when obtaining external finance due to their reputational capital and their ability to provide collateral. Their rents are generated because new firms with profitable business projects have to team up with an industrial incumbent in order to obtain financing. 'Financial incumbents', in turn, capitalize on their informational advantage, which stems from relation-based financing, and become monopolists in providing loans to firms when problems of poor disclosure and weak contract enforcement raise fixed costs of new financial entrants. Financial development improves transparency and enforcement, thus reducing the barriers to entry and undermining not only the profits of incumbents who have to operate in a more competitive environment, but also the source of their rents, since entrants are able to operate effectively without any help from incumbents. Despite the benefits it brings (after all, better disclosure rules improve operating conditions for all firms – existing and new), financial development threatens both the profits and the positional rents of the incumbents.

The way to remove incumbents' opposition to financial development, Rajan and Zingales argue, is simultaneously to open product and capital markets. More intense competition from foreign entrants, following liberalization of either trade or capital flows alone, will only intensify incumbents' opposition to financial development. For example, trade liberalization under protected capital markets would reduce industrial incumbents' competitiveness and profits, thus increasing their demand for cheaper and larger loans to defend their domestic market position. Their opposition to financial development – which, if came about, would further undermine incumbents' competitiveness, this time vis-à-vis the domestic entrants – would now be even stronger. Incumbent financiers' resistance to financial development, when capital markets are protected while product markets are liberalized, is likely to remain the same: after all, relation-based financing favours dealing with existing large clients and these are incumbent industrialists. Similarly, protected product markets in combination with free international capital flows, create a stronger resistance to financial development from the incumbent financiers (who are forced now to compete for their best and largest industrial clients with foreign financial institutions) while leaving industrial incumbents' incentives for financial development unchanged. There is little use in additional external finance available by tapping international capital markets when the economy is closed to trade. In contrast, trade liberalization, accompanied by the freeing of capital flows, forces the incumbent industrialists and financiers to make the best of the liberalized markets in order to cope with the competitive pressure from foreign and domestic entrants. Lower profits at the industrial incumbents, and their greater need for external finance, now force them to explore the possibilities of tapping the international capital markets. If unsuccessful, these industrialists would, in fact, now support financial innovations that aid greater transparency, thus improving their own access to domestic finance. Incumbent financiers, being forced to lose some of their best clients to foreign competition and, at the same time, to accept lower profitability of their remaining clientele, are now forced to seek new lending opportunities among young industrial firms that are less well known and possibly more risky. Financing these new firms is likely to be unattractive to foreign financiers, but would create incentives for domestic incumbent financiers to support the improvements in, and development of, domestic financial markets. In sum, trade and capital liberalization aligns the interests of industrial and financial incumbents with those of the rest of the economy, and financial development becomes possible.

The empirical evidence provided by Rajan and Zingales focuses on a variety of relationships that suggest that the combination of trade and capital openness are, indeed, correlated with greater financial development. Their findings, while consistent with their conceptual arguments, provide, at best, indirect evidence about the importance played by interest group politics in financial development. Moreover, their sample of countries, driven by data availability in the pre-Second World War period, is rather limited, and in some of the regressions the sample size is as low as 17 observations. Thus, while the ideas in Rajan and Zingales (2003), by themselves, undoubtedly advance our understanding of political economy factors, the empirical evidence that is provided by the same authors is less than convincing, leaving ample scope for further empirical research. Further questions that need to be addressed, both theoretically and empirically, include the following. How do special interest groups come into existence? What institutions and policies – 'political pre-conditions' for institutions and financial development – moderate the influence of interest groups? If the most effective way to curb incumbents' opposition to financial development is by means of increased openness and competitiveness, then what is the best combination of policies that could pave the way for rapid institutional development? What is the role of the state for shaping the institutional infrastructure in a way that limits the power of the interest groups and the scope for capture of government policies by special interests? These are all exciting questions that await researchers' attention.

Sources of financial development: some new evidence

Demetriades and Law (2005) draw on the literature reviewed above to specify the following financial development equation:

$$FD = f(RGDPC, R, ROL, LO, DEMOC, POL, BC, OP) \tag{2.1}$$

where *FD* is financial development; *RGDPC* is real GDP per capita; *R* is the real interest rate; *ROL* is rule of law; *LO* is legal origin; *DEMOC* is democracy score, *POL* is political stability; *BC* is bank concentration and *OP* is openness, which is measured by total trade (imports+exports) over GDP. The specification of the equation reflects all the considerations outlined previously. Real GDP per capita is a conditioning variable that purports to filter out the influence of general economic development on the level of financial development; in a growing economy, the financial sector may grow faster relative to the size of the economy because the demand for financial services grows more than proportionately to income (finance may be a luxury good). The financial policy stance, including financial liberalization, is usually captured by the presence of the real interest rate in the equation. A positive coefficient will signify the McKinnon–Shaw effect: higher real rates of interest enhance financial development. Rule of law and legal origin would capture the influence of institutions, while democracy, political stability and (to a certain extent) openness would capture the influence of political economy factors. Finally, bank concentration, which captures the influence of banking market structure, might also to some extent reflect political economy considerations: less competitive banking systems might be the result of powerful ruling elites that restrict entry and contain financial development.

Equation (2.1) is estimated by utilizing the cross-country OLS robust standard estimator. The dataset utilized consists of cross-country observations for the period 1990–2001. Two different categories of financial development indicators are employed; namely, banking sector development and capital market development. The banking sector indicators are the ratios of liquid liabilities, private sector credit and domestic credit provided by the banking sector to GDP. The capital market development indicators are the ratio of stock market capitalization to GDP and the ratio of the number of companies listed to total population. Both capital market indicators are only available for high-income and middle-income countries. The main sources of these annual data are the *World Development Indicators*.[4] The dataset for the rule of law indicator employed in this study was assembled by the Center for Institutional Reform and Informal Sector (IRIS) of the University of Maryland from the *International Country Risk Guide* (ICRG),[5] a monthly publication of Political Risk Services (PRS). The democracy score and political stability ('durable') variables are obtained from Polity IV datasets, made available by Center for International Development and Conflict Management (CIDCM).[6] The above three variables are scaled from 0 to 10, and indicate that higher values imply better rule of law, democracy score and political stability. The bank concentration is measured by the ratio of total assets of the three largest banks in each country to total banking sector assets, obtained from Beck *et al.* (2003b).[7] The annual data of real GDP per capita, real deposit interest rate (deflated by inflation) and total labour force are collected from the *World Development Indicators*.

Table 2.1 reproduces some of the results from Demetriades and Law (2005). It reports OLS regressions of Equation (2.1) with all the variables included. In all five models, real GDP per capita enters with the expected positive coefficient and is statistically significant, though only at the 10 per cent level in Models 3 and 4, in which domestic credit and stock market capitalization are the dependent variables, respectively. The real interest rate enters with a positive coefficient in the three models that utilize banking development indicators, as expected, but it is statistically insignificant in Models 1 and 2 and significant at the 10 per cent level in Model 3. Thus, the McKinnon–Shaw hypothesis that higher real interest rates resulting from financial liberalization will enhance financial development receives little, if any, support by the data. Rule of law enters with a positive and statistically significant coefficient in all five models, suggesting that institutions are important determinants of financial development. Bank concentration is generally not significant, except in Model 5 where it suggests that less competitive banking systems are positively linked to firms resorting to the stock market to obtain finance. The democracy score seems to have a mild positive influence on financial development, but is significant only in Models 1 and 2 and at the 10 per cent level. Political stability is positive and significant at the 5 per cent level in three models, suggesting that political instability is a deterrent to financial development. Openness is positive and significant in three of the models, which is consistent with the Rajan–Zingales hypothesis. Finally, the legal origin variables are, by and large, insignificant except for English legal origin, which has a positive and significant coefficient in Models 2 and 4, which utilize private sector credit and stock market capitalization, respectively, as the dependent variables.

These findings indicate that both institutions and political economy factors may be the true fundamental sources of financial development. However, as usual, OLS cross-country results may suffer from reverse causality. Indeed, in additional regressions, Demetriades and Law (2005) use the initial values of rule-of-law and find that the significance of this variable is lost. This suggests that both rule-of-law and financial development may be jointly determined by another variable. Recent work by Beck *et al.* (2003a) examining the historical determinants of financial development, suggests that the variable in question may be geographical in nature. Specifically, Beck *et al.* test the endowment hypothesis of Acemoglu *et al.* (2001), which postulates that geography and the disease environment encountered by European settlers were critical in shaping institutional development. Alongside this, they also test the law and finance hypothesis of LLS. Using a sample of 70 former colonies, they find

Table 2.1 OLS regressions with robust standard errors
Dependent variable: financial development (sample period: 1990–2001)

	Model 1: Liquid liabilities	**Model 2: Private sector credit**	**Model 3: Domestic credit**	**Model 4: Market capitalization**	**Model 5: Number of companies listed**
Constant	0.78	−1.20	−0.20	−9.34	−15.25
	(1.05)	(−1.01)	(−0.18)	(−3.63)	(−5.55)
Real GDP per capita	0.20	0.32	0.13	0.26	0.50
	(3.02)***	(4.14)***	(1.68)*	(1.99)*	(3.85)***
Real interest rate	0.07	0.06	0.12	−0.09	−0.12
	(1.45)	(1.28)	(1.97)*	(−1.51)	(−1.46)
Rule of law	0.27	0.32	0.25	0.26	0.05
	(2.56)**	(3.77)***	(2.48)**	(3.14)**	(2.43)**
Bank concentration	−0.09	−0.33	−0.07	−0.34	1.15
	(−0.59)	(−1.54)	(−0.42)	(−1.20)	(2.16)**
Democracy score	0.30	0.19	0.55	0.43	0.20
	(1.87)*	(1.78)*	(1.65)	(1.12)	(0.98)
Political stability	0.16	0.33	0.26	0.40	0.46
	(2.12)**	(1.89)*	(1.54)	(2.29)**	(2.34)**
Openness	0.32	0.34	0.21	0.73	0.32
	(2.38)**	(2.42)**	(1.09)	(2.47)**	(1.38)
English	0.21	0.18	0.25	0.33	0.41
	(1.48)	(2.23)**	(1.55)	(2.34)**	(2.02)*
French	−0.30	−0.22	−0.33	−0.28	−0.20
	(−1.45)	(−0.98)	(−1.24)	(−2.46)**	(−1.54)
German	−0.17	−0.23	−0.19	−0.10	0.22
	(−0.90)	(−1.50)	(−0.65)	(−1.32)	(1.61)
R-square	0.66	0.70	0.64	0.68	0.65
N	64	64	64	54	41

Notes: Figures in the parentheses are the *t*-statistics;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.
Source: Demetriades and Law (2005).

that the initial endowment theory of Acemoglu *et al.* explains more of the cross-country variation in financial development than the law and finance hypothesis. While this research advances our understanding of the historical origins of financial development, its policy implications for countries that remain financially under-developed today are not immediately obvious. Since the wheels of history cannot be turned back and geography cannot be changed, does it mean that there is no hope for financially under-developed economies today? We think not. If better institutions do, indeed, hold the key for financial development, it must surely be possible to adapt and strengthen them, even where the legacy of European settlers and geography has been unfavourable. Some questions that emanate from this frontier of the literature are the following. Is geography relevant today in shaping the future of institutions? Are financially under-developed economies plagued by extractive institutions even today? If so, to what extent would improvements with regard to the disease environment today help to improve institutions that are critical for financial development?

Effectiveness of financial development

In their recent empirical analysis of the effectiveness of financial development across different groups of countries, Demetriades and Law (2004) estimate the following growth equation using panel cointegration techniques (see Pesaran *et al.* 1999):

$$\begin{aligned}\ln RGDPC_{i,t} = \beta_{0,i} + \beta_{1,i}\, t + \beta_{2,i} \ln FD_{i,t} + \beta_{3,i} \ln INS_{i,t} + \beta_{4,i} \ln(FD \times \text{INS})_{i,t} \\ + \beta_{5,i} \ln K_{i,t} + \beta_{6,i} \ln(n + g + \delta)_{i,t} \qquad (2.2)\end{aligned}$$

where *RGDPC* is real GDP per capita; *FD* is a financial development indicator; *INS* is an indicator of institutional quality; *K* is the stock of capital investment or physical capital accumulation; n is the rate of labour growth; g is the rate of technology growth or technological progress, and δ is the rate of depreciation.

Their dataset consists of a panel of observations for 72 countries for the period 1978–2000. The sample countries are split into three groups: high-, middle- and low-income, in accordance with the World Bank classification.[8] Annual data on real GDP per capita, real gross capital formation, total labour force and three alternative financial development indicators (liquid liabilities, private sector credit and domestic credit provided by the banking sector, all expressed as ratios to GDP) are from the *World Development Indicators*. All these data are converted to US dollars based on 1995 constant prices. The dataset on institutional quality indicators they employ was assembled by the IRIS Center of the University of Maryland from the ICRG, discussed earlier. Following Knack and Keefer (1995), Demetriades and Law (2004) use the following five indicators to measure the overall institutional environment: (i) *corruption*, which reflects the likelihood that officials will demand illegal payment or use their position or power to their own advantage; (ii) *rule of law*, which reveals the degree to which citizens are willing to accept established institutions to make and implement laws and to adjudicate dispute; it can also be interpreted as a measure of 'rule obedience' (Clague 1993) or government credibility; (iii) *bureaucratic quality*, which represents autonomy from political pressure, strength and expertise to govern without drastic changes in policy or interruptions in government services, as well as the existence of an established mechanism for recruitment and training of bureaucrats; (iv) *government repudiation of contracts*, which describes the risk of a modification in a contract due to change in government priorities; and (v) *risk of expropriation*, which reflects the risk that the rules of the game may be abruptly changed. The above first three variables are scaled from 0 to 6, whereas the last two variables are scaled from 0 to 10. Higher values imply better institutional quality and vice versa. The institutions indicator is obtained by summing the above five indicators.[9]

Tables 2.2 to 2.5 reproduce some of the results in Demetriades and Law (2004). Table 2.2 reports the estimates of Equation (2.2) on the entire set of countries, while Tables 2.3, 2.4 and 2.5 report estimates for high-income, middle-income and low-income countries, respectively.

The Hausman test (see Hausman 1978) in Table 2.2 indicates that the data do not reject the restriction of common long-run coefficients, therefore only the pooled mean group (PMG) estimator results reported in Tables 2.2 through 2.5 are discussed. The PMG estimates in Table 2.2 reveal that both financial development and institutional quality are statistically significant determinants of long-run growth. In addition, the interaction term enters with a large positive and statistically significant coefficient. This suggests that the marginal effects of both finance and institutions on growth may be higher than has been suggested by earlier literature. Financial development has both direct and indirect effects on growth which, broadly speaking, reflects the effects of financial deepening (size effects) and the influence of institutions (quality effects). Similarly, institutional development has both direct and indirect effects on growth, with the latter depending on the size of the financial system. In other words, institutional development has a greater pay-off in terms of growth when the financial system is more developed.

The PMG results for high-income countries in Table 2.3 show that while both the financial development indicators and institutional quality retain their positive sign, they are no longer statistically significant in all models. Two of the financial development indicators – liquid liabilities and private sector credit – remain statistically significant, while

Table 2.2 Panel data estimations
Dependent variable: real GDP per capita (72 countries, 1978–2000)

Liquid liabilities/GDP (LIA)	**MG estimators**	**PMG estimators**	**Static fixed-effects estimators**
$(n + g + \delta)$	−0.50	−0.36	−0.58
	(−1.36)	(−1.44)	(1.53)
Capital	1.38	0.34	0.40
	(1.55)	(2.29)**	(4.52)***
LIA	0.32	0.25	0.27
	(1.25)	(2.36)**	(8.32)***
INS	0.68	0.20	0.29
	(0.99)	(2.28)**	(2.49)**
LIA × INS	0.60	0.35	0.31
	(1.71)	(3.62)***	(5.55)***
Time trend	0.03	0.02	0.02
	(2.14)**	(2.98)***	(2.36)**
Adjustment	0.32	−0.14	−1
	(−6.98)***	(−4.42)***	(N/A)
Loglikelihood	3141.33	2631.92	1075.78
H test for long-run homogeneity	4.11 (0.53)		
Private sector credit/GDP (PRI)	**MG estimators**	**PMG estimators**	**Static fixed-effects estimators**
$(n + g + \delta)$	−0.47	−0.34	−0.62
	(1.48)	(−1.50)	(1.54)
Capital	0.82	0.32	0.37
	(1.29)	(2.32)**	(4.08)***
PRI	0.30	0.32	0.27
	(1.52)	(2.14)**	(6.38)***
INS	0.71	0.22	0.20
	(1.14)	(2.33)**	(2.12)**
PRI × INS	0.53	0.36	0.32
	(1.80)*	(2.95)***	(4.90)***
Time trend	0.02	0.03	0.02
	(2.31)**	(3.02)***	(2.28)**
Adjustment	−0.36	−0.16	−1
	(−7.25)***	(−4.29)***	(N/A)
Loglikelihood	3169.64	2631.39	1050.96
H test for long-run homogeneity	5.82 (0.32)		

Table 2.2 (continued)

Domestic credit/GDP (DOC)	**MG estimators**	**PMG estimators**	**Static fixed-effects estimators**
$(n + g + \delta)$	−0.48	−0.29	−0.54
	(−1.53)	(−1.56)***	(−1.53)
Capital	0.74	0.30	0.35
	(1.33)	(2.45)**	(4.16)***
DOC	0.25	0.22	0.12
	(0.14)	(2.21)**	(1.47)
INS	0.84	0.24	0.21
	(1.56)	(3.46)***	(2.18)**
DOC × INS	0.33	0.30	0.39
	(1.86)*	(4.14)***	(2.19)**
Time trend	0.01	0.02	0.02
	(2.46)**	(3.21)***	(2.36)**
Adjustment	−0.40	−0.18	−1
	(−6.23)***	(−4.39)***	(N/A)
Loglikelihood	3166.85	2648.85	996.59
H test for long-run homogeneity	3.44 (0.63)		

Notes: All equations include a constant country-specific term;
Figures in parentheses are *t*-statistics except for Hausman tests (H), which are *p*-values;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively;
$N \times T = 1656$.
Source: Demetriades and Law (2004).

domestic credit is no longer significant. Institutional quality is no longer statistically significant in any of the six models at the 5 per cent level – it is, however, significant at the 10 per cent level in the first three models. The interaction term, however, performs better. It is statistically significant at conventional levels in two out of three models, and significant at the 10 per cent level in the third. The coefficients on the financial development indicators in Models 4, 5 and 6 are much lower than those in the corresponding models in Table 2.2. The interaction terms, however, are slightly higher than in the corresponding models in Table 2.2. These findings seem to suggest that, even within high-income countries, financial development, as measured by liquid liabilities or private credit, has positive albeit smaller direct effects on growth than in the entire sample. Its indirect effects, which depend on the quality of institutions, are, however, if anything, somewhat larger than in the entire

Table 2.3 Pooled mean group estimations of high-income countries
Dependent variable: real GDP per capita (24 countries, 1978–2000)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
$(n + g + \delta)$	−0.50	−0.47	−0.55	−0.53	−0.56	−0.51
	(−1.01)	(−1.07)	(−1.14)	(−1.25)	(−1.34)	(−1.39)
K	0.42	0.45	0.44	0.45	0.48	0.46
	(1.86)*	(1.77)*	(1.89)*	(1.87)*	(1.93)*	(1.84)*
INS	0.12	0.15	0.20	0.10	0.12	0.15
	(1.69)*	(1.88)*	(1.92)*	(1.58)	(1.62)	(1.54)
LIA	0.24	–	–	0.18	–	–
	(3.09)***			(3.10)***		
PRI	–	0.20	–	–	0.17	–
		(2.79)***			(2.38)**	
DOC	–	–	0.14	–	–	0.11
			(1.51)			(1.45)
LIA × INS	–	–	–	0.36	–	–
				(3.15)***		
PRI × INS	–	–	–	–	0.38	–
					(2.47)**	
DOC × INS	–	–	–	–	–	0.32
						(1.89)*
Time trend	0.02	0.03	0.02	0.01	0.02	0.03
	(2.44)**	(2.59)***	(2.38)**	(2.23)**	(2.50)**	(2.34)**
Adjustment	−0.09	−0.11	−0.08	−0.06	−0.07	−0.09
	(−2.05)**	(−2.47)**	(−1.92)*	(−2.52)***	(−2.43)**	(−2.61)***
H test for long-run homogeneity	1.68	3.27	1.65	8.09	3.90	4.39
	(0.79)	(0.51)	(0.80)	(0.08)	(0.14)	(0.35)

Notes: All equations include a constant country-specific term;
Figures in parentheses are *t*-statistics except for Hausman tests (H), which are *p*-values;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.
Source: Demetriades and Law (2004).

sample. Given that institutional quality is higher in high-income countries, financial development may, overall, still have large positive effects on economic growth. The same cannot be said for institutional quality, the effects of which are now largely through the financial system. Thus, while institutional improvements appear to display diminishing returns, financial development remains an important engine of growth, even for developed countries.

The PMG results for middle-income countries are reported in Table 2.4. The direct effects of financial development on economic growth are greater and more significant than in the high-income group in all of the corresponding six models. This finding is consistent with Rioja and Valev (2004), who also find financial development to have a much stronger growth-enhancing effect in middle-income countries compared to high-income countries. Institutional quality also has a positive and

Table 2.4 Pooled mean group estimations of middle-income countries
Dependent variable: real GDP per capita (24 countries, 1978–2000)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
$(n + g + \delta)$	−0.30	−0.36	−0.33	−0.27	−0.30	−0.28
	(−2.77)***	(−2.33)**	(−2.44)**	(−2.59)***	(−2.40)**	(−2.37)**
K	0.35	0.41	0.38	0.30	0.32	0.33
	(4.67)***	(4.65)***	(4.24)***	(3.77)***	(2.85)***	(3.32)***
INS	0.20	0.22	0.24	0.17	0.18	0.21
	(5.57)***	(5.36)***	(5.00)***	(2.41)**	(2.49)**	(2.52)**
LIA	0.35	–	–	0.30	–	–
	(3.15)***			(2.43)**		
PRI	–	0.40	–	–	0.42	–
		(4.57)***			(3.59)***	
DOC	–	–	0.27	–	–	0.36
			(3.53)***			(1.88)*
LIA × INS	–	–	–	0.49	–	–
				(4.26)***		
PRI × INS	–	–	–	–	0.53	–
					(4.48)***	
DOC × INS	–	–	–	–	–	0.45
						(5.30)***
Time trend	0.01	0.02	0.01	0.02	0.02	0.02
	(2.58)***	(2.45)**	(2.35)**	(2.40)**	(2.39)**	(2.53)**
Adjustment	−0.15	−0.18	−0.20	−0.21	−0.25	−0.24
	(−4.62)***	(4.32)***	(−4.89)***	(−3.58)***	(−3.59)***	(−3.82)***
H test for long-run homogeneity	8.14	4.41	1.74	8.10	3.96	8.33
	(0.09)	(0.35)	(0.78)	(0.08)	(0.33)	(0.08)

Notes: All equations include a constant country-specific term;
Figures in parentheses are *t*-statistics except for Hausman tests (H), which are *p*-values;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.
Source: Demetriades and Law (2004).

highly significant effect on economic growth in all six models. Thus, the findings in Demetriades and Law (2004) provide support for the argument that good institutions are more important for growth in less developed countries (Rodrik 1997). In addition, the estimated coefficient of the interaction term in Models 4, 5 and 6 is both large and highly significant. These findings seem to suggest that both finance and institutional quality have considerable direct and indirect effects on growth. Improving both finance and institutional quality in middle-income countries is, therefore, likely to boost economic growth much more than in high-income countries.

Table 2.5 Pooled mean group estimations of low-income countries
Dependent variable: real GDP per capita (24 countries, 1978–2000)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
$(n + g + \delta)$	−0.45	−0.43	−0.47	−0.48	−0.46	−0.50
	(−2.22)**	(−2.35)**	(−2.55)**	(−4.36)***	(−3.16)***	(−2.15)**
K	0.28	0.31	0.33	0.30	0.33	0.32
	(5.88)***	(6.30)***	(6.52)***	(2.87)***	(3.71)***	(2.75)***
INS	0.38	0.40	0.36	0.34	0.36	0.32
	(2.16)**	(2.29)**	(2.89)***	(2.38)**	(2.27)**	(2.41)**
LIA	0.17	–	–	0.18	–	–
	(1.32)			(1.56)		
PRI	–	0.10	–	–	0.20	–
		(2.33)**			(2.14)**	
DOC	–	–	0.08	–	–	0.13
			(0.98)			(1.38)
LIA × INS	–	–	–	0.26	–	–
				(2.45)**		
PRI × INS	–	–	–	–	0.28	–
					(2.30)**	
DOC × INS	–	–	–	–	–	0.23
						(2.27)**
Time trend	0.01	0.02	0.02	0.02	0.03	0.03
	(2.14)**	(2.39)**	(2.22)**	(2.41)**	(2.36)**	(2.50)**
Adjustment	−0.13	−0.16	−0.10	−0.17	−0.19	−0.15
	(−3.25)***	(−3.69)***	(−3.55)***	(−2.87)***	(−2.36)**	(−2.39)**
H test for long-run homogeneity	5.39	4.40	5.65	3.15	10.75	4.07
	(0.25)	(0.35)	(0.23)	(0.68)	(0.06)	(0.54)

Notes: All equations include a constant country-specific term;
Figures in parentheses are *t*-statistics except for Hausman tests (H), which are *p*-values;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.
Source: Demetriades and Law (2004).

Table 2.5 reports the results for low-income countries. Financial development is found to have very small direct effects on growth. The estimated coefficients are not only small they are also statistically insignificant for two of the three indicators. Only the private credit indicator is significant, but its coefficient is only 0.10 compared to 0.40 for middle-income countries and 0.20 for high-income countries. Institutions, however, have a large positive and significant direct effect on growth in these countries. The estimated coefficients on institutional quality are roughly twice the size of those obtained for middle- or high-income countries. The estimated coefficients of the interaction terms are positive and highly significant; however, they are almost half the size of the corresponding coefficients obtained for the middle-income group. These findings suggest that policy-makers in low-income countries should primarily be focusing on improving institutional quality, which is likely to have both direct and indirect effects on growth. Financial development, especially if it boosts credit to the private sector, is also likely to have significant pay-offs in terms of growth, but even these are to a great extent dependent on the presence of good institutions.

Demetriades and Law (2004) conclude that financial development has greater effects on growth when the financial system is embedded within a sound institutional framework. This is found to be particularly true for poor countries, where more finance might well fail to deliver more growth if institutional quality is low. For poor countries, improvements in institutions are likely to deliver much greater direct effects on growth than financial development itself. They are also likely to have positive indirect effects through the financial system, particularly when the latter is providing large amounts of credit to the private sector.

Summary and conclusion

While we now know considerably more about the sources of financial development and its effectiveness in delivering more growth, there remain many unanswered questions offering fruitful ground for further research. Specifically, the case that financial liberalization can deliver substantial benefits in terms of both financial development and growth remains largely unproven. Indeed, much of the evidence suggests that financial liberalization can have major destabilizing effects on financial markets – including major financial crises, such as that in 1997–8 in Asia – that undermine the confidence of market participants. The question that remains largely unanswered is how long it takes economies to recover from such events – if, indeed, they do recover. Therefore, despite its likely short- to- medium-term destabilizing consequences, is financial liberalization, on balance, beneficial to the development of financial markets in the long run? The case for related policy measures such as bank privatization is even less convincing. While government ownership of banks may be correlated negatively with both financial development and growth, this negative correlation might well reflect institutional weaknesses, which could leave governments with little choice but to have a controlling interest in banks. If ignored, such weaknesses can undermine the success of bank privatization programmes, leading to financial disintermediation and, subsequently, to renationalizations of problem banks. Thus, the negative correlation between government ownership and financial development that is found in the data might well reflect unsuccessful attempts at bank privatizations. Further research on this topic would be fruitful, especially if it provides in-depth case studies of the history of government ownership of banks.

Institutions and political economy factors appear to hold the key to understanding why some countries have succeeded in developing their financial systems while others have not. Institutions appear also to influence the effectiveness of financial development itself, which suggests that poor countries may be stuck in a bad equilibrium, in which weak institutions inhibit growth, both directly and indirectly, through under-developed, low-quality finance. There are, of course, many unanswered questions on detail, relating to the precise role of important institutions such as law in finance, as well as the means by which countries can overcome unfavourable starting positions such as geographical disadvantages. More research on these issues could, therefore, prove very fruitful in highlighting mechanisms that could make finance more effective in delivering both growth and poverty reduction.

Notes

1 Dollar and Kraay (2001) provide extensive evidence that suggests that economic growth worldwide has been a powerful mechanism for reducing poverty.
2 For a recent survey, see Demetriades and Andrianova (2004).
3 For example, Mauro (1995), Svensson (1998) and Acemoglu *et al.* (2001) provide macroeconomic evidence that suggests a negative impact of insecure property rights on economic growth and investment.
4 World Bank CD-ROM 2003.
5 The website of the ICRG is http://www.icrgonline.com. The ICRG's risk ratings have been cited by experts at the IMF, World Bank, United Nations and many other international bodies as a standard against which other ratings can be measured.
6 The website of the CIDCM is http://www.cidcm.umd.edu/inscr/polity
7 Demirgüç-Kunt and Levine (2000), Levine (2000) and Beck *et al.* (2003a) have employed this dataset in the empirical analysis.
8 The World Bank classifies economies as low-income if the GDP per capita is less than US$755, middle-income if the GDP per capita is between US$755 and US$9,265, and high-income economies if the GDP per capita is more than US$9,265.
9 The scale of corruption, bureaucratic quality and rule of law was first converted to 0–10 (multiplying them by 5/3) to make them comparable with the other indicators. For robustness checks, Demetriades and Law (2004) also used different weights for each indicator to construct the aggregate index, obtaining similar estimates.

References

Acemoglu, D., S. Johnson and J.A. Robinson (2001) 'The Colonial Origins of Comparative Development: An Empirical Investigation', *American Economic Review*, 91: 1369–401.

Andrianova, S., P.O. Demetriades and A. Shortland (2008) 'Government Ownership of Banks, Institutions and Financial Development', *Journal of Development Economics*, 85: 218–52.

Beck, T., A. Demirgüç-Kunt and R. Levine (2003a) 'Law, Endowments, and Finance', *Journal of Financial Economics*, 70: 137–81.

Beck, T., A. Demirgüç-Kunt and R. Levine (2003b) *A New Database on Financial Development and Structure*, Word Bank Research Dataset.

Bekaert, G. and C. Harvey (2000) 'Foreign Speculators and Emerging Equity Markets', *Journal of Finance*, 55: 565–614.

Bekaert, G. and C. Harvey (2003) 'Emerging Markets Finance', *Journal of Empirical Finance*, 10, 3–55.

Caporale, G.M., A. Cipollini and P.O. Demetriades (2005) 'Monetary Policy and the Exchange Rate during the Asian Crisis: Identification through Heteroskedasticity', *Journal of International Money and Finance*, 24 (1): 35–53.

Clague, C. (1993) 'Rule Obedience, Organizational Loyalty, and Economic Development', *Journal of Institutional and Theoretical Economics*, 149: 393–414.

Demetriades, P. and S. Andrianova (2004) 'Finance and Growth: What We Know and What We Need to Know', in C. Goodhart (ed.), *Financial Development and Economic Growth: Explaining the Links* (Basingstoke: Palgrave Macmillan).

Demetriades, P. and S.H. Law (2004) 'Finance, Institutions and Economic Development', University of Leicester Discussion Paper in Economics 04/05.

Demetriades, P. and S.H. Law (2005) 'Sources of Financial Development: Some Cross-Country Results', mimeo, University of Leicester.

Demetriades, P.O. and K.B. Luintel (1997) 'The Direct Costs of Financial Repression: Evidence from India', *Review of Economics and Statistics*, 79: 311–20.

Demetriades, P.O. and K.B. Luintel (2001) 'Financial Restraints in the South Korean Miracle', *Journal of Development Economics*, 64 (2): 459–79.

Demirgüç-Kunt, A. and E. Detragiache (1998) 'The Determinants of Banking Crises in Developed and Developing Countries', IMF Working Paper 106.

Demirgüç-Kunt, A. and R. Levine (2000) 'Bank Concentration: Cross-Country Evidence', World Bank Global Policy Forum Working Paper.

Diaz-Alejandro, C. (1985) 'Good-bye Financial Repression, Hello Financial Crash', *Journal of Development Economics*, 19 (1): 1–24.

Dollar, D. and A. Kraay (2001) 'Growth *is* Good for the Poor', World Bank Policy Research Working Paper 2587, reprinted in A. Shorrocks and R. van der Hoeven (eds) (2004) *Growth, Inequality and Poverty* (Oxford: Oxford University Press for UNU-WIDER).

Durham, J.B. (2000) 'Emerging Stock Market Liberalisation, Total Returns, and Real Effects: Some Sensitivity Analyses', Queen Elizabeth House, University of Oxford, Working Paper 48.

Hausman, J. (1978) 'Specification Tests in Econometrics', *Econometrica*, 46: 1251–71.

Kaminsky, G.L. and C.M. Reinhart (1999) 'The Twin Crises: The Causes of Banking and Balance-of-Payments Problems', *American Economic Review*, 89 (3): 473–500.

King, R.G. and R. Levine (1993) 'Finance and Growth: Schumpeter Might be Right', *Quarterly Journal of Economics*, 108: 717–37.

Knack, S. and P. Keefer (1995) 'Institutions and Economic Performance: Cross-country Tests Using Alternative Institutional Measures', *Economics and Politics*, 207–27.

La Porta, R., F. Lopez-de-Silanes and A. Shleifer (1998) 'Law and Finance', *Journal of Political Economy*, 106 (6): 1113–55.

La Porta, R., F. Lopez-de-Silanes and A. Shleifer (2002) 'Government Ownership of Banks', *Journal of Finance*, 57 (1): 265–301.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1997) 'Legal Determinants of External Finance', *Journal of Finance*, 52: 1131–50.

Levine, R. (2000) 'Bank Concentration: Chile and International Comparisons', Central Bank of Chile, Working Paper 62.

Llewellyn, D. (1999) 'The Economic Rationale for Financial Regulation', Financial Services Authority Occasional Paper 1.

Mauro, P. (1995) 'Corruption and Growth', *Quarterly Journal of Economics*, 110 (3): 681–712.

McKinnon, R.I. (1973) *Money and Capital in Economic Development* (Washington, DC: Brookings Institution).

McKinnon, R.I. (1991) *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy* (Baltimore: Johns Hopkins University).

Pesaran, M.H., Y. Shin and R.P. Smith (1999) 'Pooled Mean Group Estimation of Dynamic Heterogeneous Panels', *Journal of American Statistical Association*, 94: 621–34.

Rajan, R.G. and L. Zingales (2003) 'The Great Reversals: The Politics of Financial Development in the Twentieth Century', *Journal of Financial Economics*, 69: 5–50.

Rioja, F. and N. Valev (2004) 'Does One Size Fit All? A Re-examination of the Finance and Growth Relationship', *Journal of Development Economics*, 74 (2): 429–47.

Rodrik, D. (1997) 'Total Factor Productivity Growth Controversies, Institutions and Economic Development in East Asia', National Bureau of Economic Research Working Paper 5914.

Shaw, E.S. (1973) *Financial Deepening in Economic Development* (New York: Oxford University Press).

Stiglitz, J. (1999) 'Interest Rates, Risk, and Imperfect Markets: Puzzles and Policies', *Oxford Review of Economic Policy*, 15 (2): 59–76.

Stiglitz. J.E. (2000) 'Capital Market Liberalization, Economic Growth and Instability', *World Development*, 28 (6): 1075–86.

Svensson, J. (1998) 'Investment, Property Rights and Political Instability', *European Economic Review*, 42 (7): 1317–42.

Villanueva, D. and A. Mirakhor (1990) 'Strategies for Financial Reforms: Interest Rate Policies, Stabilization, and Bank Supervision in Developing Countries', *IMF Staff Papers*, 37 (3): 509–36.

Zingales, L. (2003) 'The Weak Links', *Federal Reserve Bank of St Louis Review*, 85 (4): 47–52.

3
The Poverty–Macroeconomic Policy Nexus: Some Short-Run Analytics

George Mavrotas and S. Mansoob Murshed

Background and motivation

The literature on macroeconomic policy and poverty is certainly not characterized by its paucity. Indeed, since the advent of the poverty reduction strategy paper (PRSP) process, the poverty assessment of policy changes is *de rigueur*. Furthermore, there exists voluminous literature on the links between financial sector development (FSD – broadly defined to go beyond financial deepening) and economic growth for industrial and developing countries (Arestis and Demetriades 1997, Levine 1997, Demirgüç-Kunt and Levine 2001, Green and Kirkpatrick 2002, Goodhart 2004 and Wachtel 2004, among others, provide comprehensive assessments of the above literature). Although the empirical literature on the finance–growth nexus remains inconclusive overall regarding the impact of FSD on growth, a causal link between the two variables is well established (see Green *et al*. 2005 and Mavrotas and Son 2006 for a discussion). However, a small, though growing, part of the above literature has focused on the impact of FSD on poverty-reducing growth, which is of crucial importance, inter alia, for the attainment of the Millennium Development Goals (MDGs) (Green *et al*. 2005, Mavrotas 2005); of relevance to this is the role of financial development in countries emerging from conflict (Addison *et al*. 2002). The links between FSD and macroeconomic policy and poverty reduction in an analytical macroeconomic context, however, are relatively less well explored. The macrostudies that do exist are mainly of the computable general equilibrium (CGE) or social accounting matrix (SAM) genre, requiring counter-factual simulation to arrive at policy recommendations. These models require elaborate assumptions about closure and a plethora of numerical guesses about parameter values. Consequently, the channels through which policy affects income are not always sharply in focus. On the other hand, most studies that connect finance to poverty are concerned with issues of agency associated with credit rationing, and how microfinance can help avoid problems of moral hazard, adverse selection and missing markets. Unfortunately, it is not normally possible to incorporate theories of agency into multisector macromodels explicity.

In analysing the link between poverty and macroeconomic change the functional distribution of income may be of importance. It is well known that growth reduces poverty. Kakwani (2000) and Kakwani and Pernia (2000) have, however, gone further in defining pro-poor growth, bearing in mind that growth will always reduce poverty as long as the distribution of income does not worsen. Truly pro-poor growth requires a more egalitarian income distribution. The question that subsequently arises is whether we should be focusing on the personal rather than the sectoral distribution of income. The poor are often concentrated in certain occupations or sectors of the economy, and expansion in these areas helps alleviate poverty more through increased employment/wages than when economic progress takes place elsewhere. The current hotly debated discourse on what is truly pro-poor growth can be usefully related to a multisectoral model of the macroeconomy. The advantage of an analytical short-run macroeconomic model is that clear and specific policy implications can be drawn. These models can also form the basis of econometric work based on actual available data in order to test theoretical propositions and establish the relative frequency of taxonomic results.

The paper forming the basis of this chapter utilizes a short-run *theoretical* macroeconomic model of a small open economy to look at the impact of macroeconomic policies and financial deepening on poverty by sectoral changes, similar to Murshed (2001). As stated above, this is because an expansion in some sectors may cause greater poverty reduction than in others. The model that follows involves a non-traded good and a traded sector in the formal side of the economy.[1] The former is more capital intensive and the latter more (unskilled) labour-intensive. Growth and increased employment in the non-traded sector will be less pro-poor than a comparable increase in the traded sector, as the latter draws workers out of poverty in the informal sector. We know that financial deepening can induce growth, but how pro-poor is it? The model in our chapter *explicitly* analyses short-run effects of devaluation, a rise in the money supply induced by financial deepening and taxation (strictly not a macroeconomic policy) to discourage non-traded goods consumption.

Furthermore, the model follows the sectoral delineation between traded and non-traded goods outlined in Sachs (1999), which attempts to differentiate between the economic development experience of East Asia and Latin America. The salient features of Sachs' dichotomy are: (i) East Asian economies rely more heavily on labour-intensive manufactured exports,[2] whereas Latin America has had a relatively greater share of capital intensive and natural resource-based exports; and (ii) the non-traded sector exhibits a greater price in Latin America. In recent decades, countries in these two regions have had differing experiences in poverty reduction, with the personal distribution of income worsening in both areas. Poverty has arguably declined in East Asia, whereas the Latin American experience is much more mixed. Asian countries, excluding those in the Middle East, have been the world's fastest-growing economies and the most successful 'globalizers' since the early 1980s, see Murshed (2002). Is the reliance of East and South Asia on labour-intensive manufactured exports part of the explanation? True, East and South Asia – especially China and India, but also countries such as Indonesia and Vietnam – are more labour-abundant than any other region of the world. It is therefore unsurprising that they specialize in unskilled labour-intensive manufactured exports, such as ready-made garments. Furthermore, East Asian economies have traditionally pursued more open or export-orientated policies. In Latin America, the abandonment of import substitution industrialization strategies following the 1980s debt crises may have resulted in greater economic dislocation and poverty than in East and South Asia, except in, say, Chile. Moreover, alternative export expansion strategies in Latin America have been less successful, and at present the higher-wage Latin American countries are less competitive in labour-intensive manufacturing.

Within a single unified framework, typologies are developed in our chapter, distinguishing between what could be the stylized East Asian and Latin American experience ex post. Therein lies the major innovation of our model; providing, as it were, a single toolkit with which to analyse short-run macroeconomic policy impact on poverty and related issues.

It is worthwhile emphasizing, at the very outset, what the model does not incorporate. The model is not a long-run growth model involving the accumulation of physical, human, institutional and social capital; neither is it concerned with macroeconomic effects related to international debt and debt-financed domestic fiscal policy. However, the short-run comparative statics contained in this chapter have implications for long-run growth and development.

Sketch of the model

The economy is composed of two formal sectors on the real side, one of which is internationally traded, the other being a non-traded commodity. M indexes the traded sector, which is both consumed domestically and exported. It is basically a labour-intensive manufactured good. In addition, there are consumption imports, C_F, which compete with M in domestic consumption. M is produced utilizing labour only, following Sachs (1999), in order to capture the part played by labour-intensive manufactured goods produced for export and domestic consumption. The price of M, P_T, is normalized at unity and is, in any case, given in a small open economy. The supply of M is described by:

$$M = \theta L_M \tag{3.1}$$

L_M represents labour employed in the M sector and θ stands for the marginal value product of labour in that sector. Note that this sector can draw upon unlimited supplies of labour[3] from an informal sector at a fixed wage rate, so that an increase in output leads to an expansion in formal sector traded goods employment at a fixed wage.

The non-traded goods sector is represented by N, the production of which requires capital, labour and an imported intermediate input (T). Therefore, it requires some foreign technological input and is the capital-intensive sector by definition. In a sense, the output of the N sector is more 'sophisticated' than the other sectors, but perhaps that is precisely why it is non-traded. Note that manufacturing could lie within both the M and N sectors, and the 'real-life' counterpart of the non-traded sector is not restricted to public and private services only. In summary, the output of the N sector could include government services, utilities, private services, as well as the hangover from the days of import substitution industrialization: shielded or state-sector manufacturing. For the sake of analytical convenience, in the N sector fixed proportions characterize the use of the intermediate input from abroad. See Findlay and Rodriguez (1977), for a discussion of production functions where an imported input enters in a 'Leontief' fashion. Supply[4] in the N sector, in general reduced form, can be depicted as:

$$P_N N = P_N N(P_N, E) \tag{3.2}$$

P_N represents the price of the non-tradable good. The supply of N increases with P_N but declines as the nominal exchange rate depreciates

(E increases) as this makes the intermediate input more expensive. As far as the domestic value-added of the N sector is concerned, this is obtained by subtracting the value of the intermediate input:

$$(P_N - \lambda)N(P_N, E) = P^D{}_N N \tag{3.3}$$

where $\lambda = ET$, as $P_T = 1$, $P^D{}_N$ measures domestic value-added in the N sector.

Turning to consumption or the demand side, in the manufactured traded goods sector, this is composed of domestic demand (C_M) and foreign or export demand (X_M):

$$C_M(P_N, Y, E) + X_M(E) = M \tag{3.4}$$

Domestic demand for the output of the M sector depends positively on the price of the non-traded good, P_N, as well as income, Y. It is also positively related to the exchange rate; a rise in E represents devaluation, an increase in the cost of obtaining imported substitutes. Export demand is positively related to the nominal exchange rate. Equation (3.4) represents equilibrium in the M sector. Equation (3.4) can be interpreted as demand on the left-hand side equalling supply on the right-hand side.

In the non-traded goods sector, equilibrium between demand and supply is represented by:

$$C_N(P_N, Y) + I_N(r) = (P_N - \lambda)N(P_N, E) \tag{3.5}$$

Domestic consumption of non-tradables is negatively related to its own price and positively linked to income. I_N stands for investment; that is, the savings leading to capital formation in that sector, negatively related to the interest rate (r).

Equations (3.4) and (3.5) may be viewed as the balance or equilibrium relations for the traded and non-traded goods sector respectively, in the sense of supply equals demand. We need to specify the concept of national income, Y or GDP. This consists of domestic value-added in both productive sectors less imports. Thus:

$$Y = (P_N - \lambda)N(P_N, E) + M - EC_F(E, Y) \tag{3.6}$$

Note that there are two imports: λ, the imported input; and C_F, consumption imports. They have been subtracted from the value of domestic product, as they do not augment domestic value-added. Consumption imports are positively related to their relative price described by the exchange rate, as well as income.

It is useful at this stage to define an overall price index, P, representing the aggregate cost of consumption of all three goods: imported consumption goods (priced by E), non-traded goods and domestic non-resource-based traded goods prices. This price index is a cost of living or consumer price index. It represents the cost of purchasing a basket of goods comprising imported consumer goods, non-tradables and traded goods: the prices of these three goods are represented by E, P_N and P_T respectively.[5] The consumer price index is of use in measuring the real consumption wage and arriving at an appropriate definition of real money balances. The consumer price index takes the form:

$$P = E^{\beta} {P_N}^{\alpha} {P_T}^{(1-\alpha-\beta)}$$

This collapses to:

$$P = E^{\beta} {P_N}^{\alpha} \tag{3.7}$$

as $P_T = 1$.

We now turn to specifying a monetary sector for this economy; this takes the following form:

$$H(Y, r) = H/P \tag{3.8}$$

Equation (3.8) is exactly the same as the *LM* function for the economy. It represents equilibrium on the monetary side of the economy. Money demand, on the left-hand side of (3.8), is negatively related to interest rates and positively linked to Y. When it is deflated by the consumer price index, P, we obtain the value of real balances. Note also that changes in the exchange rate will impact on real balances; for example, nominal exchange rate depreciation or devaluation (rise in E) lowers real money supply.

Next, we come to the balance of trade:

$$X_M(E) - EC_F(E, Y) - ETN(.) = F \tag{3.9}$$

The left-hand side represents the trade balance, or exports minus imports. Exports arise from the traded sector, and the two imports are consumption and intermediate inputs, respectively. F stands for the trade balance, which is positive if there is a trade surplus, negative if there is a deficit. We postulate a fixed exchange rate regime. This corresponds to the stylized facts for the vast majority of developing countries. Under a system of fixed exchange rates, the balance of payments is a residual in the short run; improvements in the trade balance cause an increase in the stock of foreign exchange reserves, F, and vice versa. Flexible exchange rates can, however, be easily incorporated, but will add an extra endogenous variable, E, into the system. E will rise (depreciate) with balance of payments deficits, and vice versa.

Finally, we can move on to consider employment, made up of work in the two formal sectors, M and N. We can safely assume that almost all developing countries have surplus labour to some extent, in the sense described by Lewis (1954). Countries in East and South Asia, because of their greater populations, may be deemed to be endowed with greater surplus labour compared to the other less populous regions of the world. An increase in demand in the traded sector will lead to a rise in labour input requirement, and we postulate that this need is fulfilled by drawing on surplus labour at the rate of the going wage. This also implies the existence of a residual informal sector, which provides subsistence to workers not engaged in either the formal traded or non-traded sector. It is likely that a wage premium exists in the traded goods sector, over and above the subsistence rate in the informal sector. Increased labour demand in the non-traded sector may lead to increased wages for workers in that sector, should there be a skill premium in existence. We may, therefore, postulate that increased employment in the traded sector is more pro-poor compared to a similar rise in the non-traded sector, as the former draws workers out of poverty in the informal sector. Total formal sector labour employment, L, is composed of the sum of labour employed in the two sectors:

$$L = M + L_N \tag{3.10}$$

Note that the M sector only employs labour, whereas in the N sector it is one of several factors used for production. We can also safely conclude that the former (traded) sector is more labour-intensive and therefore more pro-poor.

Totally differentiating (3.10) we find that:

$$dL = \theta dL_M + (P_N - \lambda) f_2 dL_N \cdots \text{where } dM = dL_M \tag{3.11}$$

The first term on the right-hand side above is obtained using (3.1). The last term in (3.11) is obtained from profit-maximizing behaviour around the production function for N, $f(K, L_N, min\ T)$, where K denotes capital and L_N is employment. Employment rises with equilibrium output in each sector, but the rise in employment is greater in the traded sector as labour is the only factor of production there. Moreover, increased non-traded output may also lead to a rise in real wages in that sector. If workers in that sector are relatively non-poor, then economic expansion biased in the non-traded direction will not be so poverty reducing. Furthermore, since it is the traded sector that draws on the poor in the residual informal when it expands, it is through this channel that growth (or income expansion in the short run) lowers the poverty headcount.

Equilibrium

We assume that excess capacity exists in the short run. Both the productive sectors resemble fixed-price sectors, in the sense of Taylor (1983). This postulate can later be relaxed by the imposition of capacity constraints or full employment. The assumption of excess capacity in the short run is compatible with a state where factors of production are paid their marginal product. Also, this does not preclude increases in money wages when either one or more productive sectors expand.

It is postulated that in the non-traded goods sector, N, excess demand causes its relative price P_N to be bid up. The rise in P_N will restore equilibrium in that sector. In the non-resource-based traded goods sector, M, excess demand causes output to rise, but one could make its relative price increase as well. In the monetary sector excess demand for money leads to a rise in interest rates, which restores equilibrium.

The short-run equilibrium of the model can be described by writing Equations (3.5), (3.4) and (3.8) in excess demand format, after substituting (3.6) into them. The idea is that excess demand in these three independent equilibrium relations leads to an increase in P_N, M and r respectively, corresponding to the non-traded goods sector, the traded (but not natural resource-based) sector and the money market. Totally differentiating (3.5), (3.4) and (3.8) and writing them in matrix format gives us:

$$\begin{bmatrix} C_{N1} + C_{N2}\rho - N - P_N N_1 & C_{N2}(1 - C_{F2}) & I_{N1} \\ C_{M1} + C_{M2}\rho & -1 & 0 \\ H_1\rho + \delta & H_1(1 - C_{F2}) & H_2 \end{bmatrix} \begin{bmatrix} dP_N \\ dM \\ dr \end{bmatrix}$$
$$= \begin{bmatrix} -C_{N2} & 0 & -C_{N2}\Omega + (P_N - \lambda)N_2 - TN \\ -C_{M2} & 0 & -C_{M2}\Omega - X_{M1} - C_{M3} \\ -H_1 & 1/(P_N{}^{\alpha}E^{\beta}) & -H_1\Omega + \beta H/(E^{1+\beta}P_N{}^{\alpha}) \end{bmatrix} \begin{bmatrix} dR \\ dH \\ dE \end{bmatrix} \tag{3.12}$$

Note that

$$\rho = (N + P_N N_1)(1 - C_{F2}) > 0 \tag{3.13}$$

Also

$$\Omega = (P_N - \lambda)N_2 - TN - C_F - C_{F1} - C_{F2} \gtreqless 0 \tag{3.14}$$

The parameter Ω can be interpreted as the 'income' effect of an alteration in the exchange rate, in the sense that it captures the effect of an alteration in E on Y in Equation (3.6). Its sign is ambiguous (it could be either positive or negative). As will become apparent below, the sign and magnitude of Ω will turn out to be crucial for the analysis of devaluation. $\Omega < 0$ if $C_{F1} < 1$, which means that the demand for consumption imports is inelastic with regard to the exchange rate. $\Omega > 0$ only if $C_{F1} > 1$, and $C_{F1} < N_2$. In this case, the demand for consumption imports is elastic, and the impact of a change in E has to be greater on consumption imports than on imports of intermediate inputs.

Furthermore

$$\delta = \alpha H/(E^{\beta} {P_N}^{1+\alpha}) > 0 \tag{3.15}$$

The signs of the various partial derivatives above are:

$$\{C_{N1}, I_{N1}, H_2, C_{F1}, N_2\} < 0; \{C_{N2}, C_{F2}, C_{M1}, C_{M2}, C_{M3}, N_1, H_1, X_{M1}\} > 0$$

The determinant (J) of the Jacobian matrix is

$$\begin{aligned} J = &-H_2(C_{N1} + C_{N2}\rho - N - P_N N_1) + I_{N1}(H_1\rho + \delta) \\ &+ \{(1 - C_{F2})(C_{M1} + C_{M2}\rho)\}\{H_1 I_{N1} - H_2 C_{N2}\} \end{aligned} \tag{3.16}$$

The determinant is negative in sign as $(1 - C_{F2})(C_{M1} + C_{M2}) < 1$. This means that the model is stable, which is helpful in the conduct of the meaningful comparative statics analysis that follows and is in accordance with Samuelson's correspondence principle.

Variations in parameters

This section is concerned with comparative statics analysis around the equilibrium described in the previous section.

A rise in *H*

A rise in H can emerge for a variety of reasons such as policy-induced increases in money supply. It can also be the consequence of financial deepening, leading to a rise in the high-powered monetary stock. FSD could also be defined more broadly to include several aspects of the deregulatory and the institution-building process in the financial system, including issues related to the efficiency of financial intermediaries (Bandiera *et al*. 2000; Beck *et al*. 2000a, 2000b; Mavrotas and Son 2006). These could also have an impact on H; however, for simplicity, we focus here on the financial deepening aspect of FSD.

$$\frac{dP_N}{dH} = \frac{I_{N1}}{{P_N}^{\alpha} E^{\beta} J} > 0 \tag{3.17}$$

where $J < 0$.

$$\frac{dM}{dH} = \frac{I_{N1}(C_{M1} + C_{M2}\rho)}{{P_N}^{\alpha} E^{\beta} J} > 0 \tag{3.18}$$

$$\frac{dr}{dH} = \frac{-\{C_{N1} + C_{N2}\rho - N - P_N N_1\} - C_{N2}\{(1 - C_{F2})(C_{M1} + C_{M2}\rho)\}}{{P_N}^{\alpha} E^{\beta} J} < 0 \tag{3.19}$$

Thus, an increase in H causes an expansion in both the N and M sectors. However, it is interesting to note, by comparing Equation (3.17) with (3.18), that the expansionary impact is greater in the non-traded goods sector. The reason is that the rise in H impacts on interest rates, and the lower interest rates affect capital accumulation positively in the N sector. We do not have capital as a factor of production in the traded sector. From (3.10) and (3.11) we cannot unambiguously pinpoint in which sector the greater expansionary employment takes place. However, the greater the price and income effects inducing demand for traded goods, the greater the expansion in the M sector, and the subsequent rise in employment in the more pro-poor traded sector. This is more likely in East Asia rather than Latin America, where, traditionally, there is a greater demand for basic domestic goods. Finally, the effect on the trade balance is clearly negative, as can be seen by differentiating the trade balance equation (3.9) with regard to E:

$$\frac{dF}{dH} = -EC_{F2}\frac{dY}{dH} - ETN_1\frac{dP_N}{dH} \tag{3.20}$$

The results above, with regard to a rise in H on the N and M sectors, can be depicted in terms of a diagram, in M and P_N space. In Figure 3.1, the NN and MM schedules represent equilibrium (supply equals demand) in

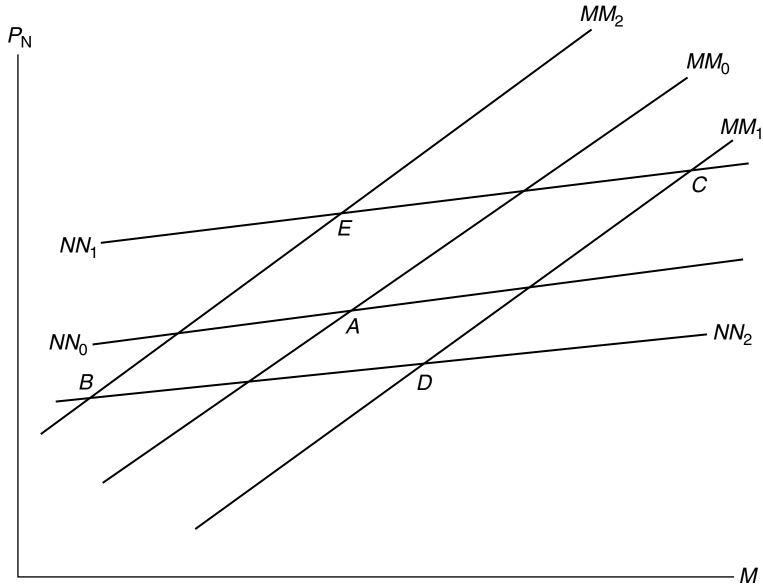

Figure 3.1 Comparative statics analysis

the non-traded and traded goods markets respectively.[6] They are both positively sloped, as an increase in either M or P_N raises income, and, thus, the demand for the other good goes up. The initial equilibrium in both markets occurs at the intersection point, A. An upward movement in NN represents an expansionary effect on output in the N sector, NN_0 moves to NN_1. It reflects the fact that more N is demanded for each level of M. In the M sector, a movement to the right signals expansion from MM_0 to MM_1. This indicates that a greater quantity of M is demanded for each level of N produced. As both sectors expand, we arrive at point C in the new equilibrium following the rise in H.

A devaluation (rise in *E*)

Policy-based exchange rate depreciation can be motivated by a variety of reasons, including balance of payments crises, the desire to improve international competitiveness and attempts to cope with debt servicing. It could also be part of a programme of structural adjustment or efforts to counteract the deleterious effects of natural resource booms or ‘Dutch disease’.

Devaluation, which is an increase in E, will from (3.8) lower the value of real money balances, hence, putting upward pressure on the interest rate, r. Note that devaluation, at least upon impact, lowers the real wage as the price of imported consumption goods increases. It will also make the intermediate import more expensive in terms of domestic currency.

When we examine the impact of devaluation on the non-traded sector:

$$\frac{dP_N}{dE} = \frac{-H_2\{-C_{N2}\Omega + (P_N - \lambda)N_2 - TN\} + H_2 C_{N2}(1 - C_{F2})H_2\{C_{M2}\Omega + X_{M1} + C_{M3}\}}{J}$$
$$\frac{-I_{N1}H_1\{C_{M2}\Omega + X_{M1} + C_{M3}\}\{(1 - C_{F2})\} - H_1\Omega I_{N1} + (I_{N1}\beta H)/(E^{1+\beta}P_N{}^{\alpha})}{J} \tag{3.21}$$

As noted above, the analysis of the effect of devaluation will depend quite crucially on Ω, which can be construed as the effect, on national income, of devaluation (impact of changes in E on Y). There are two opposing effects of devaluation upon imports: one, negative impact on the supply side as imported inputs cost more domestically; the other, the positive impact devaluation has by reducing consumption imports, which become more expensive in terms of the home currency. If we examine (3.14), we find that $\Omega < 0$ when the negative impact of devaluation on the non-traded sector (through imported intermediate input costs) dominates its positive effect through consumption imports. This is what Krugman and Taylor (1978) refer to as 'contractionary' devaluation, although their analysis would also include the effect on exports, which we consider below in (3.27). It is also the classic Latin American 'structuralist' outcome. Let us refer to this as case 1. The converse, when $\Omega > 0$, more like the situation in East Asia, we will call case 2. This is because, in the stylized East Asian scenario, the non-traded sector is less significant and consumption imports are likely to be highly price-elastic.

Case 1 ($\Omega < 0$), Latin America

In this instance:

$$\begin{aligned}&\frac{dP_N}{dE} > 0, \text{ if}\\ &|(P_N - \lambda)N_2 - TN| > |C_{N2}\Omega|\\ &|C_{M2}\Omega| > |C_{M3} + X_{M1}|\\ &|I_{N1}H_1| > |C_{N2}H_2|\end{aligned} \tag{3.22}$$

The reversal of the above is necessary for $dP_N/dE < 0$.

Case 2 ($\Omega > 0$), East Asia

$$\frac{dP_N}{dE} > 0, \text{ if}$$
$$|C_{N2}H_2| > |I_{N1}H_1| \tag{3.23}$$

The reversal of this condition is necessary for $dP_N/dE < 0$.

With regard to the effect of devaluation on the non-resource-based tradable good, M, we obtain:

$$\frac{dM}{dE} = \frac{-H_2\{C_{N1} + C_{N2}\rho - N - P_N N_1\}\{C_{M3} + X_{M1}\} - H_2\{C_{N1} - N - P_N N_1\}}{J}$$
$$\frac{C_{M2}\Omega - H_2\{(P_N - \lambda)N_2 - TN\}\{C_{M1} + C_{M2}\rho\} + C_{N2}\Omega H_2 C_{M1}}{J} +$$
$$\frac{I_{N1}\{-H_1\Omega C_{M1} + (\beta H)/(E^{1+\beta}{P_N}^{\alpha})\{C_{M1} + C_{M2}\rho\} + I_{N1}\{H_1\rho + \delta\}}{J}$$
$$\frac{\{X_{M1} + C_{M3}\} + I_{N1}\delta C_{M2}\Omega}{J} \tag{3.24}$$

$\Omega < 0$ is necessary for $dM/dE < 0$. This was case 1 above, the Latin American experience. If the converse is true, and $\Omega > 0$, the East Asian model holds, then $dM/dE > 0$ if:

$$|C_{N2}H_2| > |I_{N1}H_1| \tag{3.25}$$

In the East Asian case, both sectors are likely to expand, as indicated by a shift from the point A to C in Figure 3.1. The increase in the traded goods sector will, however, be the greater of the two. The effect is strongly and unambiguously pro-poor, as increased employment in the traded sector reduces the numbers of the poor in the informal sector. In the Latin American case, there could be a negative impact in one or both sectors of the economy. If the contractionary effect is only in the non-traded commodities, point D will be the new equilibrium in Figure 3.1. This will turn out to be pro-poor. If both sectors decline, the new equilibrium is at point B.

One would expect devaluation to push up interest rates, as it lowers the value of real money balances. The expression for this effect, in

Equation (3.26), turns out to be quite involved:

$$\frac{dr}{dE} = \frac{\{H_1\Omega - (\beta H)/(E^{1+\beta}P_N{}^{\alpha}) + H_1(1 - C_{F2})(C_{M2}\Omega + X_{M1} + C_{M3})\}}{J}$$
$$\frac{\{C_{N1} + C_{N2}\rho - N - P_N N_1\}}{J}$$
$$- \frac{\{C_{N2}(1 - C_{F2}\}\{(C_{M1} + C_{M2})(\beta H)/(E^{1+\beta}P_N{}^{\alpha}) + (H_1\rho + \delta)(X_{M1} + C_{M3})}{J}$$
$$\frac{+\delta C_{M2}\Omega\} + \{(P_N - \lambda)N_2 - C_{N2}\Omega - TN\}\{C_{M2}\rho(H_1(1 - C_{F2}) + (H_1\rho + \delta)\}}{J}$$
$$\frac{+\{(P_N - \lambda)N_2 - TN\}\{C_{M1}H_1(1 - C_{F2})\}}{J} \tag{3.26}$$

If $\Omega > 0$, then $dr/dE > 0$, if $|H_1\Omega| > |(\beta H/E^{(1+\beta)}P_N{}^{\alpha}|$, implying a high income elasticity of money demand. Even if $\Omega < 0$, $dr/dE > 0$, as long as the condition above is reversed, as well as: (a) $|N_2| > |C_{N2}\Omega|$; and (b) $|X_{M2} + C_{M3}| > |C_{M2}\Omega|$ in absolute value. Note that these are sufficient conditions.

Finally, we come to the all-important impact of devaluation on the balance of trade. From (3.9):

$$\frac{dF}{dE} = X_{M1} - C_F(1 + \eta) - TN - ETN_2 - EC_{F2}\frac{dY}{dE} - TN_1\frac{dP_N}{dE} \tag{3.27}$$

where $\eta = EC_{F1}/C_F < 0$. This is the elasticity of consumption import demand with respect to the nominal exchange rate. Note that $N_1 > 0$ and $N_2 < 0$. The first term on the right-hand side of (3.27) is positive. With regards to the second term, if imports are inelastically demanded then the balance of trade worsens; however, if they are elastically demanded, the trade balance improves. The third and fourth terms on the right-hand side of (3.27) refer to the additional payment needed to finance intermediate inputs for N production; the smaller the N sector, the lesser the adverse supply-side effect of devaluation on the balance of trade. Finally, the last two terms on the right-hand side of (3.27) will be negative unless Y and the N sector decline following devaluation. In summary, devaluation is likely to be positive in its effects on the economy, the smaller the non-traded goods sector and the more elastic the demand for consumption imports. This may conform more to the stylized nature of East Asia as envisaged by Sachs (1999).

A tax on non-traded goods

In addition to devaluation, more directly interventionist policies could be pursued to foster the output of the tradable labour-intensive sector. One form of such policies could be an ad valorem tax, τ, on the price of the non-traded good, P_N. Note that even when the tax is levied on the supplier, it ends up being borne by the consumer. The tax is similar to VAT. The object is to discourage consumption of the N sector's output – after, say, a resource boom – and sustain domestic demand for the traded good, M. The proceeds of the tax on the consumption of non-traded goods are redistributed back to the population in a lump-sum fashion.[7] In other words, it does not alter the distribution of income, and national income Y is unchanged. In the technical sense, $dY/d\tau = 0$ in Equation (3.6), because the public receives the tax revenue back as an income supplement. This policy is akin to industrial policy favouring production of labour-intensive tradables vis-à-vis more capital-intensive non-traded commodities. If successful, the policy will expand M sector production at the expense of N sector output in the context of a constant national income, Y. Ultimately, the aim is to avoid some of the pitfalls of the 'Dutch disease'-type effect, which shifts the production base towards non-tradable goods from tradable goods that are also for export. The policy instrument chosen, however, amounts to a consumption tax, which is essentially an expenditure-switching policy with a view to making consumers spend more on M relative to N. Most importantly, if successful, the effect of such a policy will be very strongly pro-poor, as it draws the poor out of poverty by providing increased employment in the formal traded goods sector.

In order to proceed, we need to modify the equilibrium relations of the model to take account of the tax. These were (3.5), (3.4) and (3.8), respectively. Once the tax, τ, on the price of the non-traded good, P_N, is incorporated, we have:

$$C_N(P_N(1+\tau); Y) + I_N(r) = (P_N - \lambda)N(P_N, E) \tag{3.5$'$}$$

Note that τP_N 'nets' out from the right-hand side of (3.5′):

$$C_M(P_N(1+\tau); Y; E) + X_M(E) = M \tag{3.4$'$}$$

And

$$H(Y, r) = H/[E^{\beta}\{\mathrm{P_N}(1+\tau)\}^{\alpha}] \tag{3.8$'$}$$

To simplify the computation of the results, we utilize the standard technique where the *initial* value of $\tau = 0$ but, of course, $d\tau \neq 0$. Totally differentiating (3.5′), (3.4′) and (3.8′), we discover that the Jacobian of the matrix in (3.12) is unchanged, but the right-hand side relevant for $d\tau$ becomes:

$$\begin{bmatrix} -C_{N1}P_N \\ -C_{M1}P_N \\ -\delta P_N \end{bmatrix} d\tau \tag{3.10′}$$

This is what will be utilized for the comparative static exercises.

Turning first to the effect of the tax on the non-traded sector, we discover that:

$$\frac{dP_N}{d\tau} = \frac{P_N H_2\{C_{N1} + C_{N2}(1 - C_{F2})C_{M1}\} - I_{N1}\{H_1(1 - C_{F2})(C_{M1}P_N) + \delta P_N\}}{J} \tag{3.28}$$

Note that $|J| < 0$. The expression above will be negative if $|C_{N1}| > |C_{N2}(1 - C_{F2})C_{M1}|$. The reversal of this condition is necessary, but insufficient, to induce a fall in the equilibrium output of N. The condition states that the price elasticity of demand for N with respect to a change in price (C_{N1}) outweighs the marginal propensity to consume non-tradable goods (C_{N2}). The former effect causes a decline in consumer demand for the N sector's output as it is now more expensive; the latter is the propensity to consume non-tradables which, if sufficiently high (as in the Latin American stereotype), could even negate the object of the tax, as consumers have a strong preference for the non-traded good. See Clarida and Findlay (1992) for an analytical model where such proclivities are outlined. In the more virtuous East Asian case, the output of the N sector declines following the imposition of the tax.

When we come to the effect on the output of traded goods, we find that:

$$\frac{dM}{d\tau} = \frac{\{N + P_N N_1\}P_N H_2 C_{M1} + I_{N1}P_N\rho\{H_1 C_{M1} - \delta C_{M2}\}}{J} \tag{3.29}$$

This will be positive as long as $C_{M1}H_1 > \delta C_{M2}$. Again, this implies that the price effect outweighs the marginal propensity to consume. The price effect makes consumers choose more M; in order for the tax to work, this parameter must be high. If the M sector expands and the N sector contracts then, in (3.11), the first term on the right-hand side is positive, while the second term is negative. This means that employment rises in the traded sector, and falls in the non-traded sector. The former effect is likely to be greater, as the traded sector is more labour-intensive. Overall employment will therefore increase, and the net effect is more pro-poor.

When we come to depict these results diagrammatically in Figure 3.1, point D illustrates the 'successful' post-tax intervention, with a decline in the N sector accompanied by an expansion in the M sector. Starting from an initial position at A, where NN_0 and MM_0 intersect, the tax will shift the MM schedule to the right, to MM_1, say, indicating expansion. The NN schedule moves downward to NN_2, depicting contraction.

The effect of the tax on interest rates is analytically complicated. This is despite the fact that from (3.8′) the value of real balances declines, as the tax becomes operational, putting upward pressure on the interest rate, as there is excess demand for money. But a decline in the N sector, and investment in that sector, moderates interest rate increases. The algebraic effect is

$$\frac{dr}{d\tau} = \frac{(C_{N2}\rho - N - P_N N_1)\delta P_N - (N + P_N N_1)(1 - C_{F2})H_1 C_{M1} P_N}{J}$$
$$+ \frac{P_N C_{N2}(1 - C_{F2})\delta\rho C_{M2} - C_{N1} P_N\{H_1(1 - C_{F2})C_{M2}\rho + H_1\rho\}}{J} \qquad (3.30)$$

This is ambiguous in sign, the first line in (3.30) is positive and the second negative, but the entire effect is likely to be positive.

Finally, we have the effect on the trade balance, from (3.9):

$$\frac{dF}{d\tau} = -ETN\frac{dP_N}{d\tau} > 0 \qquad (3.31)$$

Hence, the trade balance improves after the imposition of a tax on the N sector, as long as non-tradable production declines, and with it the need to import intermediate inputs.

Conclusion and policy implications

Table 3.1 contains a summary of the impact of the policies considered above. The effect of financial deepening, amounting to a rise in the money supply, is to expand the economy. This policy is pro-poor, but the effect may be weak if the non-traded sector expands more than the traded sector, which draws more people out of poverty. Financial deepening might need to be accompanied by policies of exchange rate depreciation to induce more tradable sector output. This, arguably, is the widespread East Asian-type experience, especially in China. Turning to

Table 3.1 Summary of analytical results

Type	Financial deepening	Devaluation	Industrial policy favouring tradables
Latin America	Both sectors expand, N by more. Weakly pro-poor	N contracts. M may also fall. May be pro-poor (if M does not decline) or may not be pro-poor	May work. If so, then pro-poor
East Asia	Both sectors expand, N by more. More pro-poor than in the Latin American case	Both M and N expand. Strongly pro-poor	Works unambiguously and is strongly pro-poor

devaluation, there is the possibility of contractionary devaluation, particularly for the non-traded sector. This likelihood is strongly associated with Latin American characteristics. When devaluation is expansionary, it is so because the non-traded sector is less important to domestic consumers, and surges in import consumption are accompanied by export expansion.

These are more likely in the East Asian case, where countries are more likely to have trade balance surpluses and more orderly servicing of international debt. The converse applies in most recent Latin American cases. Devaluation is pro-poor as long as the traded goods sector expands. This is likely to be case for all economies, except those specializing in natural resource-based goods that are price- and income-inelastic.

A policy to tax non-traded goods consumption would be akin to industrial policy favouring the production of traded goods. Such a policy would be initiated because of the view that labour-intensive manufactured and exportable traded goods are superior to non-traded goods production, the latter including manufacturing 'dinosaurs'. It is also very pro-poor as it pulls out of poverty by expanding traded sector production, which absorbs numbers of the poor. This policy is most likely to succeed when non-traded goods are quite price-elastic in demand, and the propensity to consume them out of income is small. Arguably, these are features of the more successful East Asian economies with their diffused production structure. Size would also be an important consideration. Without a critical mass of consumers geared to the domestic consumption of labour-intensive traded manufactures, industrial policies of this type would be rendered meaningless.

A number of caveats are in order before concluding. First, the assumption about increased employment in the traded sector promoting pro-poor growth because it draws the poor out of poverty in the informal sector may be challenged from the standpoint that one size does not fit all. This is certainly true, and the poor and almost poor may also be employed in the non-traded sector. Our dichotomy would match the stylized facts, however, for countries that do export labour-intensive products, and have some remnants of state-owned enterprises and nationalized public utilities, with the really poor engaged in informal sector activities. Countries, such as India, have not only reduced poverty since they opened up, but there is evidence that informal sector wages are also on the increase. Those nations that have moved up the product cycle and export more skill-intensive commodities have, to a great extent, reduced poverty, by means of more impressive growth rates. Furthermore, any discussion about poverty is also fraught with measurement problems, as national poverty lines vary so much that cross-country international comparisons using these yardsticks are impossible. We are left with the dollar-a-day or two-dollars-a-day international measures.

Second, objections regarding the Latin American and East (or South) Asian stylization may be raised. Clearly, there are exceptions to the stereotypes in both regions. Chile and Costa Rica are examples of economic success stories in Latin America; the Philippines are a case of relative failure in East Asia. These exceptions may, however, prove the rule! The main point rests with the fact that the East Asian model is one of a more outwardly orientated economic structure accompanied by a more egalitarian distribution of income. The richer countries in East Asia have moved up the ladder from being unskilled labour-intensive manufactured goods exporters, and specialize now in skill- and R&D-intensive commodities. They have, indeed, become OECD nations in terms of average income and socio-economic indicators, even if they are not members. Latin American nations, which were richer to begin with (say in 1960), have relied more on import substitution industrialization policies and natural resource-based exports. Compelled to open up by the debt crises of the 1980s, they have had less success in exporting manufactured goods compared to East Asia, despite the benefits of free trade agreements, such as NAFTA for Mexico. They have also been subject to severe macroeconomic crises more frequently, and have been slower to recover. The Latin American region has witnessed slower growth rates, more poverty and the creation of greater inequality than East and South Asia. There is also a continued reliance on mineral- and plantation-based natural resource exports.

The most significant factor underlying the Latin American–East Asian dichotomy lies in their differing underlying political economies. The political economy of a plantation-type Latin American economy is outlined in Sokoloff and Engerman (2000). These economies are characterized by greater inequality; a lower middle-class share of income; and less investment in productive, growth-enhancing public goods. Latin American countries have been caught in a 'staple trap' – the reliance on traditional natural-based exports, with the associated terms-of-trade volatility. The solution proffered to this endemic problem seems not to have worked well for the region for which it was first proposed (Prebisch 1950). Often the state, and elites, can be more destructively extractive of rents in some regions of the world compared to dictatorships in other areas. See also Auty and Gelb (2001) on benevolent and developmental versus non-benevolent and non-development typologies among nation states with different relative endowments of natural resources vis-à-vis labour. There is a history of social conflict in both regions but, in the Latin American case, a more substantial sheltered non-traded sector rather than competitive industrialization was seen as the economic panacea.

Third, the policy implications contained in this chapter advocate the expansion of labour-intensive manufactured exports as a means of achieving growth and poverty reduction. In international trade, the fallacy of composition argument always applies, meaning that not every country can expand its exports simultaneously. The greater exposure of China and India to world trade, given their huge populations and endowments of labour, means that less populous countries will be less able to compete with them in labour-intensive manufactured exports (Mayer 2003). This can be either because of higher relative wages, as in Latin America, or because of a size or an economies-of-scale argument, which makes China and India more competitive in areas such as ready-made garments compared to equally low-waged economies such as Bangladesh and Vietnam. The policy implication for higher-waged developing countries is that they must either move up the product cycle themselves or wait for relative wages to rise in India and China.

In the long run, poverty reduction is brought about by sustained economic growth, and policies or factors that improve the distribution of income. Growth is more important to poverty reduction in low-income countries, whereas redistribution becomes relevant as anti-poverty strategy at higher levels of affluence, particularly when a middle-income status is achieved. Finally, it has to be borne in mind that every kind of success – including economic achievement – is, more often than not, a result of serendipity rather than a product of deliberate design.

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Notes

1 The traded-non-traded dichotomy may be somewhat artificial: what matters most are relative factor intensities and the nature of the main exportable commodity.
2 There are exceptions in both regions; for example, Malaysia and Indonesia are major exporters of primary commodities.
3 This is similar to the Keynesian assumption of excess capacity, which is assumed for all formal sectors in the model.
4 The *production* function for N may be characterized as f (K, LN, $min\ T$), where K denotes capital. At this stage, however, we are concerned with supply behaviour, which is a function of the relative price and the exchange rate.
5 The exponents in P (β, α and $1\text{-}\alpha - \beta$) represent the weights or shares of the three goods in the representative consumer's consumption basket. They sum to unity.
6 The *NN* and *MM* schedules are obtained by totally differentiating (3.5) and (3.4) for dPN and dM, setting dr and other differentials equal to zero. We then discover the ratios of the differentials, $dPN/dM > 0$, in both (3.5) and (3.4). Thus, both *MM* and *NN* schedules (derived from (3.5) and (3.4), respectively) are positively sloped. But the slope of *MM* is greater, as the ratio is greater in (3.4). This makes *MM* steeper than *NN* in Figure 3.1.
7 Alternatively, the tax revenues may be utilized to subsidize the production of M. But such a policy, within this particular model, would merely augment supply without necessarily raising domestic consumer demand. Also, the algebraic effects of doing this are very similar to the case when the revenue is given back to consumers.

References

Addison, T., A.R. Chowdhury and S.M. Murshed (2002) 'How Much Does Conflict Reduce Financial Development?', WIDER Discussion Paper 2002/48 (Helsinki: UNU-WIDER).

Arestis, P. and P. Demetriades (1997) 'Financial Development and Economic Growth: Assessing the Evidence', *Economic Journal*, 107 (442): 783–99.

Auty, R.M. and A.G. Gelb (2001) 'Political Economy of Resource Abundant States', in R.M. Auty (ed.), *Resource Abundance and Economic Development* (Oxford: Oxford University Press for UNU-WIDER): 126–44.

Bandiera, O., G. Caprio, P. Honohan and F. Schiantarelli (2000) 'Does Financial Reform Raise or Reduce Saving?', *Review of Economics and Statistics*, 82 (2): 239–63.

Beck, T., A. Demirgüç-Kunt and R. Levine (2000a) 'A New Database on the Financial Development and Structure', *World Bank Economic Review*, 14: 597–605.

Beck, T., R. Levine and N. Loayza (2000b) 'Finance and the Sources of Growth', *Journal of Financial Economics*, 58: 261–300.

Clarida, R.H. and R. Findlay (1992) 'Government, Trade and Comparative Advantage', *American Economic Review*, 82 (2): 122–7.

Demirgüç-Kunt, A. and R. Levine (eds) (2001) *Financial Structure and Economic Growth: A Cross Country Companison of Banks, Markets, and Development* (Cambridge, MA: MIT Press).

Findlay, R. and C.A. Rodriguez (1977) 'Intermediate Inputs and Macroeconomic Policy under Flexible Exchange Rates', *Canadian Journal of Economics*, 10: 209–17.

Goodhart, C. (ed.) (2004) *Financial Development and Economic Growth: Explaining the Links* (Basingstoke: Palgrave Macmillan).

Green, C. and C. Kirkpatrick (2002) 'Finance and Development: An Overview of the Issues', *Journal of International Development*, 14 (2): 207–10.

Green, C., C. Kirkpatrick and V. Murinde (2005) 'How Does Finance Contribute to the Development Process and Poverty Reduction?', in C. Green, C. Kirkpatrick and V. Murinde (eds), *Finance and Development: Surveys of Theory, Evidence and Policy* (Cheltenham: Edward Elgar).

Kakwani, N. (2000) 'On Measuring Growth and Inequality Components of Poverty with an Application to Thailand', *Journal of Quantitative Economics*, 16 (1): 67–79.

Kakwani, N. and E.M. Pernia (2000) 'What is Pro-Poor Growth?', *Asian Development Review*, 16 (1): 1–16.

Krugman, P. and L. Taylor (1978) 'Contractionary Effects of Devaluation', *Journal of International Economics*, 8: 445–56.

Levine, R. (1997) 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35 (2): 688–726.

Lewis, W.A. (1954) 'Economic Development with Unlimited Supplies of Labour', *Manchester School*, 22: 139–91.

Mavrotas, G. (2005) 'Savings and Financial Sector Development: An Assessment', in C. Green, C. Kirkpatrick and V. Murinde (eds), *Finance and Development: Surveys of Theory, Evidence and Policy* (Cheltenham: Edward Elgar).

Mavrotas, G. and S.-I. Son (2006) 'Financial Sector Development and Growth: Re-examining the Nexus', in M. Bagella, L. Becchetti and I. Hasan (eds), *Transparency, Governance and Markets* (Amsterdam: Elsevier).

Mayer, J. (2003) 'Trade Integration and Shifting Comparative Advantage in Labour-Intensive Manufactures', at www.unctad.org

Murshed, S.M. (2001) 'Short-Run Models of Natural Resource Endowment', in R.M. Auty (ed.), *Resource Abundance and Economic Development* (Oxford: Oxford University Press for UNU-WIDER): 113–25.

Murshed, S.M. (2002) 'Perspectives on Two Phases of Globalization', in S.M. Murshed (ed.), *Globalization, Marginalization and Development* (London: Routledge in association with UNU-WIDER): 1–19.

Prebisch, R. (1950) *The Economic Development of Latin America and its Principal Problems* (New York: United Nations).

Sachs, J. (1999) 'Resource Endowments and the Real Exchange Rate: A Comparison of Latin America and East Asia', in I. Takatoshi and A.O. Krueger (eds), *Changes in Exchange Rates in Rapidly Developing Countries*: *Theory, Practice, and Policy Issues* (Chicago: University of Chicago Press): 133–53.
Sokoloff, K.L. and S.L. Engerman (2000) 'Institutions, Factor Endowments, and Paths of Development in the New World', *Journal of Economic Perspectives*, 14 (3): 217–32.
Taylor, L. (1983) *Structuralist Macroeconomics* (New York: Basic Books).
Wachtel, P. (2004) 'How Much Do We Really Know About Growth and Finance?', *Research in Banking and Finance*, 4: 91–113.

4

Finance and Poverty in Ethiopia: A Household-Level Analysis

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Introduction

The year 1992 marked a policy watershed in the Ethiopian financial sector, as well as the country's economic policy at large. This was the period where a shift from a controlled to market-friendly policy regime was made. The new government continued with the policy of state ownership of major financial institutions, with major reforms such as operational autonomy and streamlining of some activities, expansion of credit and savings facilities, and adherence to prudent monetary and banking policy. In addition, the sector was, for the first time, opened to the private sector. The World Bank and the IMF supported the financial liberalization programme through the Structural Adjustment Programme (SAP), which started in late 1992.

The major development in the financial sector during the post-reform period is the reorientation of the sector away from its bias to the socialized sectors. Unlike the pre-1991 military-cum-socialist regime (the *Derg*), which simply set the financial sector to the service of public enterprises and cooperatives, the post-reform period shows a market-based allocation of credits and financial services. Following this reform, the private sector is claiming the lion's share of total credits disbursed by the banking system. In contrast, public enterprises have seen their share declining through the years. Apart from the effect of the market-based credit allocation, the considerable decline in the share of credits to public enterprises may be attributed to the privatization process, which, in effect, reduced the number of clients deemed as public entities. The result is that the financial system has evolved into an ownership structure, which is mixed (public and private) and largely guided by market forces.

There are various studies that have attempted to evaluate the effect of these reforms on the efficiency and growth of the financial sector (see Addison and Geda 2003 and Geda 2005, for instance). However, one area that is neglected is the relationship between the liberalization of the financial sectors and the pervasive poverty that is haunting the country. With an absolute poverty level of about 42 per cent, it is imperative that one needs to examine the link between finance and poverty. Thus, this chapter tries to fill this gap by looking at this relationship in the rural households of Ethiopia, which make up over 80 per cent of the Ethiopian population.

Access to, and efficiency of, the financial sector are important elements in reducing poverty, through lessening the financial constraints of the poor and enabling them to invest in a risky but profitable environment. Some empirical evidence shows that the inefficiency of the financial sector could lead to a high transaction cost for the poor, causing them to switch the form of saving and investment to physical assets. In Ghana, 80 per cent of savings are in terms of physical assets, while the figure for India is 50 per cent (see Srinivasan and Wallack 2004). This renders the poor incapable of earning interest income and engaging in high return but risky ventures. Moreover, it would also make hedging against inflation more difficult, as part of their saving contains liquid cash.

Lack of financial access coupled with low endowment may lead to self-perpetuating poverty. Households with low endowment and no/limited financial access tend to invest in low-risk and low-return areas, and hence earn low return. This constrains the poor from investment on long-term high-return areas such as education. Moreover, households will also be faced with borrowing constraints, which makes it very difficult for them to smooth consumption. The combined effect of these forces is significant reduction in the welfare of the poor, resulting in possible perpetuation of poverty – sometimes even across generations.

As we noted above, while there is a wide literature on financial sector performance and its impact on growth (both globally and in Ethiopia), empirical work on its impact on the poor using microdata is still scanty. This chapter documents evidence using panel data from Ethiopia that covers the period 1994–2000. Specifically, we attempted to: (i) test the impact of access to credit on poverty; (ii) investigate the importance of access to credit on the smoothing of consumption and, hence, the welfare of the population; and (iii) test for the possibility of a poverty trap due to financial markets imperfections.

Finance and poverty

It can be hypothesized that there is a link between poverty and finance. In a more subtle manner, Banerjee and Newman (1993) showed that the distribution of initial wealth, coupled with an imperfect capital market, determines the occupational choice of an individual and, hence, the level of income of that individual and their offspring. Capital market imperfection affects the borrowing capacity of an individual, which would be limited by the level of their initial wealth. This would, in effect, rule out the poor from investing in high-return investment ventures (Banerjee and Newman 1993).

The credit market imperfection can also affect the poor through human capital accumulation. Galor and Zeira (1993) showed that, with capital market imperfection and unequal distribution of wealth, those with higher initial endowment would invest in human capital, while those with no or lower initial endowment would face a higher interest rate and, hence, tend to invest less in human capital. To the extent that earnings depend on human capital, the rich that invest in human capital would remain rich, while the poor remain poor and stay in the unskilled labour sector, showing that the liquidity constraint stemming from the imperfect capital market is particularly binding on the poor. This rising level of inequality would, in turn, aggravate poverty. In the Ethiopian case, empirical evidence shows that inequality is one of the major determinants of poverty. Inequality aggravates poverty by 1 percentage point, compared to a reduction of 2 percentage points that could be obtained from a growth rate of 1 percentage point (see Geda *et al.* 2003).

Better financial intermediation is, thus, expected to ease the liquidity constraints faced by the poor, in addition to containing the adverse impact of initial wealth distribution. The evidence in this respect is mixed. Greenwood and Jovanovic (1990) demonstrate theoretically that, given that there is a lump-sum cost of accessing the financial intermediary, agents below some minimum level of savings remain outside of the formal financial market. As a result, at the early state of financial development, inequality across the very rich and the very poor increases, as it is only the rich who would have access to the financial markets. Over time, with the growth in the wealth of the poor, the poor would gain access to the financial intermediary and, hence, stable distribution of wealth can be achieved.

In terms of the empirical evidence, the results reported in Beck *et al.* (2004) suggest that financial development is pro-poor. Using a sample of 52 developed and developing countries over the period 1960–99, they obtained that the income of the lowest quintile grows faster than average per capita GDP, with a fall in inequality in countries with better financial intermediation. In a more focused study, Amin *et al.* (2003) showed, using panel data from Bangladesh, that microfinance institutions, targeted to address the poor directly, are effective in reaching the poor. However, they reported that microfinance institutions are less successful in reaching the vulnerable, which are the very poor among the population. As opposed to Amin *et al.* (2003), also using panel data from Bangladesh, Khandker (2003) showed that microfinance is important in reducing poverty and it also matters, even for the very poor, by increasing their consumption.

Given the empirical evidence about the positive correlation between financial development and growth (see Levine *et al.* 2000, for instance) and to the extent that growth is pro-poor, better financial intermediation would be pro-poor. Apart from its growth impact and the fact that it enables the poor to invest in a risky but profitable environment, access to credit might enhance the welfare of the poor by reducing liquidity constraints and consumption variability. We will test these hypotheses below.

Poverty, savings and access to credit in Ethiopia

At a per capita income of around US$100, Ethiopia is one of the poorest nations on earth. The state of poverty is one of appalling human suffering and persistent deprivations. The evidence of recent periods shows that 40–50 per cent of households in Ethiopia live in abject poverty, and that this has been persistent over time. The measure of poverty reported in this study is based on the Foster–Greer–Thorbecke index (see Foster *et al.*, 1984), which essentially aggregates poverty based on the income of the poor. Given the income of the population by the vector $y_1 < y_2 <, \ldots z_q <, \ldots y_n$, (where n is the number of the total population, and q is the number of the poor population), the Foster–Greer–Thorbecke measure of poverty is given by:

$$P_\alpha = \frac{1}{n}\int_0^q \left(\frac{z-y}{z}\right)^\alpha dy$$

where α is a measure of the degree of inequality aversion among the poor population. In this report, we focus on $\alpha = 0$, which basically gives the proportion of the poor population, or the headcount ratio; $\alpha = 1$ provides the poverty gap, which measures the average deprivation

Table 4.1 Evolution of poverty in Ethiopia

Year	Headcount ratio	Poverty gap	Poverty squared gap
(a) Urban			
1994	39.4	15.2	8.0
1995	37.6	14.0	7.2
1997	34.2	13.1	6.8
2000	47.4	19.4	10.6
(b) Rural			
1994	42	17.2	9.0
1995	37	17.3	9.8
1997	35	17.1	8.8
2000	50	22.0	12.8

Source: Authors' computation based on Department of Economics, AAU, data.

among the poor; and $\alpha = 2$ is a measure of how severe poverty is among the population. Table 4.1 reports these measures for Ethiopia from 1994–2000 based on a unique panel dataset collected over the last few years by the Department of Economics of Addis Ababa University and its various collaborative institutions.[1]

As Table 4.1 clearly indicates, the percentage of households unable to meet the barest minimum basic needs in both urban and rural Ethiopia is substantial. The minimum income per adult in real terms is calculated to be around 2 birr per person per day[2] for the reference survey site. This poverty line is considerably lower than the US$1 a day (a dollar is about 8.90 birr at the nominal exchange rate) in PPP globally used to measure extreme poverty. It is therefore self-evident that Ethiopia harbours one of the worst human conditions in the world. The other measures of poverty, such as poverty gap and squared poverty gap, show a considerably lower degree of deprivation and severity, as the maximum that these values take is the headcount ratio. So, for instance, the poverty gap in most cases is less than half of the headcount ratio. In effect, many more people are concentrated around the poverty line, so that absolute poverty is a more serious policy concern than the relative deprivation of the poor.

The trend in poverty is not encouraging either. Between 1994 and 1997, there was some sign of hope, as poverty declined and per capita income increased. The situation in 2000, however, showed an increase in poverty as the country struggled through difficult periods, such as the war with Eritrea and a major drought.

Poverty is much more persistent in urban rather than rural areas (see Table 4.2). The percentage of the persistently poor in urban areas is twice

Table 4.2 Households by poverty status (%), 1994–2000

Poverty status	**Rural**	**Urban**
Always poor	7.3	15.4
Once poor	28.9	20.4
Twice poor	23.0	18.3
Thrice poor	20.0	16.0
Never poor	20.8	29.9

Source: Authors' computation based on Department of Economics, AAU, data.

that in rural areas, suggesting the limited opportunities for earning an income in urban areas.

We also provide the factors that are closely correlated with the persistence of poverty in Table 4.3, where we can read that in both urban and rural households the persistence of poverty is positively associated with household size; that is, the greater the size of the household, the more persistent poverty would be. Also, the level of the household head's education, the value of assets owned (including the number of oxen) and the area of land owned are negatively correlated with the persistence of poverty. In urban areas, the persistence of poverty declines with being a civil servant, in private business or a private sector employee. On the other hand, poverty is more persistent among the unemployed, casual workers and dwellers in the capital.

The microevidence on the state of household savings and access to credit indicates that, particularly in rural Ethiopia, saving in the form of cash is hardly a common practice. The panel dataset, collected over the period of six years, from 1994 up to 2000, shows features typical of a very poor and subsistence economy. Accordingly, of nearly 1500 households in the panel, only 0.7 per cent of respondents in rural areas reported having a bank account in 1994, and 15.6 per cent said that they belonged to a traditional rotating saving club/group (*Iqub*) in that period. In its simplest form, *Iqub* is a culture of group savings intended usually to raise money to finance large expenses relative to the current income of the members. This includes events (such as weddings, funerals or religious observances), purchases of household durables and certain types of non-durables (such as clothing and shoes), or even for investment purposes (such as the purchase of livestock or fertilizers) and other ventures (such as house construction). Each *Iqub* member contributes a certain previously agreed sum to the group every week, month or quarter,

Table 4.3 Households characteristics and persistent poverty, 1994–2000

Variable	Never	Once	Twice	Three times	Always
(a) Rural households					
Household size (numbers)	4.9	5.8	6.4	6.9	8.3
Age of head of household (years)	44	46	47	47	48
Female-headed household (%)	23	22	18	22	16
Household head with primary education (%)	12	10	7	7	3
Wife completed primary school (%)	4	2	2	1	1
Land size (hectare)	1.1	0.9	0.7	0.7	0.5
Crop sale (birr)	334	247	158	83	90
Asset value (birr)	225	173	152	87	92
Off-farm employment (%)	24	38	39	45	29
No. of oxen owned	2.0	1.7	1.4	1.1	0.78
(b) Urban households					
Household size (numbers)	5.7	6.3	6.6	6.9	7.6
Age of head of household (years)	47	49	50	48	51
Female-headed household (%)	40	44	46	39	43
Household head with primary education (%)	60	44	30	27	20
Wife with primary education (%)	33	21	16	12	8
Private business (%)	3	2	2	0	0
Own account employee (%)	19	17	15	12	16
Civil servant (%)	21	15	11	9	9
Public sector employee (%)	9	7	5	6	5
Private sector employee (%)	6	5	5	3	3
Casual worker (%)	4	6	7	14	32
Unemployed (%)	4	4	7	4	9
Resides in the capital (%)	68	71	79	78	87

Source: Authors' computation based on Department of Economics, AAU, data.

depending on the prior set intervals, and the collected money is given to one person at a time. In some sense, *Iqub* undertakes saving and lending activities simultaneously. Typically, members wait for their turn to collect the money raised through such contributions. Customarily, the queue for getting the collected money is established by drawing lots. However, it is also common to arrange it by mutual consent, with the needy coming first. In many ways, *Iqub* is a mechanism for group insurance, frequently used to overcome idiosyncratic shocks, and also a form of medium to develop social networks with neighbours. *Iqub* is much more common in urban areas than rural areas, where people have a relatively predictable flow of income over the *Iqub* period, and a number of mechanisms exist for easy enforcement, including legal remedies.

The relative size of *Iqub* contribution reported in the data for rural households is quite interesting. The median contribution to *Iqub* was close to 90 birr per household over a period of four months. This is close to 5 per cent of total household consumption expenditure in the period. A parallel is also discovered with our result from nationally representative data on savings. First, the percentage of households who reported positive savings from this data was around 15 per cent, which is close to the percentage of households with similar savings status in the panel data. Second, the percentage of savings from mean income was around 5 per cent, which is close to the average propensity to save that we found for the panel data (which is also consistent with the macrodata of the last decade, which show a gross domestic savings figure of about 6 per cent). In all likelihood, household cash savings are much lower in Ethiopia, mainly due to very low levels of income, and partly also due to a lack of efficient financial intermediation.

On the other hand, there is significant credit activity among households in the country. The percentage of households who took a loan at least once in the five years' preceding the survey year (1994) was 40 per cent, while the rest did not borrow money at all. The largest sources of this credit are relatives and friends, followed by village moneylenders (see Table 4.4). In the recent survey of 2004, the proportion of households that took a loan in the 12 months prior to the survey period increased to around 54 per cent. Half of the households who did not take a loan reported that they did not face any need for credit, while the remaining households were constrained by different factors, including lack of access, fear of not being able to pay a loan back and rejection of the loan application (see Table 4.5).

Table 4.4 Source of loan: rural households

Source of loan	**Percentage**
Village moneylenders	19.7
Relatives/friends	77.5
Bank	0.6
Other	2.2

Source: Authors' computation based on Department of Economics, AAU, data.

Table 4.5 Reasons for not taking a loan

Reasons	**Percentage**
No need for a loan	50.8
Tried to obtain a loan but was refused	3.1
No one available from whom to obtain a loan	9.3
Expected to be rejected, so did not try to obtain loan	1.3
No access to collateral	0.5
Afraid of losing collateral	1.1
Afraid unable to repay loan	31.1
Interest rates too high	1.8
Other	0.8

Source: Authors' computation based on Department of Economics, AAU, data.

Evidence from the 2004 survey of the panel households also highlighted the importance of access to credit in raising funds for emergency purposes. The data show that only around 57 per cent of rural households can obtain 100 birr (around US$11.50, which is a significant amount of money for them) if the household is faced with an emergency. Of those who can obtain the money, credit and saving associations are the source of the fund for about 39 per cent of the households, followed by a sale of animals at 37 per cent (see Table 4.6). As sales of animals, particularly

Table 4.6 Ability to raise money for an emergency

Situation	**Percentage**
If the household needed 100 birr for an emergency, could the household obtain it within a week?	
Yes	57.1
No	42.9
How would the household obtain 100 birr?	
Sale of animals	37.4
Sale of farm/business assets	7.4
Sale of household asset	1.7
Own cash	7.4
Saving association	5.7
Loan	33.5
Sale of crops	7.0
Other	0.1

Source: Authors' computation based on Department of Economics, AAU, data.

Table 4.7 Access to credit by deciles distribution of 'permanent income'

Deciles	**Percentage with access to credit**
Poorest deciles	3.61
2	4.13
3	4.21
4	4.30
5	4.64
6	4.73
7	4.82
8	5.59
9	5.93
Richest deciles	3.61
Households with access to credit (%)	40.00

Source: Authors' computation based on Department of Economics, AAU, data.

Table 4.8 Chronic poverty and access to credit, 1994–2000

Household types	**Long term poverty, P_0**	
Households with access to credit	28	(43)
Households with no access to credit	33	(47)

Note: Figures in parentheses indicate urban poverty.

oxen, might have an adverse impact on farm production and income in the ox-plough culture of Ethiopia, credit would remain an important mechanism by which to deal with shock.

It is also interesting to note that access to loans is an increasing function of the level of income, except for the wealthiest category (see Table 4.7). Table 4.8 shows that households that have access to credit, compared to those who do not, are relatively less poor, although the distinction between these two groups is not that strong.

Theoretical framework and estimation results: finance and poverty

There is general consensus on the basic premise that economic growth is central to achieving the objective of poverty reduction. In the literature, however, there is also a debate on the type of growth – that is, whether it is pro-poorgrowth or not – and the extent to which the poor gain from growth. Among others, studies by Bruno *et al.* (1995), Birdsall and Londono (1997), Ravallion and Chen (1997) and Deininger and Squire (1998) reported that growth has a positive impact on reducing income poverty, though its effectiveness differs depending on the initial degree of inequality. In the cases where growth is inequitable in the poor countries, as indicated in the Kuznets hypothesis, the poverty-reducing impact of growth may be hampered.

Following this literature and supporting empirical evidence in Ethiopia (see Geda *et al.* 2003), we specify the level of poverty as a function of income, inequality and other household characteristics:

$$P = f(Y, G, \boldsymbol{H}) \tag{4.1}$$

where P is the level of poverty, Y is income, G is inequality and $\boldsymbol{H}$ household-specific characteristics such as education and asset holdings.

Now, turning to the determinants of poverty, we can specify the dynamics of income and inequality. As the rural households are mainly engaged in agricultural activities, what happens to agriculture directly affects their income. Thus, we specify a simple production function as:

$$Y = f(\boldsymbol{X}, F) \tag{4.2}$$

where Y is output; $\boldsymbol{X}$ is a vector of physical inputs including labour, land, oxen used in the production process, and F is availability of credit.

Finally, we hypothesized inequality to depend on initial endowment and access to finance, as in Banerjee and Newman (1993). We proxy initial endowment by the quality of land and number of oxen owned by the household:

$$G = f(\boldsymbol{E}, F) \tag{4.3}$$

where $\boldsymbol{E}$ is the initial endowment.

Combining [4.1], [4.2] and [4.3], we can estimate a reduced form equation that links poverty with access to finance as:

$$P = f(X, E, F, \boldsymbol{H}) \tag{4.4}$$

In a panel framework, the estimatable version of Equation [4.4] can be written as:

$$P_{it} = \beta_0 + \beta_1(HHSZ)_{it} + \beta_2(OXEN)_{it} + \beta_3(LandSZ)_{it} + \beta_4(Credit)_{it} + \beta_5(Educ)_{it} + \beta_6(Asset)_{it} + c_i + u_{it} \quad [4.5]$$

where P is a dummy variable indicating the absolute poverty status of the household; *HHSZ* is household size, which we used as a proxy for labour; *OXEN* is the number of oxen owned by the household, which can be used as a proxy for capital, owing to the ox-plough culture in Ethiopia; *LandSZ* is size of land holding occupied by the household; *Credit* is an indicator of whether the household has access to credit or not; *Educ* is the level of education of the household head; *Asset* is the total current assets of the household, c is the individual heterogeneity term, which might contain initial endowment and other household-specific heterogeneity; u is the idiosyncratic error term.

We estimated Equation [4.5] using a fixed effect logit estimator to account for a possible correlation between the individual heterogeneity and the explanatory variables. The fixed effect logit estimation has an advantage over both the random effect and fixed effect probit models, in that it accounts for the possible correlation between the explanatory variables and unobserved heterogeneity without running into incidental parameter problems, as c_i is not estimated along with the βs (see Wooldridge 2002). Table 4.9 presents the estimation result.

Table 4.9 Result of the logit fixed effect model

Dependent: absolute poverty	Coefficient	z-values
Household size	0.08	(2.05)*
Total land of household in hectares	–0.25	(5.93)**
Number of oxen owned	0.03	(0.55)
Credit	0.38	(3.56)**
Total current value of household assets	0.00	(1.54)
Observations		2083

Notes: Education level of the household head is omitted due to no within-group variance;
Absolute value of z-statistics in parentheses;
Significance at 1 per cent and 5 per cent denoted by ** and * respectively.

The result shows that, controlling for other factors, the probability of being poor increases with the availability of credit, which is counter-intuitive. We suspected that this is mainly due to the endogeneity of credit in our specification. That is, on the one hand, the probability of being poor declines with the availability of credit and, on the other hand, availability of credit is also determined by the poverty status of the household. This might drive our estimates to be inconsistent. As a result, we resorted to instrumental variable probit estimation to address the endogeneity problem.

The main problems encountered in using the IV estimation are ensuring (i) the 'right' instrumental variable(s); and (ii) that the other variables in the model are exogenous. We argued the total asset holding of the household, the number of oxen owned and total crop sales to be good indicators of access to credit, as they show the capacity of the household to repay. However, since total asset holdings and crop sales are correlated with the dependant variable, we could not use them as an instrument. Rather, we used the total number of oxen to instrument for credit, as it is not significantly correlated with the dependent variable as shown in our fixed effect logit model. The result of our IV probit estimation is presented in Table 4.10.

Our IV probit result passes the Wald test for exogeneity, thus, confirming the endogeneity problems we noted earlier. The result in Table 4.10 shows that availability of credit has a significant impact in reducing the probability of being poor. This underscores the importance of finance (and financial development) in reducing poverty.

One caveat to note in estimating the model in [4.5], allowing for the possible endogeneity between poverty and the access to finance, is the fact that the endogenous variable is also a dummy variable. When the endogenous variable is binary, having a non-normal distribution, the instrumental variable method may not be valid. As a result, we also used a bivariate probit model to deal with the problem of endogeneity and to check the reliability of our result.

To allow for the possible unobserved correlation between poverty (P) and access to finance (C), we let the error terms of the two equations be distributed as a bivariate normal. As our interest is to model the relationship between these two discrete variables, the decisions involve four cases; that is, $P = 0$ and 1; and $C = 0$ and 1. The likelihood function that captures these features can be presented as a bivariate probit model (see Evans and Schwab 1995 and Carrasco 1998). The bivariate probit model can, hence, be formulated as

Table 4.10 Probit estimation of poverty and credit

	Coefficients	Marginal effects
Credit	−1.285 (0.000)***	−0.4788671
Household size	0.078 (0.000)***	0.0310112
Total land of household in hectares	−0.119 (0.000)***	−0.0475257
Has the household head completed primary school?	−0.242 (0.002)***	−0.0954966
Female-headed households	0.091 (0.084)*	0.036457
Has the wife completed primary school?	−0.149 −0.344	−0.0588589
Age of household head	0 −0.719	−0.0001902
Crop sales	0 (0.000)***	−0.0001602
Off-farm employment	0.113 (0.007)***	0.0449408
Constant	0.46 (0.059)*	
Observations	3637	

Notes: Wald test of exogeneity (/athrho = 0): chi2(1) = 9.78 Prob > chi2 = 0.0018;
Significance at 1 per cent and 10 per cent denoted by *** and * respectively;
Robust *p*-values in parentheses.

$$
\begin{aligned}
&P_{it} = \beta X_{it} + \delta C_{it} + \varepsilon_{it} \\
&C_{it} = \gamma Z_{it} + \mu_{it} \qquad [4.6] \\
&E(\varepsilon_{it}) = E(\mu_{it}) = 0;\ \ Var(\varepsilon_{it}) = Var(\mu_{it}) = 1;\ \ \mathrm{cov}(\varepsilon_{it}, \mu_{it}) = \rho
\end{aligned}
$$

The model is identified if there is at least one variable in Z that is not contained in X. As in our previous estimation, we used the number of oxen owned as an identifying instrument. The result of the bivariate model is presented in Table 4.11.

Our result suggests that the bivariate specification is a valid one as ρ is significantly different from zero. Controlling for household characteristics and other factors, our result shows that availability of credit significantly and negatively affects the probability of being poor, as the marginal effects suggest availability of credit reduces the probability of being poor by around 21 per cent (Table 4.11). This reduction is much lower than that provided by our instrumental variable estimation; that is, 47 per cent (in Table 4.10).

The overall picture suggested the importance of access to finance for poverty reduction. Thus, it is imperative to examine the channels through which finance, as found in Tables 4.10 and 4.11, could affect poverty. We identified two major channels through which it does affect poverty: (i) through the smoothing of consumption; and (ii) by permitting avoidance of the poverty trap that could emanate from liquidity constraint. The next two sections offer empirical evidence on this.

Consumption smoothing and access to credit

Due to the dependence of the rural economy on rain-fed agriculture, the income and consumption of the rural population are highly volatile, being dependent on the weather. With the absence of formal insurance and a credit market, smoothing consumption is one of the most difficult challenges for rural households. As can be read from Table 4.2, about 29 per cent of the rural population in the sample fall into poverty at least once, indicating the difficulty in smoothing consumption, for which liquidity constraint and the absence of insurance mechanisms could be the main culprits. Though the rural farmers adopt different consumption and income-smoothing mechanisms with absent or under-developed formal insurance and credit market (see Morduch 1995, for instance), access to credit from the informal market and running down one's assets and savings are still important smoothing mechanisms.

As a credit market is not completely absent in rural villages, by using a model of consumption determination it is possible to pick up the importance of access to credit for the smoothing of consumption. Equation (4.1) provides an estimating equation of the determinants of long-term consumption (C_i) on a set of exogenous variables (X). Since C_i is mean consumption over six years for each household (i), the vectors of explanatory variables are all initial endowments as reported in 1994. Thus, the Xs in Equation (4.1) are instruments uncorrelated with the error term and OLS gives consistent and efficient estimates of the regression coefficients.

$$\ln C_i = \beta_0 + \beta X + e_i \tag{4.1}$$

The estimated results of this model are reported in Table 4.12 and are quite interesting in many ways. Long-term income in a typical rural

Table 4.11 Bivariate probit estimation of poverty and credit

		Marginal effects	**Auxilary regression**
	Poverty	Pr (poverty = 1, credit = 1)	Credit
Credit	−0.927	−0.2093725	
	(0.000)***		
Household size	0.092	0.0197964	−0.016
	(0.000)***		(0.027)**
Total land of household in hectares	−0.136	−0.0374564	−0.027
	(0.000)***		(0.044)**
Has the household head completed primary school?	−0.227	−0.091633	−0.244
	(0.005)***		(0.003)***
Female-headed households	0.107	0.0278861	0.013
	(0.042)**		−0.809
Has the wife completed primary school?	−0.209	−0.03525	0.154
	−0.18		−0.31
Age of household head	−0.001	−0.0000825	0.001
	−0.615		−0.712
Crop sales	−0.000483	−0.000107	0.000064
	(0.000)***		−0.123
Off-farm employment	0.118	0.0417128	0.079
	(0.006)***		(0.073)*
Number of oxen owned (bulls, oxen and young bulls)			0.074
			(0.000)***
Constant	0.207		0.182
	−0.201		(0.028)**
Observations	3637		3637
Rho	0.6398438		
Wald test of rho=0: Prob > Chi2	(0.0003)***		

Notes: Robust *p*-values in parentheses;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.

household is negatively correlated with size of the household and the head of the household; that is, whether the household head is female or male. On the other hand, such factors as initial wealth, assets, experience and, most of all, access to credit have a positive effect on 'permanent' consumption. This is a further evidence of the positive role that access to credit plays on household welfare. The importance of access to finance in reducing poverty is especially important, since income variability is a major factor in inflicting poverty in Ethiopia. The latter can be inferred from the fact that the transitory component of poverty comprises about

Table 4.12 Determinants of 'permanent income' in rural Ethiopia

Dependent variable: logarithm of real income	**Cofficients**	***t*-statistics**
Household size	–0.096	(16.57)**
Farming systems	0.411	(8.21)**
Female-headed households (female reference group)	–0.05	−1.27
Primary school completion of the household head	0.098	−1.76
Primary school completion of wife	–0.013	–0.12
Total land of the household	0.075	(2.92)**
Age of the household head	0.001	−1.16
Total current value of household assets	0	(4.83)**
Crop sales either previous meher and belg (r1 and r4) or after last interview	0	(3.75)**
Population of nearest town divided by the distance in km from the site	0	(2.89)**
Dependency ratio	–0.117	(−1.28)
Worked on someone else's land or other employment?	–0.103	(3.21)**
Dummy for households that harvested teff during last season	0.011	–0.28
Dummy for households that harvested coffees last season	0.124	(2.24)*
Dummy for households that harvested khat last season	0.238	(4.93)**
Number of oxen owned (bulls, oxen and young bulls)	0.019	−1.71
Access to credit	0.112	(3.68)**
Constant	3.605	(24.83)**
Observations	1159	
R-squared	0.37	

Notes: Significance at 1 per cent and 5 per cent denoted by ** and * respectively. Growing seasons 'meher' and 'belg' correspond to the 'big' (July–September) and 'short' (February–April) rains, respectively.

15–20 percentage points of the total poverty. Access to credit, thus, helps squarely to address such poverty, by allowing the smoothing of consumption, as can be inferred from its strong impact on permanent income reported in Table 4.12.

Finance and the poverty trap: liquidity constraint and poverty

The discussions in the preceding section have brought out important facts regarding the role of credit for household welfare and overall poverty. The first point of interest is that a large percentage of people in rural areas do not have access to credit. And, these people make up a large proportion of the chronically poor population. Second, households with access to some credit generally have a higher long-term per capita consumption, so consumption smoothing occurs with relative ease in this group, as opposed to those experiencing credit constraint. This essentially brings into the picture the notion of a poverty trap. The idea is that households experiencing credit or liquidity constraint tend to experience long-term poverty resulting from slight shocks in the past. The nature of previous period or past consumption therefore has an important impact on current consumption. This is in sharp contrast to the life-cycle hypothesis of consumption growth, where, among other things, due to perfect capital markets assumption, consumption will be unaffected by consumption or its determinants in the previous period, since shocks are fully taken care of through the use of the financial market in that period.

The most commonly applied theoretical models of household consumption growth are based on a general framework where households are assumed to maximize lifetime utility U, defined over consumption, subject to lifetime budget constraint (see Shimeles 2005 for detail):

$$E_t \sum_{\tau=0}^{T-\tau} (1+\delta)^{-\tau} u(c_{t+\tau}) \tag{4.2}$$

subject to the budget constraint:

$$\sum_{\tau=0}^{T-\tau} (1+r)^{-\tau} (c_{t+\tau} - w_{t+\tau}) = A_t$$

where E_t is the mathematical expectation conditional on all information available to the individual at time period t, δ is the rate of subjective time preference, r is the real rate of interest, c_t is consumption, w_t is earnings and A_t is physical assets. Using the sequential maximization rule, at any period t, optimal consumption will be given by Euler's equation[3] for the constant rate of time preference and interest rate, with the additional assumption that the only uncertainty the household faces originates from the income earning process:

$$E_t u'(c_{t+1}) = [(1+\delta)/(1+r)]\, u'(c_t) \tag{4.3}$$

Equation (4.3) states that a typical household sets the marginal utility of expected consumption equal to the marginal utility of current consumption weighted by the rate of time preference and asset prices.

This general formulation of the optimal consumption rule has sparked a large literature on consumption growth and its determinants in the theoretical as well as empirical literature. Particularly notable is the work by Hall (1978), which provided a testable hypothesis for the Life Cycle Model (Modigliani) and the Permanent Income Hypothesis (Friedman) on household consumption growth. The immediate implication of Equation (4.3) is that:

$$u'(c_{t+1}) = \frac{1+\delta}{1+r}u'(c_t) + \varepsilon_{t+1} \tag{4.4}$$

where ε_{t+1} is a random disturbance term and $E_t\varepsilon_{t+1} = 0$. Equation (4.3) provided the basic framework for the large empirical literature that followed Hall's (1978) seminal paper. Depending on the specific functional form of the utility function, a number of variants of Equation (4.4) have been suggested, empirically estimated and, in the process, have spurred a controversy that is still alive and thriving.[4] The first to spark immense attraction is Hall's assumption of a quadratic utility function with a 'bliss' maximum point and constant rate of discount rate and interest rate, which led to a consumption function of the following form:

$$c_{t+1} = \beta_0 + \gamma c_t + \varepsilon_{t+1} \tag{4.5}$$

If we further assume away the 'bliss' point and add the assumption that the rate of time preference and interest rate are equal (which also could be interpreted as equality between the marginal rate of substitution between future and current consumption with the marginal rate of transformation), we obtain the parsimonious model of consumption growth. That is, $\gamma = 1$, or current consumption has a unit root with respect to lagged consumption implying that consumption growth is a random walk, except for its trend.[5] Equation (4.5) and its variants also imply that utility is time-separable as well as additive. In addition, over their lifetime, it is assumed that households are fully insured from income risk, so that consumption is not affected by transitory changes in income. Thus, consumption growth is independent of past, current or predictable changes in income. In addition, consumption patterns are independent of the riskiness of income.[6]

Augmenting Equation (4.5) with current disposable income and other wealth variables ($X_{it}s$) therefore provides a basis for testing the life-cycle hypothesis:

$$c_{it+1+} = \beta_0 + \gamma c_{it} + \sum \beta_k X_{kit} + \varepsilon_{it} \tag{4.6}$$

Table 4.13 Real household consumption and its lag rural areas by the poverty status of households

One period lagged variable	Poor households		Non-poor households	
	Coefficient	***P*-value of Sargan's Test**	**Coefficient**	***P*-value of Sargan's Test**
Real total consumption expenditure	−0.428 (−4.8)	0.0000	0.495 (1.4)	0.8185
Real food consumption expenditure	−0.442 (−4.75)	0.0000	0.484 (1.42)	0.8493
Real non-food consumption expenditure	0.128 (1.76)	0.0022	0.046 (0.57)	0.0000

Note: Terms in parentheses are z-values.

Where β_k are coefficients of the asset variables and the subscripts refer respectively individual household (i), time (t) and asset-holdings (k). The implications of Equation (4.6) and its variants in a developing country context have been investigated in the empirical literature (for example, Morduch 1990, Deaton 1992, Ravallion and Chaudri 1997, Jacobi and Skoufias 1998). Recently, using data for selected developing countries, including that for Ethiopia, Skoufias and Quisumbing (2003) employed this framework to relate a household's consumption variability with its vulnerability to poverty, where per capita consumption growth is regressed on per capita income growth. Two sets of issues are at hand regarding Equation (4.6) and its implications. With a quadratic utility function, and equality between the rate of time preference and return to asset holdings, consumption over time will be a random walk, except for its trend. Second, information on previous earnings, asset holdings and other features of household finances should not affect future consumption. Thus, a test of the life-cycle hypothesis involves examining the coefficients of c_{it} and X_{kit}.

Table 4.13 illustrates this fact very clearly where lagged consumption expenditure turned out to be an important factor in driving current consumption among poor households, while it did not do so among the persistently non-poor households. This suggests that the Martingale hypothesis is strongly rejected among poorer households, perhaps due to the interplay of shocks and liquidity constraints. The negative sign of

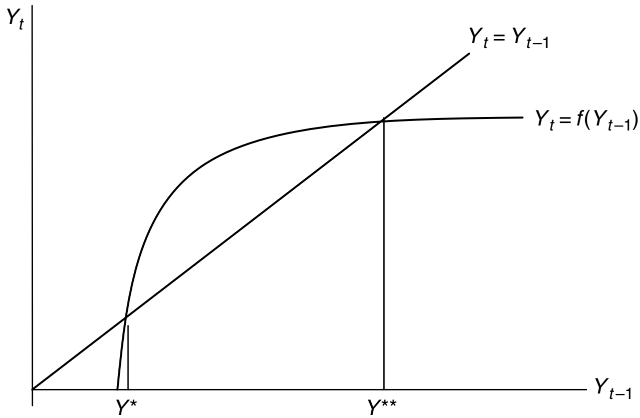

Figure 4.1 Consumption dynamics and poverty trap

the coefficients of the lagged variables among poorer households is even more consistent with the liquidity constraint hypothesis, where current and lagged consumption move in the opposite direction in response to unforeseen income shocks.

The presence of liquidity constraint in our set-up suggests the possibility of multiple equilibria (see Figure 4.1), resulting in non-linearity in consumption growth (see also Jalan and Ravallion 2001). In this study we investigate for the existence of a poverty trap by examining non-linearity in consumption dynamics. From Figure 4.1, we see that concavity or non-linearity in consumption with respect to lagged consumption generates two stable or equilibrium points (Y^* and Y^{**}). The lower consumption level indicates a low-equilibrium trap.

Shimeles (2005) reports that that, between 1994 and 1995, approximately 44 per cent of households in the panel did experience a decline in their real per capita consumption expenditure or had negative consumption shock. Among these, only 50 per cent of households recovered fully from the negative shock in consumption expenditure in 1997. Again, among those who did not recover in 1997 from the 1994 negative shock, 28 per cent recovered fully in 2000. Nearly 72 per cent of those with negative income shocks that did not recover in 1997 continued to live below the expenditure level they had experienced in 1994. All in all, about 16 per cent of sample households had a negative consumption shock in 1994 that was not recovered at all in 2000. From this brief encounter in consumption dynamics, it is easy to see that there may be some households who might find it very difficult to bounce back following an initial income shock, either to their previous level of consumption or beyond. This motivates a need to look at consumption growth or transitory consumption shocks in a non-linear setting.

The general empirical strategy we used below to test for non-linearity in consumption dynamics follows the specifications of Jalan and Ravallion (2001) as stated in Equation (4.7):

$$y_{it} = \alpha + \gamma_t + \beta_1 y_{it-1} + \beta_2 {y^2}_{it-1} + \beta_3 {y^3}_{it-1} + u_i + \varepsilon_{it} (i = 1, \ldots, n;\ \ t = 1, 2, \ldots, T) \tag{4.7}$$

where y_{it} is per capita consumption in period t by household i. The econometric specification in (4.7) is typical of a dynamic panel data specification with fixed effect error correction. We used the Arellano–Bond Generalized Moments Method to estimate the coefficients of Equation (4.7) for rural households in Ethiopia. The results are reported in Table 4.14 and evidently confirm the existence of poverty traps, as shown by the roots of the polynomials underlying the dynamics and the significance of the coefficients for higher-order consumption lags.

The existence of the poverty trap suggests that, due to liquidity constraint and the resultant inability to smooth consumption over time, the bulk of rural households are entrapped in a low-level equilibrium. This result has an interesting policy implication: introducing efficient financial intermediaries in the rural villages may reduce poverty by easing the liquidity constraints of the poor.

Table 4.14 Non-linear dynamic model of consumption expenditure: rural areas

	All households	**Poor households**
Intercept	–18.58 (–9.72)	0.0314 (0.62)
Lagged per capita consumption expenditure	–0.0676 (–3.56)	0.0054 (1.13)
Squared lagged per capita consumption expenditure	0.0003312 (58.2)	0.0313 (97.0)
Cubic lagged per capita consumption expenditure	–2.03e-08 (–43.28)	–0.0029 (–55.71)
Sargan's Test of over-identifying restrictions	0.0000	0.3417

Note: Terms in parentheses are z-values.

Conclusion

This chapter assesses the importance of financial development (in terms of access to credit) in explaining poverty and a poverty trap. Using panel data from Ethiopia that covers the period 1994–2000, first, we tested whether access to credit matters with regard to poverty. Using a parsimonious poverty-finance model and controlling for the possible endogeneity between access to credit and the poverty status of households, we discovered that access to credit significantly reduces absolute poverty. Having this result, we attempted to investigate the channel through which finance may impact on poverty. This is found to be through: (i) the smoothing of consumption; and (ii) aiding escape from the possibility of a poverty trap, which in turn is related to liquidity constraint.

Second, we examined the importance of access to credit in relation to the smoothing of consumption. Our results show that access to credit has a positive and significant effect on 'permanent' consumption, implying that credit is an important component for the smoothing of consumption and, hence, it is pro-poor as it enhances the welfare of households. We also tested whether or not liquidity constraints lead to a poverty trap. As evidenced from the non-linearity of our dynamic consumption function, rural households are faced with a poverty trap due to their inability to smooth their consumption as a result of liquidity constraint.

An important policy implication of our result is that promoting the financial sector is a desirable pro-poor policy, as it eases liquidity constraints. In addition, facilitating credit facilities for the rural poor where the formal sector is less interested in being involved can be an important intervention area for a sensible poverty reduction strategy. It is imperative to note that the use of finance to address poverty is found to be as important as other determinants of poverty, finance being among the top five (out of 17) determinants of poverty with strong and statistically significant effect.

Notes

1 The panel data are collected by Addis Ababa University, in collaboration with Oxford University, the Center for the Study of African Economies, IFPRI and Michigan State University. The panel started with approximately 1,500 households in 1994 and has been active since then. The result reported in this study covers the period 1994–2000. For an extensive discussion of this data, see, for instance, Bigsten *et al.* (2003).

2 The poverty line is computed on the basis of food and non-food (non-durables) basic needs by taking into account consumption preferences of the poorest population and price differences across rural and urban areas. For further details, see Bigsten *et al.* (2005).
3 See, for instance, Hall (1978), for a straightforward derivation of Euler's equation.
4 A useful survey of this literature is found in, for example, Browning and Lusardi (1996), Hayashi (1997), Browning and Crossley (2001) and Carroll (2001).
5 If consumers are relatively impatient ($\beta < 1/(1 + r)$), consumption declines gradually; if they are patient it rises.
6 See Coleman (1998), for further details of the implications of the quadratic expected utility functional form.

References

Addison, T. and Alemayehu Geda (2003) 'Ethiopia's New Financial Sector and its Regulation', in T. Addison (ed.), *From Conflict to Recovery in Africa* (Oxford: Oxford University Press for UNU-WIDER).

Amin, S., A.S. Rai and G. Topa (2003) 'Does Microcredit Reach the Poor and Vulnerable? Evidence from Northern Bangladesh', *Journal of Development Economics*, 70: 59–82.

Arellano, M. and S. Bond (1991) 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, 58: 277–97.

Banerjee, A.V. and A.F. Newman (1993) 'Occupational Choice and the Process of Development', *Journal of Political Economy*, 101 (2): 274–98.

Beck, T., A. Demirgüc-Kunt and R. Levine (2004) 'Finance, Inequality and Poverty: Cross-country Evidence', Policy Research Working Paper 3338 (Washington, DC: World Bank).

Bigsten, A., B. Kebede and A. Shimeles (2005) *Poverty, Income Distribution and Labor Market Issues in Ethiopia* (Uppsala: Scandinavian Institute of African Studies).

Bigsten, A., B. Kebede, M. Taddesse and A. Shimeles (2003) 'Growth and Poverty Reduction in Ethiopia: Evidence from Household Panel Surveys', *World Development*, 31 (1): 87–106.

Birdsall, N. and J.L. Londono (1997) 'Asset Inequality Matters: An Assessment of the World Bank's Approach to Poverty Reduction', *American Economic Review*, 87: 32–7.

Browning, M. and T. Crossley (2001) 'The Life-Cycle Model of Consumption and Saving', *Journal of Economic Perspective*, 15 (3): 3–22.

Browning, M. and A. Lusardi (1996) 'Household Saving: Micro Theories and Micro Facts', *Journal of Economic Literature*, 34: 1797–855.

Bruno, M., M. Ravallion and L. Squire (1995) 'Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issues', in V. Tanzi and K.Y. Chaleds (eds), *Income Distribution and High Quality Growth* (Cambridge MA: MIT Press).

Carroll, C. (2001) 'A Theory of Consumption Function, with and without Liquidity Constraints', *Journal of Economic Perspectives*, 15 (3): 23–45.

Carrasco, R. (1998) 'Binary Choice with Binary Endogenous Regressors in Panel Data: Estimating the Effect of Fertility on Female Labour Participation', mimeo, CEMFI.

Coleman, A. (1998) 'Household Savings: A Survey of Recent Microeconomic Theory and Evidence', Treasury Working Paper 98/9, New Zealand.

Deaton, A. (1992) *Understanding Consumption* (Oxford: Clarendon Press).

Deininger, K. and L. Squire (1998) 'New Ways of Looking at Old Issues: Asset Inequality and Growth', *Journal of Development Economics*, 57: 259–87.

Evans, W.N. and R.M. Schwab (1995) 'Finishing High School and Starting College: Do Catholic Schools Make a Difference?', *Quarterly Journal of Economics* (November): 941–74.

Foster, J., J. Greer and E. Thorbecke (1984) 'Notes and Comments: A Class of Decomposable Poverty Measures', *Econometrica*, 52 (3): 761–6.

Galor, O. and J. Zeira (1993) 'Income Distribution and Macroeconomics', *Review of Economic Studies*, 60: 35–52.

Geda, Alemayehu (2005) 'The Structure and Performance of Ethiopia's Financial Sector in the Pre and Post Reform Period: With Special Focus on Banking', mimeo, Department of Economics, Addis Ababa University.

Geda, Alemayehu, A. Shimeles and J. Weeks (2003) 'Growth, Poverty and Inequality in Ethiopia: Which Way for Pro-poor Growth?', MOFED Research Report (Addis Ababa: MOFED).

Greenwood, J. and B. Jovanovic (1990) 'Financial Development, Growth, and the Distribution of Income', *Journal of Political Economy*, 98 (5): 1076–107.

Hall, R.E. (1978) 'Stochastic Implications of the Life-Cycle-Permanent Income Hypotehsis', *Journal of Political Economy*, 86 (6): 971–87.

Hayashi, F. (1997) *Understanding Savings: Evidence from the United States and Japan* (Cambridge MA: MIT Press).

Jacobi, H. and E. Skoufias (1998) 'Testing Theories of Consumption Behaviour Using Information on Aggregate Shocks: Income Seasonality and Rain Fall in Rural India', *American Journal of Agricultural Economics*, 80 (1): 215–27.

Jalan, J. and M. Ravallion (2001) 'Behavioural Responses to Risk in Rural China', *Journal of Development Economics*, 66: 23–49.

Khandker, S.R. (2003) 'Microfinance and Poverty: Evidence Using Panel Data from Bangladesh', Policy Research Working Paper 2945 (Washington DC: World Bank).

Levine, R., N. Loayza and T. Beck (2000) 'Financial Intermediation and Growth: Causality and Causes', *Journal of Monetary Economics*, 46: 31–77.

Morduch, J. (1990) 'Consumption Smoothing across Space: Tests for Village Level Response to Risk', mimeo, Department of Economics, Harvard University.

Morduch, J. (1995) 'Income Smoothing and Consumption Smoothing', *Journal of Economic Perspectives*, 9 (3): 103–14.

Ravallion, M. and S. Chaudri (1997) 'Risk and Insurance in Village India: Comment', *Econometrica*, 65 (1): 171–84.

Ravallion, M. and S. Chen (1997) 'What Can New Survey Data Tell us about Recent Changes in Distribution and Poverty?', *World Bank Research Observer*, 11: 357–82.

Shimeles, A. (2004a) 'Evolution of Poverty in Ethiopia', mimeo, Department of Economics, Gothenburg University.

Shimeles, A. (2004b) 'Consumption Variability, Risk and Poverty in Ethiopia', mimeo, Gothenburg University.

Shimeles, A. (2005) 'The Dynamics of Consumption in Ethiopia', mimeo, Department of Economics, Gothenborg University.

Skoufias, E. and A.E. Quisumbing (2003) 'Consumption Insurance and Vulnerability to Poverty: A Synthesis of the Evidence from Bangladesh, Ethiopia, Mali, Mexico and Russia', mimeo, IFPRI.

Srinivasan, T.N. and J.S. Wallack (2004) 'Globalization, Growth, and the Poor', *De Economist*, 152 (2): 251–72.

Wooldridge, J.M. (2002) *Econometric Analysis of Cross-section and Panel Data* (Cambridge, MA: MIT Press).

5

Financial Sector Development, Savings Mobilization and Poverty Reduction in Ghana

Peter Quartey

Introduction

Domestic resources serve as a vital engine of growth and poverty reduction. However, the effective mobilization of domestic resources depends on an efficient and well-developed financial market. The financial sector in Ghana has undergone change in terms of the number of institutions and services rendered, as a result of the financial sector liberalization programme pursued in the late 1980s, which led to interest rate liberalization and the entrance of new players. The outcome of this liberalization policy is reflected in Ghana's financial development indicators: the M2/GDP ratio increased from 0.195 in 1996 to 0.32 in 2003. Similarly, over the same period the currency/M2 ratio declined from 0.41 to 0.29.

Despite these developments, the level of mobilized domestic resources, savings included, has not been enough to stimulate private investment to propel the economy towards the desired level of growth. Savings as a percentage of GDP were 5.5 per cent in 1990, declined to 1.3 per cent in 1992 and continued to exhibit oscillatory trends until the year 2000 when a savings–GDP ratio of 3.5 per cent was recorded. On a positive note, the savings ratio has increased consistently thereafter and, by 2002, had reached 7.4 per cent (Figure 5.1).

However, private savings in Ghana remain low by African standards. Gross domestic savings as a percentage of GDP in Ghana are low compared to many African countries, and averaged 6.4 per cent between 1980 and 2001, while the corresponding figures were 37.4 per cent for Botswana, 21.4 per cent for Cameroon, 21.6 per cent for Nigeria, 13.9 per cent for Kenya and 7.3 per cent for Malawi (World Bank 2003). Thus, domestic resource mobilization has been relatively low, despite the innovations and developments within Ghana's financial sector.

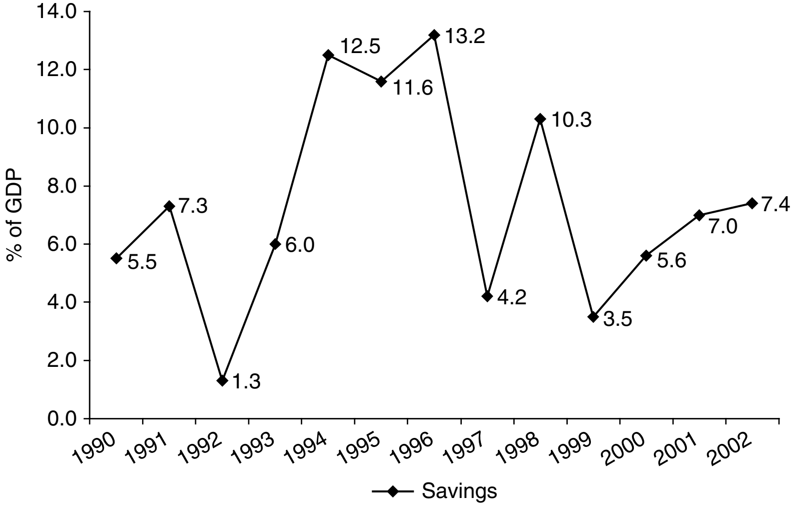

Figure 5.1 Savings–GDP ratio, 1990–2002
Source: World Bank (2004).

The development in the financial sector has also occurred during a period when poverty declined in Ghana, although the direction of causation has not been established. Between 1992 and 1999, the number of people considered to be poor dropped from 51 to 40 per cent (Ghana Living Standards Survey (GLSS), 3 and 4). However, not all groups gained from this reduction in poverty: there were both winners and losers; the winners being the export farmers and the losers the foodcrop farmers, the majority of whom were women. In addition, people living in the urban areas of the northern savannah experienced an increase in their poverty level.

Poverty increased during the 1990s in the upper east, northern and central regions, while significant reductions in poverty at the national level have been concentrated in four regions (western, Greater Accra, Volta and Brong Ahafo). Other regions (central, northern and upper east) experienced large increases in poverty between 1991 and 1999, while the remaining regions show little change. The Ghana Statistical Service (2003) results showing the distribution and intensity of poverty across regions are given in Figure 5.2. The proportion of the poor in the three northern regions remains high, relative to other regions. About 68–74 per cent of people in the three northern regions are either poor or very poor compared to between 18 per cent and 58 per cent in

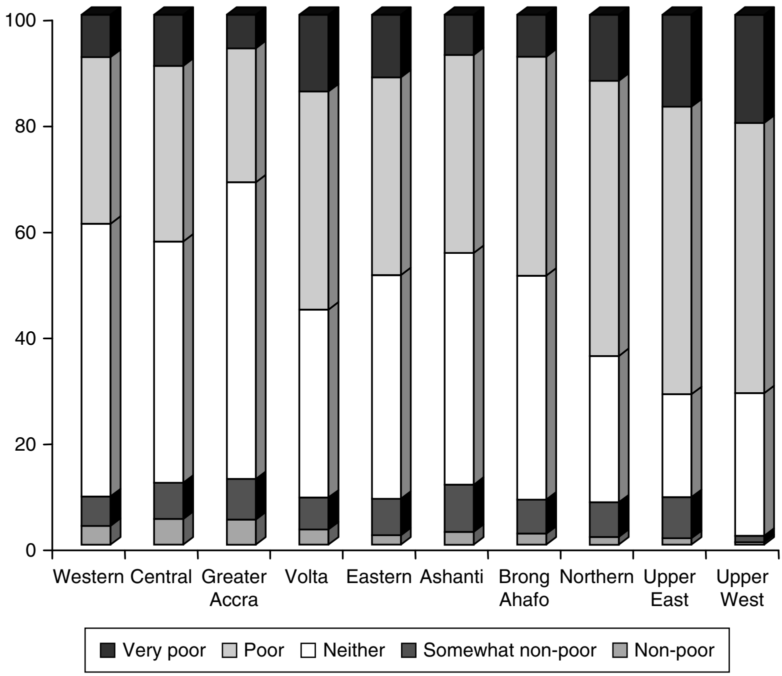

Figure 5.2 Regional distribution of households by poverty status
Source: Ghana Statistical Service (2003).

other regions. The level of poverty in Ghana when viewed in terms of occupation indicates that foodcrop farmers are the poorest (Figure 5.3).

Thus far, there appears to be some development in Ghana's financial sector and aggregate poverty has declined, but the issue of whether the financial developments induced the poverty decline in Ghana remains a mystery. This problem is the focus of this chapter.

Developments in Ghana's financial sector

As with most developing countries that have pursued economic and structural reforms, Ghana has undergone a process of financial sector restructuring and transformation as an integral part of a comprehensive financial sector liberalization programme. Ghana's financial sector liberalization programme began in the early 1990s as part of a comprehensive macroeconomic adjustment programme, with the support of the

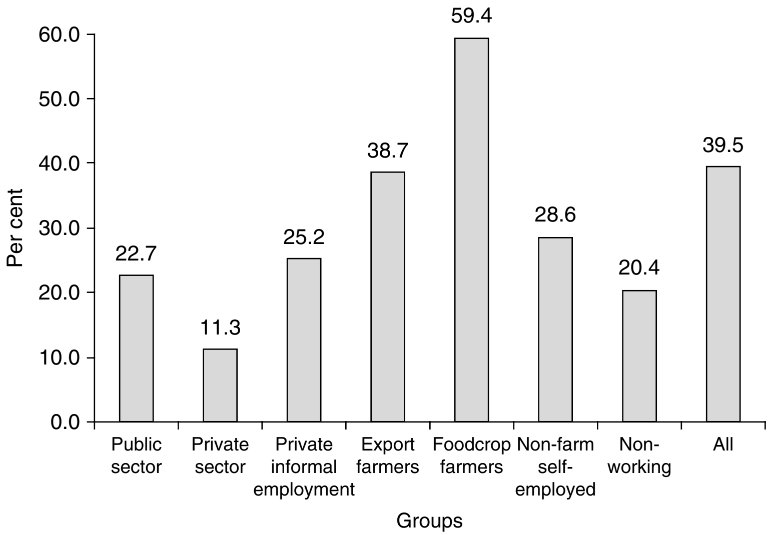

Figure 5.3 Poverty status by occupation, 1999
Source: Ghana Statistical Service (2000).

International Monetary Fund and the World Bank. This involved the restructuring of distressed banks and the cleaning up of non-performing bank assets to restore banks to profitability and viability.

The programme set the prices right, and initiated structural reforms to include fiscal and monetary operations as well as privatization, banks included. The reforms were a throwback to the history of severe distress and dysfunction in the banking system, illiquidity and insolvency, interest rate controls, and credit rationing punctuated by an event of vetting of accounts and the lingering effects on security deposits and confidentiality. In retrospect, the financial sector adjustment programme (FINSAP) was a successful reform agenda, though it remains a powerful reminder of the banking problems of the 1990s.

The financial system that emerged after the reforms is relatively diversified in the range of services and increasingly offers innovative new products. While small and medium-sized private enterprises depend extensively on self-financed capital investments, the economy is dominated primarily by bank-intermediated debt finance. The next stage, and the thrust of financial market policy, was therefore the development of a vibrant capital market as a vehicle for raising funds to support large amounts of equity finance and investment.

The reforms, liberalizing interest rates and bank credit by government, transformed the financial sector from a regime characterized by controls to a market-based system. The central bank also shifted gradually from a system of direct monetary controls to an indirect system that utilized market-based policy instruments. As part of the process, the Bank of Ghana rationalized the minimum reserve requirements for banks, introduced new financial instruments and opened market operations for liquidity management. These policies were complemented with an improvement in the soundness of the banking system through a proper regulatory framework, the strengthening of bank supervision and an upgrade in the efficiency and profitability of banks, including replacement of their non-performing assets (Quartey 1997).

As part of the process of full liberalization, the Bank of Ghana introduced 'universal banking' in the first quarter of 2003; this allows banks to undertake commercial, development, investment or merchant banking without the need for separate licences. The practice also enables all banks capable of expanding into, or currently operating in banking areas other than those permitted by their licence or regulations, to undertake all types of banking business. This development, however, depends on the capital resources of the institution as it would, with the expected expansion, assume greater risk and therefore would need to be well resourced. There were further developments within Ghana's financial sector in 2003, which included the acquisition of 50+ per cent equity stakes in SSB Bank by Société Générale, the establishment of a local branch office by Citibank, the Union Bank of Nigeria's acquisition of a 20 per cent equity stake in Home Finance Company, a local mortgage institution, and the launch of a real-time gross settlement system for high value transactions. These financial sector reforms have led to changes in Ghana's monetary indicators, which are discussed below.

Financial deepening

The reforms had significantly affected Ghana's financial development. The level of financial deepening, as measured by Cu/M2+, M1/GDP, M2/GDP and Cu/GDP, improved between 1996 and 2003. Table 5.1 shows that M2+/GDP ratios increased from 0.195 in 1996 to 0.32 in 2003. Similarly, the currency/GDP ratio improved by 1.4 percentage points over the same period, while the currency ratio (Currency/M2+) improved by 12.0 percentage points for the same period. In Ghana, currency accounts for a greater proportion of transactions. Thus, the persistent decline in the currency ratio since the year 2000 signals an improvement in the financial depth of the economy. The decline in cash

Table 5.1 Financial deepening, 1996–2003

Year-end	Nominal M2+	Nominal M1	Currency (Cu)	Nominal GDP	M2+ GDP	M1/ GDP	Cu/ GDP	Cu/ M2+
	Cedis bn	Cedis bn	Cedis bn	Cedis bn				
1996	1,785.0	1,215.1	724.0	9,167.0	0.195	0.133	0.079	0.41
1997	2,506.0	1,765.7	981.8	13,863.0	0.181	0.127	0.071	0.39
1998	3,903.0	2,070.0	1,083.6	17,157.0	0.227	0.121	0.063	0.28
1999	4,896.5	2,192.5	1,272.4	20,580.0	0.238	0.107	0.062	0.26
2000	7,248.1	3,516.5	2,635.5	27,153.0	0.267	0.130	0.097	0.36
2001	10,248.0	5,121.8	3,089.9	38,014.0	0.270	0.135	0.081	0.30
2002	15,368.1	8,218.0	4,671.6	47,764.0	0.322	0.172	0.098	0.30
2003	20,875.4	11,074.3	6,039.3	65,262.0	0.320	0.170	0.093	0.29

Source: *Bank of Ghana Statistical Bulletins* (various years).

holdings in recent times may be attributed to an increase in the use of electronic cards within the economy.

Trends in interest rates

The prime rate has declined consistently from a high of 37.0 per cent in 1998 to 25.5 per cent in 2003, and further to 18.0 per cent in 2004. The Monetary Policy Committee (MPC) raised the prime rate from 24.5 per cent in December 2002 to 25.5 per cent in January 2003 in order to reflect the generated inflationary pressures following the monetary expansion that was undertaken during the last quarter of 2002. The rate was reduced in February to its December 2002 level, only to be raised steadily to 27.5 per cent by April 2003 when petroleum price adjustments caused inflation to reach 30 per cent. The prime rate was maintained at this level until July, when the inflationary pressures receded. The MPC gradually reduced the rate to 21.5 per cent by year-end 2003 and was at 18.8 per cent by the end of 2004.

Meanwhile, the savings rate has increased marginally over the same period: from 16.5 per cent in 1998 to 18 per cent in 2000, but declining thereafter to 11.09 per cent in 2003. Similarly, the lending rates of banks have also responded marginally to the decline in the bank's prime rate. The lending rate was 38.5 per cent in 1998, rose to 47 per cent in 2000 but declined to 34.95 per cent in 2003. Obviously, such a huge margin between the lending and savings rate does not augur well for financial intermediation and this is reflected in the low savings rate in the economy.

Table 5.2 Interest rates, 1998–2003

	Averages (% per annum)					
	1998	**1999**	**2000**	**2001**	**2002**	**2003**
Central bank						
Bank rate/prime rate*	37.00	27.00	27.00	27.00	24.50	25.50
Treasury bill discount rate (91 days)	26.75	31.49	38.00	27.65	23.68	26.36
Interest rate equivalent	28.67	34.18	41.99	29.70	25.16	28.27
Commercial banks						
(a) Deposit rates						
Demand deposits	4.70	8.50	16.75	13.50	8.00	8.50
Savings deposits	16.50	10.50	18.00	14.50	11.13	11.09
Time deposits (3 months)	29.50	21.75	33.50	23.25	16.22	14.28
Certificates of deposit	25.25	18.75	33.75	18.00	14.56	15.79
Call money	23.00	na	28.00	17.00	12.17	12.52
Others	22.27	17.44	24.80	18.33	12.83	13.42
(b) Lending rates	38.50	36.50	47.00	43.75	36.36	34.95

Note: * The prime rate was introduced at the end of March 2002.
Source: *Bank of Ghana Statistical Bulletin* (2004).

In contrast, the money market rates were more flexible in relation to interest rate movements compared to lending and borrowing rates. Between 2002 and 2004, the rates on money market instruments and the inter-bank weighted average rates were the most responsive to movements in the prime rate during the period. In response to the downward trend in the prime rate during the second half of 2003, the 91-day bill rate and the weighted inter-bank average rate declined by the end of 2003 by 16.61 and 9.55 percentage points, respectively.

Domestic resource mobilization

The level of private savings in Ghana is low by African standards and, in recent times, there appears to be a shift from savings and time deposits towards money market instruments (ISSER 2004). The share of money market instruments increased consistently from 48.9 per cent in 1995 to 57.7 per cent in 2001, and then to 62.7 per cent in 2003, while the share of savings deposits in total private savings declined steadily from 27.1 per cent in 2001 to 23.0 per cent in 2003 (Table 5.3). However, although time deposits declined from 15.8 per cent in 2001 to 13.1 per cent in 2002, these increased to 14.3 per cent in 2003. Thus, money market instruments remain a dominant component of total private savings,

Table 5.3 Private savings with formal financial institutions (%), 1995–2003

Year	Money market instruments	Savings deposits	Time deposits	Total
1995	48.9	40.2	10.9	100
1996	51.0	39.8	9.2	100
1997	52.0	30.7	17.3	100
1998	55.6	25.3	19.1	100
1999	51.5	19.9	28.6	100
2000	61.2	23.8	15.0	100
2001	57.7	27.1	15.8	100
2002	58.1	28.8	13.1	100
2003	62.7	23.0	14.3	100

Source: Calculated from the *Bank of Ghana Statistical Bulletin* (February 2004).

accounting for 62.7 per cent of total private savings in 2003, while savings deposits and time deposits accounted for 23.0 per cent and 14.3 per cent of total private savings, respectively (Table 5.3). Also, between 2001 and 2003, preferences shifted from short-term instruments towards long-term instruments.

The year 2003 also recorded an increase from 3,332.7 billion cedis in 2002 to 4,786.0 billion cedis in the nominal values of private savings and an increase of 43.6 per cent for time deposits as compared to the 32.5 per cent growth rate recorded between 2001 and 2002. Foreign currency deposits with domestic money banks (DMBs) rose from 3553.3 billion cedis to 4576 billion cedis, representing a 28.8 per cent increase compared to an increase of 49.7 per cent recorded in 2002 (Table 5.3). This partly accounts for the relatively low changes in 2003 in money supply growth, inflation and the exchange rate, as compared to the preceding year.

It is worth emphasizing that most savings, especially those of the relatively poor, are held in the form of real assets. Aryeetey (2005) argues that this equilibrium portfolio allocation results from both the poor performance of financial assets and the strong desire for owning the real assets used directly in production. These, in turn, are both consequences (in large part) of information asymmetries. The poor performance of financial assets is not particularly surprising, because financial 'saving' is affected by precisely the same information and enforcement difficulties as 'lending'. As a result, much of the financial savings that does occur is held within close social groups in order to circumvent the moral hazard and adverse selection problems associated with entrusting assets to strangers.

Financial sector development and poverty reduction

Financial sector development and savings mobilization

Literature clearly suggests a strong positive relationship between financial sector development (FSD) and savings mobilization. In the early works of McKinnon (1973) and Shaw (1973), they argue that the liberalization of interest rates would end financial repression and cause financial deepening due to the resulting increased efficiency of the intermediation process, and the effects of higher interest rates on savings. The difference between the hypotheses of these two authors is in the transmission mechanisms through which they believe this process would occur. Similarly, Mavrotas and Santillana (1999) present the theoretical links between financial sector liberalization and savings mobilization based on the life cycle or permanent income theory of consumption. They argue that financial liberalization increases competition between providers of financial intermediation, thereby eliminating the constraint on borrowing. This means that the young can now borrow in order to attain their optimal lifetime consumption path.

Empirical studies on the linkage between financial liberalization and the consumption/savings decisions of individuals can be classified largely into two groups, depending on whether the focus is on consumption or savings. The group of studies that focuses on consumption usually extends the Euler equation framework of Hall (1978) and Campbell and Mankiw (1989), and examines whether consumption growth responds to various measures of financial liberalization. These studies typically find that financial liberalization increases current consumption growth by relaxing credit constraints (see, for example, King 1986, de Brouwer 1996, Ludvigson 1996 and Bacchetta and Gerlach 1997). However, the results from these studies are not directly related with the issue of financial liberalization and saving.

According to the standard theory, the interest rate is positively correlated with consumption growth (permanent income hypothesis) but has an ambiguous impact on saving. Similarly, financial liberalization may affect consumption growth but with no clear effect on saving. However, the results of some studies suggest that financial liberalization actually reduces the quantity of savings (de Melo and Tybout 1986, Muellbauer and Murphy 1993, Jappelli and Pagano 1994, Ostry and Levy 1995, Bandiera *et al.* 2000). On the contrary, Bandiera *et al.* (1998), using a principal components analysis, find that the effects of financial liberalization on savings differ across countries: there is no evidence of significant and sizable interest rate effects. Overall, there is no firm evidence that liberalization increases savings; often it will reduce it.

Although financial liberalization can enhance the efficiency with which saved resources are channelled into productive use, the effect on the quantity of savings is theoretically ambiguous (Bandiera *et al.* 2000). The mechanisms at work here include both long-term and short-term effects. Having settled down, a competitive liberalized financial system will typically be characterized by improved savings opportunities, including higher deposit interest rates, a wider range of savings media with improved risk–return characteristics and, in many cases, more banks and bank branches, as well as other financial intermediaries. Bank lending rates will typically be higher for those borrowers who had privileged access in the restricted regime, but access to borrowing should be wider. These long-term effects of liberalization on aggregate private savings will be felt through changes in the rates of return and in the degree of credit restrictions. Moreover, financial liberalization can have a favourable effect on the allocation of resources, which will generate increases in income that will, in turn, increase savings.

The process of financial liberalization also unleashes a series of short-run effects. In particular, not only can the process of domestic portfolio adjustment lead to transitory changes in the volume of domestic savings, but may also (especially when combined with liberalization of the foreign exchange market) induce large capital inflows; such inflows, if not sterilized, can result in a credit boom leading to real income surges. These, in turn, have a direct but transitory effect on the volume of savings. Therefore, in modelling the effect of financial liberalization on saving, consideration would have to be given to these short-run effects, as well as the long-run effects. It is also important to recognize that some of the overall effects can come through the effect of income on savings.

Savings mobilization and growth

Some studies have also examined the relationship between domestic resource mobilization, including private savings and economic growth. The Harrod–Domar model predicts a strong positive relationship between economic savings and growth. Similarly, in the Solow–Swan model, a change in the savings rate changes the economy's balanced growth path and, hence, per capita output in the steady state, but it does not affect the growth rate of output per worker on the balanced growth path. Only an exogenous technological change will result in a further increase in output per worker in the steady state. By contrast, in the Romer growth model technology is endogenized and therefore an increase in the savings rate not only raises the per capita output in steady state, but also increases the growth rate of per capita output.

Mavrotas and Santillana (1999) support the view that higher savings raise the growth of GDP by increasing capital accumulation. They note that the investment growth link has been challenged by a number of studies that argue that the co-movement of investment ratios and growth rates may be mainly the result of a third crucial factor; namely, technological innovation, which drives both output expansion and capital accumulation. More precisely, they indicate that recent empirical studies cast serious doubts on the hypothesized positive impact of investment on growth. Mavrotas and Santillana provide robust empirical evidence according to which, even though a causal link seems to be apparent, the direction of causation runs from growth to investment and not vice versa, as pointed out by King and Levine (1994), Benhabib and Jovanovic (1991) and, much later, by Blomstrom *et al.* (1996). However, the authors explain that the intrinsic endogeneity of the two makes the assessment of the direction of causation extremely difficult.

Some authors have attempted to deal with the endogeneity problem of savings and growth through mechanisms such as the use of instrumental variables techniques and causality tests. Carroll and Weil (1993) use household-level data to deal with this issue, and conclude that there is evidence suggesting that growth indeed affects private savings positively. Cardenas and Escobar (1998) also examine the question of causation for Colombia by using a first-order vector autoregression of the growth rate and the savings rate for the period 1925–94. They find that changes in national savings and changes in investment are perfectly correlated, and that savings Granger-cause growth. Similarly, an earlier work by Edwards (1996) finds that the coefficient on the rate of growth in per capita GDP is significantly positive in a private savings regression, and seems to provide some support for the hypothesis that there is a vicious circle in operation.

Mavrotas and Kelly (2001) use a methodology proposed by Toda and Yamamoto (1995) to test for causality between growth and savings, in order to avoid the problems and possible misleading inferences associated with the asymptotic nature of Granger causality testing in time-series studies. The relationship between gross domestic product, gross domestic savings and private savings is examined for India and Sri Lanka, and they find no causality between GDP growth and private savings in India, but there appears to be a bi-directional causality between private savings and growth in Sri Lanka. These authors conclude that the existing evidence on the subject should be treated with caution, given the inappropriateness of the econometric methodology adopted in most of the previous empirical studies using time-series data.

In a related study, Kelly and Mavrotas (2003) use panel integration and cointegration tests for a dynamic heterogeneous panel of 17 African countries to examine the impact of FSD on private savings. They use three different measures of FSD to capture the variety of channels through which financial structure can affect the domestic economy. The empirical results obtained vary considerably among the countries in the panel, thus highlighting the importance of using different measures of FSD rather than a single indicator. The evidence is rather inconclusive, although in most of the countries in the sample a positive relationship between FSD and private savings seems to hold. Their empirical analysis also suggests that a change in government savings is offset by an opposite change in private savings in most of the countries in the panel, thus confirming the Ricardian equivalence hypothesis. Liquidity constraints do not seem to play a vital role in most of the African countries in the group, since the relevant coefficient is negative and significant in only a small group of countries.

Similarly, a study by Anoruo and Ahmad (2001) utilizes cointegration and the vector error-correction modelling technique (VECM) to explore the causal relationship between economic growth and growth rate of domestic savings for Congo, Côte d'Ivoire, Ghana, Kenya, South Africa and Zambia. Specifically, three analyses are undertaken: first, the time-series properties of economic growth and domestic savings were ascertained with the help of the augmented Dickey–Fuller unit root procedure. Second, the long-run relationship between economic growth and growth rate of domestic savings was examined in the context of the Johansen and Juselius (1990) framework. Finally, a Granger causality test was undertaken to determine the direction of causality between economic growth and growth rate of domestic savings. The results indicate one order of integration for each of the series. The results of the cointegration tests suggest that there is a long-run relationship between economic growth and the growth rate of savings. Also, contrary to conventional wisdom, economic growth prima facie causes growth rate of domestic savings for most of the countries in their sample.

Financial sector development and economic growth

Other studies have also examined the link between FSD, economic growth and poverty reduction in order to identify clearly the channels through which FSD can influence economic growth. Theorists can be subdivided into two broad schools of thought: (i) the structuralists;

and (ii) the repressionists. The structuralists contend that the quantity and composition of financial variables induce economic growth by directly increasing savings in the form of financial assets, thus encouraging the capital formation that leads to economic growth and, consequently, poverty reduction.

The financial repressionists, led by McKinnon (1973) and Shaw (1973) – often referred to as the 'McKinnon–Shaw' hypothesis – contend that financial liberalization in the form of an appropriate rate of return on real cash balances is a vehicle for promoting economic growth. The essential tenet of this hypothesis is that a low or negative real interest rate will discourage savings. This will reduce the availability of loanable funds for investment, which, in turn, will lower the rate of economic growth. Thus, the McKinnon–Shaw model posits that a more liberalized financial system will increase competition, increase interest rates and induce an increase in savings and investment, consequently promoting economic growth. Empirical studies have also established the relationship between FSD and economic growth. Jung (1986) finds a bi-directional causality between financial and real variables in postwar data for 56 countries, 19 of which are developed industrial economies. Demetriades and Hussein (1996) conduct causality tests and find little evidence that FSD causes economic growth. They note that causality patterns vary across countries. On the other hand, Wachtel and Rousseau (1995) find that FSD Granger-causes economic growth.

Financial sector development and poverty reduction

Few studies have attempted to establish the relationship between FSD and poverty reduction. The interaction between financial development and poverty can be examined by first considering the contribution that financial development makes to the growth performance of the economy. This, in turn, has implications for changes in the poverty level within the economy. Deininger and Squire (1996), and later Dollar and Kraay (2001), argue that growth has been beneficial for the poor. Using data on the income of the lowest quintiles, they show empirically that the poor have benefited from growth at least as much as the other quintiles. Dollar and Kraay's empirical results suggest that 'good' macroeconomic policies, openness and globalization have a positive, direct impact on the income of the poor.

Similarly, Jalilian and Kirkpatrick (2001) examine the link between financial development and poverty reduction by using data for a sample of 26 countries, including 18 developing countries. They use bank deposit money assets, and net foreign assets, as measures of financial development. Their results suggest that a 1 per cent change in financial development raises growth in the incomes of the poor in developing countries by almost 0.4 per cent.

Financial development can also have an indirect impact on the living standards of the poor through its support of economic growth (World Bank 2001: 6). The relationship between growth and poverty has been the focus of considerable attention in recent years (Squire 1999; Ravallion 2001; World Bank 2001). A World Bank study (2001: 52) explains that any given growth scenario can generate different poverty outcomes: for a given rate of growth, the extent of poverty reduction depends on how the distribution of income changes with changes in growth; and on initial inequalities in income, assets and access to opportunities to allow the poor to share in growth. Equi-proportional growth leaves income distribution intact, whereas, by improving the position of some at the lower scale of distribution, it reduces poverty. Pro-poor growth, however, will by definition improve the status of the poor and affect income distribution.

Studies have shown that FSD can lead to poverty reduction and can also affect inequality. For instance, Goudie and Ladd (1999) and McKay (2002) argue that although growth will benefit the non-poor in society, at the same time it will improve income distribution. It is obvious therefore, that aggregate growth may have different relationships to poverty. Beck *et al.* (2004) use data on 52 developing and developed countries over the period 1960–99 to assess whether there is a direct relationship between financial development (measured by credit to private sector ratio) and changes in income distribution. They find that the income of the poorest 20 per cent of the population grows faster than the average GDP per capita in countries with higher financial development, and that income inequality falls. They also find that financial development contributes to reductions in infant mortality. Similarly, Honohan (2004) finds that financial development (measured by private credit to GDP ratio) is negatively associated with headcount poverty, with a coefficient suggesting that a 10-percentage point increase in the ratio of private credit to GDP should (even at the same mean income level) reduce poverty ratios by 2.5–3 percentage points.

Some studies have examined the relationship between financial development and the distribution of income, about which there are competing theories. For example, Greenwood and Jovanovic (1990) argue that there is an inverted U-shaped relationship between income inequality and financial development; that is, financial development leads to greater inequality to begin with, which, however, falls back again as financial development continues. This theory is based on the idea that financial intermediaries provide savers with higher returns and lower risks, but that poor individuals initially cannot afford to make use of these financial intermediaries, which results in growing inequality. It is assumed, however, that more and more poor people will be able to afford to use these intermediaries over time, offsetting the initial increase in inequality.

Banerjee and Newman (1993) and Galor and Zeira (1993) argue that imperfections in financial markets create hurdles to borrowing funds for income-enhancing investments. It is only the rich who are able to overcome these hurdles and, therefore, they serve to perpetuate the initial distribution of wealth. Financial development overcomes these imperfections and thus reduces income inequality (that is, there is a negative relationship between the two).

Clarke *et al.* (2002) empirically investigate these alternative theories on the relationship between financial development and income inequality with data from 91 countries between 1960 and 1995. As measures of financial development, they use credit to the private sector by financial intermediaries, and claims on the non-financial domestic sector by banks. Their findings support the theory that there is a negative relationship between financial development and income inequality rather than an inverted U-shaped relationship. They note that financial development reduces inequality, even when there are initially low levels of financial development. However, they also find that the beneficial impact of financial development on income inequality is smaller in countries with larger modern (non-agricultural) sectors.

These same authors (Clarke *et al.* 2002) also provide some support for the Kuznets-based theory, which suggests that financial development facilitates more migration from the low-income, but more egalitarian, agricultural sector to the higher-income but unequal modern (industrial and services) sector. Thus, FSD increases inequality, although it still reduces income inequality as long as the modern sector accounts for less than 99.6 per cent of GDP (which was true of almost all countries in the sample). For the average country in the sample, they estimate that a 1 per cent increase in private credit reduces inequality by 0.3 per cent.

Evidence on the relationship between financial development and inequality is mixed; that is, neither the theory nor the evidence is conclusive on the impact of financial development on inequality. In conclusion, there is strong evidence from the literature that FSD can lead to poverty reduction. The financial system in Ghana has witnessed considerable development, including interest rate liberalization and the emergence of new products and institutions. However, there has been no empirical study using multivariate causality tests to establish and explain the relationship between FSD, savings mobilization and poverty reduction in Ghana. This raises the following issues:

(i) Why has the FSD not stimulated domestic resource mobilization?
(ii) Have financial intermediaries intermediated savings into the pro-poor sectors of the economy?
(iii) Has the formal financial sector responded to interest rate cuts by the central bank to reduce the cost of credit to the pro-poor sector of the economy, particularly small and medium-sized enterprises?

These issues will be the principal focus of investigation by the study.

The study uses both descriptive and analytical statistical methods to examine the interrelationship between FSD, domestic resource mobilization and poverty reduction. It will specifically investigate the following issues:

(i) Explore, with a series of causality tests, the direction of causality between (a) FSD and domestic resource mobilization; (b) FSD and poverty reduction; and (c) domestic resource mobilization and poverty reduction. These causal relationships will be examined;
(ii) Investigate whether there is a long-run relationship between FSD and poverty reduction in Ghana; and
(iii) Suggest ways in which the FSD in Ghana can accelerate poverty reduction.

Methods of analysis

The study adopts the descriptive statistical analysis approach, using frequency distribution of indicators of FSD, domestic revenue mobilization and poverty. It exploits the causality between: (i) FSD and domestic resource mobilization; (ii) FSD and poverty reduction; and (iii) domestic resource mobilization and poverty reduction. The causal relationships are examined with the help of a Granger causality procedure. To determine whether there is a long-run relationship between FSD, domestic resource mobilization and poverty reduction, the Johansen cointegration procedure is used (Johansen and Juselius 1990; Johansen 1991).

Table 5.4 Definition of variables

Variable	**Definition**
GDSGDP	Gross domestic savings measured as a percentage of GDP
DCRPGDP	Domestic credit to the private sector as a percentage of GDP
PCONS	Per capita consumption
M2GDP	M2 as a percentage of GDP
EX	Exchange rate
POPG	Population growth rate
TOT	Terms of trade

Definition of variables and data sources

The detection of causal relationships within a set of variables is one of the objectives of empirical research. A degree of correlation between FSD, domestic resource mobilization and poverty reduction does not necessarily mean the existence of a causal relationship among them; it may simply be attributable to the common association of a third variable. Accordingly, Granger formulated a procedure for detecting a causal relationship among the variables. Having established the direction of causality, an empirical model of the determinants of FSD will be estimated. The model is specified as:

$$Yi = \beta_1 + \beta_i X_i + e_i$$

where Yi is FSD and Xs is a vector of explanatory variables including income measures of poverty. The variables used in the analysis are defined in Table 5.4.

The study relies heavily on the data obtained from *Bank of Ghana Statistical Bulletins* and the World Bank's *World Development Indicators* (2003). Annual data from 1970–2002 are used.

Findings

Unit root test

We report the data properties by examining the unit root properties of the variables in Table 5.5. The equation estimated for the augmented Dickey–Fuller (ADF) test is stated as follows:

$$\Delta X_t = \phi_0 + \beta_t X_{t-1} + \sum_{i=1}^{n} \theta_i \Delta X_{t-1} + \varepsilon_t$$

Table 5.5 Augmented Dickey–Fuller (ADF) unit root test

Variable	*t*-adf	lag 1[a]	Variable	*t*-adf
M2GDP	−1.8518	3	ΔM2GDP	−1.6206
M2GDP	−0.92123	2	ΔM2GDP	−1.7201
M2GDP	−1.0185	1	ΔM2GDP	−3.7202**
M2GDP	−1.0129	0	ΔM2GDP	−4.9813**
GDSGDP	−2.7687	3	ΔGDSGDP	−4.1902**
GDSGDP	−2.2767	2	ΔGDSGDP	−2.6635
GDSGDP	−2.0322	1	ΔGDSGDP	−3.7737**
GDSGDP	−3.7015*	0	ΔGDSGDP	−9.8038**
PCONS	−3.5456*	3	ΔPCONS	−2.9422
PCONS	−3.6002*	2	ΔPCONS	−3.9141**
PCONS	−3.9469**	1	ΔPCONS	−4.7750**
PCONS	−4.0135**	0	ΔPCONS	−5.3824**
DCRPGDP	0.70164	3	ΔDCRPGDP	−0.93909
DCRPGDP	0.88071	2	ΔDCRPGDP	−1.5896
DCRPGDP	0.96086	1	ΔDCRPGDP	−2.3614
DCRPGDP	1.9869	0	ΔDCRPGDP	−3.0410*

Notes: [a] Lag length selected using $T^{1/3}$; ** Significance at 5 per cent and * Significance at 10 per cent;
Unit-root tests in levels 4 to 31;
Critical values: 5 per cent = −2.971, 1 per cent = −3.685, constant included;
Unit-root tests in 1st difference (Δ) 5 to 31;
Critical values: 5 per cent = −2.975, 1 per cent = −3.696, constant included.

where Δ is the first difference operator, t is the time trend, ε is the stationary random error and n is the maximum lag length. The null hypothesis is that the series contains a unit root which implies that $\beta_1 = 0$. The null hypothesis is rejected if β_1 is negative and statistically significant.

In all cases – except for gross domestic savings measured as a percentage of GDP (*GDSGDP*), which is stationary in levels at zero lag length – the FSD indicators, M2/GDP and domestic credit to the private sector measured as a percentage of GDP (*DCRPGDP*) have unit roots. Per capita consumption (*PCONS*) also follows a random walk. All the variables that are stationary after first difference are integrated of first order I (1). These tests are complemented with graphical analysis (Appendix Figures A5.1 and A5.2), which show that the variables become stationary after the first difference.

Causality test

We undertake a causality test to establish the link between financial development, domestic savings and per capita consumption (a measure of poverty) and these results are reported in Table 5.6. The null

Table 5.6 Granger causality test
Sample: 1970/2001
Lags: 3

Null hypothesis	**Obs.**	**f-statistics**	**Probability**
DDCRPGDP does not Granger-cause DGDSGDP	27	0.79617	0.51041
DGDSGDP does not Granger-cause DDCRPGDP		0.76527	0.52683
DM2GDP does not Granger-cause DGDSGDP	28	0.07838	0.97101
DGDSGDP does not Granger-cause DM2GDP		0.31662	0.81320
DPCONS does not Granger-cause DGDSGDP	28	0.06626	0.97719
DGDSGDP does not Granger-cause DPCONS		1.54357	0.23270
DM2GDP does not Granger-cause DDCRPGDP	27	0.07602	0.97221
DDCRPGDP does not Granger-cause DM2GDP		0.47453	0.70350
DPCONS does not Granger-cause DDCRPGDP	27	1.08022	0.38005
DDCRPGDP does not Granger-cause DPCONS		6.65407	0.00269***
DPCONS does not Granger-cause DM2GDP	28	1.62635	0.21338
DM2GDP does not Granger-cause DPCONS		1.54803	0.23162

Notes: Significance at 1 per cent denoted by ***.

hypothesis of no causal relationships between gross domestic savings measured as a percentage of GDP (*GDSGDP*) and financial development measured as domestic credit to the private sector as a percentage of GDP (*DCRPGDP*) is accepted. In Ghana, the two variables do not predict each other. Credit to the private sector strongly predicts *PCONS* with a probability of 1 per cent. The key issue that emerges from Table 5.6 is that FSD induces poverty reduction.

Financial sector development and poverty reduction

Having established the causal relationship between FSD and poverty, we proceed with the Johansen (1992) procedure to test for the long-run relationship between FSD and poverty reduction in Ghana. The findings as presented in Table 5.7 reject the null hypothesis of no cointegration at a 1 per cent level of significance in favour of two cointegration vectors, at most. The long-run relationship between financial development, domestic savings and poverty in Ghana has thus been established. The fact that there is a long-run equilibrium relationship between the three series confirms the existence of causality, at least in one direction. This

Table 5.7 Johansen cointegration test

Hypothesized no. of CE(s)	Eigenvalue	Trace statistic	Critical value (at 5%)	Critical value (at 1%)
None **	0.723	50.107	29.68	35.65
At most 1 *	0.434	15.443	15.41	20.04
At most 2	0.001	0.029	3.76	6.65

Notes: Rejection of the hypothesis at 5 per cent (1 per cent) significance level is denoted by *(**);
Trace test indicates two cointegrating equation(s) at 5 per cent significance level.

goes to confirm the earlier estimates from the Granger causality test reported in Table 5.6.

Johansen cointegration test

Table 5.7 shows the eigenvalues, likelihood ratio and trace test statistics adjusted for degrees of freedom. The result shows that we have two significant vectors. It should be noted that in a system of N variables, we should expect to generate or identify N–1 cointegrating vectors. The method used here helps us to get the most significant vectors.

The cointegration test includes financial development indicators (*DCRPGDP* or M2GDP), domestic savings (*GDSGDP*) and per capita consumption (*PCONS*).

The cointegrating vector is not identified unless we impose some arbitrary normalization. The normalized cointegrating relation assuming two cointegrating relations $r = 2$ is given in Table 5.8. The vectors are identified jointly and normalized with *DCRPGDP* and *GDSGDP* consistent with the objectives of the study. The first vector is normalized with *DCRPGDP*. We see that the coefficients of this vector for *DCRPGDP* are consistent with theory.

Impulse response functions

We analyse the impulse response function[1] which traces the effect of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables; namely, in this study, *DCRPGDP* or M2GDP, *GDSGDP* and *PCONS*. Figures 5.4, 5.5 and 5.6 show the results of the impulse response analyses derived from the estimated VEC models. The number of lags used is 3 and based on the evidence

Table 5.8 Normalized cointegration relationship

DCRPGDP	GDSGDP	PCONS	C
Normalized cointegrating coefficients: 1 cointegrating equation(s)			
1.000000	−3.737735	0.304064	−67.63952
	(2.38482)	(0.23273)	
Loglikelihood	−198.6376		

Normalized cointegrating coefficients: 2 cointegrating equation(s)

DCRPGDP	GDSGDP	PCONS	C
1.000000	0.000000	−0.098594	24.57591
		(0.01754)	
0.000000	1.000000	−0.107728	24.67147
		(0.01070)	
Loglikelihood	−190.9306		

provided by $L = T^{1/3}$ where L is number of lags and T is the number of data points used.

Figure 5.4 shows the response of *PCONS* to *DCRPGDP*. A shock to *DCRPGDP* reduces *PCONS* slightly in the first two periods and increases thereafter. However, the response to the shock by *GDSGDP* is positive throughout the period.

Figure 5.5 also presents very straightforward results, as a *DCRPGDP* shock increases gross domestic savings throughout the entire period while a shock to *PCONS* increases slightly initially and dissipates thereafter.

In Figure 5.6, while a one-off shock to gross domestic savings increases domestic credit to the private sector significantly, consumption shock reduces domestic private sector credit over the period. This is consistent with theory.

Variance decomposition

We proceed by analysing the variance decomposition. The variance decomposition shows the relative importance of shocks in explaining the deviations in an endogenous variable at different time horizons. Variance decomposition of domestic credit to the private sector (Table 5.9) shows that 54 per cent is explained by own innovations, 45 per cent by shocks in gross domestic savings to the private sector and about 1 per cent by shocks in per capita consumption.

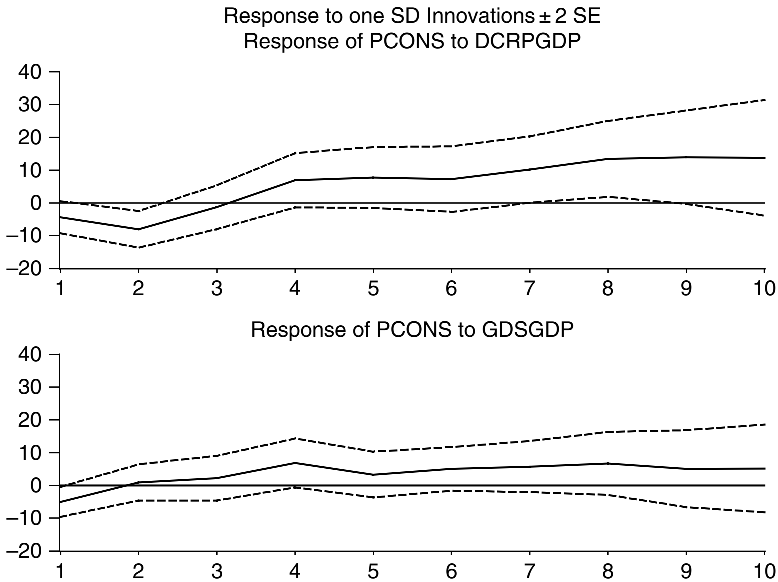

Figure 5.4 Impulse response to one SD innovation
Source: World Bank (2004).

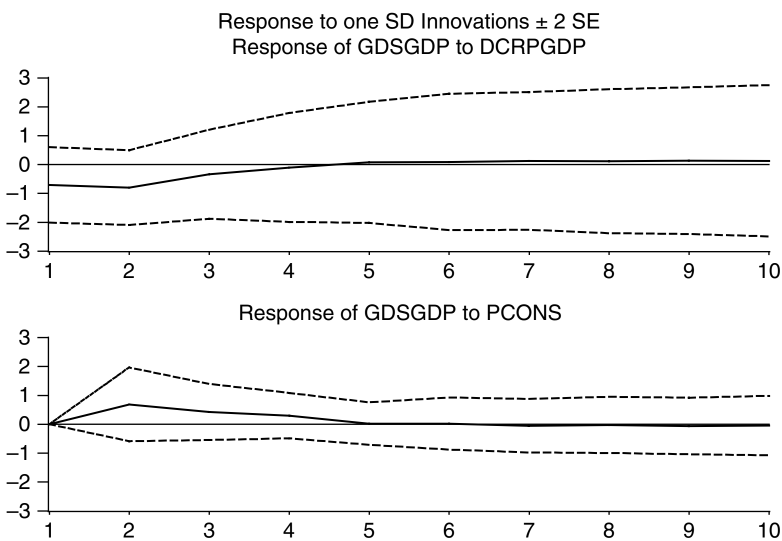

Figure 5.5 Impulse response to one SD innovation
Source: World Bank (2004).

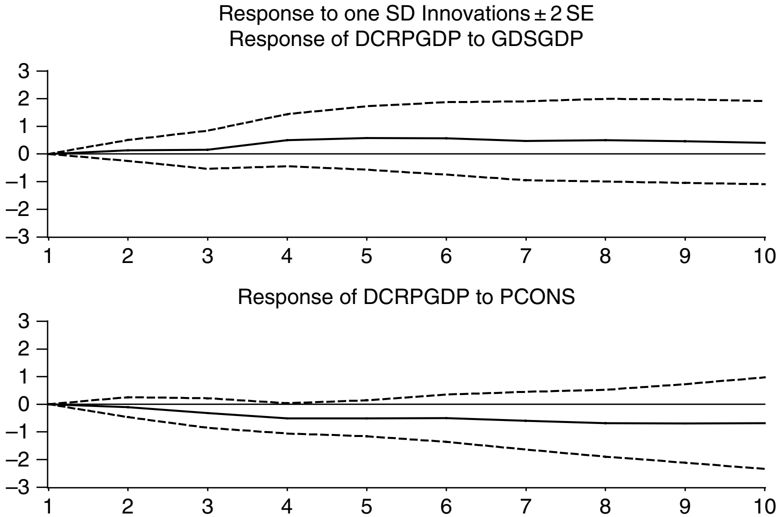

Figure 5.6 Impulse response to one SD innovation
Source: World Bank (2004).

Table 5.9 Variance decomposition of DCRPGDP

Period	SE	DCRPGDP	GDSGDP	PCONS
1	0.763334	100.0000	0.000000	0.000000
2	1.176674	96.95336	2.897771	0.148869
3	1.364637	95.20719	4.634740	0.158067
4	1.718788	86.41760	13.129950	0.452453
5	2.279829	69.95533	29.772620	0.272048
6	2.832831	61.09347	38.443230	0.463302
7	3.365944	55.77976	43.450320	0.769917
8	3.717240	53.40766	45.278390	1.313943
9	3.981644	53.59595	45.025230	1.378822
10	4.214743	53.98803	44.711650	1.300310

For gross domestic savings to the private sector (Table 5.10), own innovations are dominant, as they explain 75 per cent, while domestic credit to the private sector and per capita consumption shocks account for 10 and 15 per cent, respectively.

For per capita consumption (Table 5.11), gross domestic savings shocks are dominant in the system, accounting for 71 per cent of the innovations in per capita consumption. Own innovations contribute only 22 per cent, while domestic credit to the private sector explains 7 per cent.

Table 5.10 Variance decomposition of GDSGDP

Period	SE	DCRPGDP	GDSGDP	PCONS
1	2.943256	5.619558	94.38044	0.000000
2	3.717786	3.525251	79.92048	16.55427
3	4.687001	10.20055	78.27052	11.52893
4	5.075143	8.883154	74.00783	17.10901
5	5.153183	10.23841	72.50481	17.25678
6	5.359838	9.967505	73.67782	16.35467
7	5.442229	9.745896	73.22124	17.03286
8	5.885659	10.98832	74.30563	14.70605
9	6.265994	9.820043	74.83177	15.34819
10	6.593282	10.32316	74.74664	14.93020

Table 5.11 Variance decomposition of PCONS

Period	SE	DCRPGDP	GDSGDP	PCONS
1	12.23237	26.07145	4.784787	69.14376
2	16.64766	30.09125	20.52792	49.38083
3	19.32105	24.07165	31.48910	44.43925
4	24.55208	22.73100	48.12598	29.14302
5	31.66148	15.02865	62.28263	22.68873
6	36.38785	11.42264	64.42370	24.15366
7	41.02324	9.272141	68.04194	22.68592
8	44.17769	8.067642	68.73127	23.20108
9	46.98156	8.001191	69.71971	22.27910
10	49.99163	7.290224	70.86455	21.84522

On the whole, per capita consumption is a variable that is weak in accounting for its own innovations and that of other variables.

Finally, as can be seen from Table 5.12, an increase in credit to the private sector has a positive but insignificant effect on poverty in the country, while a decrease in poverty levels has an insignificant effect on poverty. From column 3 it can be seen that a decrease in poverty levels leads to a significant improvement in gross domestic savings. Also, an increase in credit to the private sector reduces gross domestic savings.

In trying to establish the relationship of the effect of financial development on poverty in Ghana, we modelled per capita consumption as our household welfare indicator (dependent variable). Table 5.12 presents the parameter estimates of four regressions. The fit is good in all the four regressions. The R^2 values show that a large proportion of the variations in per capita consumption can be explained by the variations in

Table 5.12 Vector error correction model

Explanatory variables	Dependent variables			
	Δ PCONS$_t$	**Δ DCRPGDP$_t$**	**Δ GDSGDP$_t$**	**Δ M2GDP$_t$**
ECM1	−0.419582	−0.042361	0.022988	−0.06185
	(−1.44744)	(−2.65925)	(−0.46655)	(−1.86219)
ECM2	1.507211	0.214065	0.645269	0.475427
	(−0.62979)	(−1.62772)	(−1.58626)	(−1.73382)
$\Delta PCONS_{t-1}$	0.011679	0.024976	0.101754	0.022262
	(−0.04474)	(−1.74125)	(−2.29343)	(−0.74435)
$\Delta PCONS_{t-2}$	−0.032568	0.011399	−0.042114	0.043581
	(−0.15704)	−1.00025	(−1.19467)	−1.83404
$\Delta PCONS_{t-3}$	−0.392297	0.019591	−0.008713	0.036192
	(−1.71090)	−1.55484	(−0.22356)	−1.37758
$\Delta DCRPGDP_{t-1}$	−7.310698	−0.203241	−0.973211	−0.7003
	(−1.32972)	(−0.67270)	(−1.04140)	(−1.11169)
$\Delta DCRPGDP_{t-2}$	2.945863	−0.551346	0.500612	−0.939682
	−0.58469	(−1.99138)	−0.58456	(−1.62779)
$\Delta DCRPGDP_{t-3}$	2.587089	−0.114388	−1.914735	−0.534344
	−0.56637	(−0.45570)	(−2.46609)	(−1.02096)
$\Delta GDSGDP_{t-1}$	−3.636672	−0.35229	0.941766	−0.349282
	(−1.46640)	(−2.58501)	−2.23411	(−1.22921)
$\Delta GDSGDP_{t-2}$	−2.80842	−0.374603	1.057838	−0.258439
	(−1.26492)	(−3.07033)	−2.80306	(−1.01592)
$\Delta GDSGDP_{t-3}$	−2.491441	−0.205968	0.577137	−0.082809
	(−1.41491)	(−2.12860)	−1.92828	(−0.41045)
$\Delta M2GDP_{t-1}$	2.70431	−0.10246	0.63944	−0.291333
	(−1.23725)	(−0.85304)	(−1.72113)	(−1.16330)
$\Delta M2GDP_{t-2}$	1.923338	−0.085619	0.064504	−0.041355
	(−1.00205)	(−0.81174)	(−0.19771)	(−0.18805)
$\Delta M2GDP_{t-3}$	−2.002553	−0.057234	−0.003038	0.447299
	(−1.06117)	(−0.55191)	(−0.00947)	(−2.0687)
C	−5.200789	0.240924	0.104107	0.10384
	(−1.42676)	(−1.20275)	(−0.16803)	(−0.24863)
R-squared	0.752236	0.668379	0.847315	0.607847

Note: *t*-statistics in parentheses.

the explanatory variables in the model. From Table 5.12, an increase in credit to the private sector has a positive but insignificant effect on poverty in Ghana. Also, from column 3, a decrease in poverty levels will lead to a significant improvement in gross domestic savings. Furthermore, an increase in credit to the private sector will reduce gross domestic savings.

Financing the pro-poor sectors of the economy

The empirical evidence above suggests that FSD Granger-causes poverty reduction in Ghana. Furthermore, the impact of FSD on poverty is positive but insignificant, implying that FSD leads to poverty reduction if the financial intermediaries in Ghana allocate considerable proportions of their loan portfolio to those sectors of the economy that have strong links to poverty reduction. Increased credit to the private sector (an important indicator of FSD) can lead to poverty reduction, particularly when credit is intermediated to the pro-poor sectors of the economy; mainly, agriculture[2] and industry. The Ghana Living Standards Survey indicates that the poor are mostly employed within the agricultural sector and are mostly foodcrop farmers. Furthermore, agriculture employs about 55 per cent of the population and contributes about 40 per cent to GDP in Ghana. Therefore, increased credit to the agricultural sector, as well as to manufacturing, can significantly reduce poverty.

In order to ascertain whether FSD in Ghana has actually affected the pro-poor sectors of the economy, we examine the proportion of domestic credit to the various sectors of the economy. From Table 5.13, it can be noted that total domestic credit increased from 1,416 billion cedis in

Table 5.13 Distribution of domestic credit, 1995–2003

Year	Central government		Public enterprises		Private enterprises		Total
	Cedis bn	%	Cedis bn	%	Cedis bn	%	Cedis bn
1995	835.0	59.0	188.0	13.3	393.0	27.8	1,416.0
1996	107.0	10.8	200.0	20.3	680.0	68.9	987.0
1997	777.0	39.3	128.0	6.5	1,070.0	54.2	1,975.0
1998	2,420.0	56.9	194.0	4.6	1,639.0	38.5	4,253.0
1999	3,464.0	54.5	424.0	6.7	2,466.0	38.8	6,354.0
2000	5,839.0	53.7	1,213.0	11.2	3,826.0	35.2	10,878.0
2001	5,989.0	49.0	1,762.0	14.4	4,472.0	36.6	12,223.0
2002	5,797.0	45.6	1,050.0	8.3	5,864.0	46.1	12,711.0
2003	5,084.6	32.5	2,212.3	14.2	8,328.7	53.3	15,626.0
2003, Q1	6,146.8	47.2	1,091.0	8.4	5,786.2	44.4	13,024.0
2003, Q2	5,557.8	41.9	1,314.2	9.9	6,403.5	48.2	13,276.0
2003, Q3	5,257.8	36.9	693.2	4.9	8,312.9	58.3	14,264.0
2003, Q4	5,084.6	32.54	2,212.3	14.2	8,328.7	53.3	15,626.0

Source: *Bank of Ghana Statistical Bulletins* (various years).

1995 to 6,354 billion cedis in 1999, and then to 15,626 billion cedis in 2003. Another notable finding is that there has been a decline in the share of domestic credit to the central government (decreasing from 59.0 per cent in 1995 to 45.6 per cent in 2002, and to 32.5 per cent in 2003) while the shares of total domestic credit to public and private enterprises increased from 8.3–14.2 per cent over the same period. Similarly, the share of domestic credit to the private sector increased from 46.1–53.3 per cent over the same period, an increase of about 7.2 percentage points (Table 5.13). It may be argued that credit to private enterprises dominates the proportion of domestic credit to the three economic categories in 2003. This is a positive signal and more policies of this type should be pursued in order to stimulate private sector growth. Government over the years has crowded out the private sector in terms of credit allocation, and this has not encouraged the private investment needed to achieve sustained economic growth.

Viewed in terms of the allocation of credit to the various economic sectors of the country, the share of DMB credit to agriculture – one of the major drivers of growth and poverty reduction – declined consistently between 1999 and 2003. Similarly, the share of domestic credit to manufacturing declined between 2000 and 2003. Likewise, the share of domestic credit to all the other sectors has declined over the past four to five years, except for the category identified as 'others', comprising electricity, gas and water, import, export, domestic trade, transport, storage and communications, services and cocoa marketing (Table 5.14).

Table 5.14 Sectoral allocation of credit by DMB, 1995–2003

Year	Agriculture	Manufacturing	Mining	Construction	Others	Total
1995	9.7	29.8	1.5	11.7	47.3	100
1996	10.8	31.0	4.0	9.8	44.4	100
1997	12.0	22.8	5.1	10.1	50.0	100
1998	12.2	24.6	5.0	11.2	47.0	100
1999	11.8	24.9	5.8	8.9	48.6	100
2000	9.6	28.1	5.5	6.8	60.3	100
2001	9.6	19.3	4.0	6.8	60.3	100
2002	9.4	21.1	3.7	7.8	58.0	100
2003	9.4	20.7	2.9	5.0	62.0	100

Source: ISSER (2004).

The decline in the share of DMB credit to manufacturing, mining and construction, together with the zero change in the share of credit to agriculture, raises certain issues for policy consideration. First, it questions the current effort to reduce poverty, given the marginal or zero change in credit to the agricultural sector, one of the key engines of growth.

Second, the share of domestic credit to the industrial sector has been dwindling, implying that the concept of promoting industrialization and achieving a golden age of business in Ghana remains fuzzy. Ironically, the 'others' category took a significant proportion of DMB credit, but this category is not the principal sector for poverty reduction. Thus, to re-emphasize the point, credit to the pro-poor sector in Ghana has not increased to ensure poverty reduction. The reasons for this are varied, but one of the main factors has been the financing of the government budget deficit through borrowing from the domestic banking system.

Government borrowing has been handled through the sale of treasury bills at interest rates ranging between 26 and 40 per cent. Ghanaian financial institutions prefer to lend to the government than to the private sector, as treasury bills are considered very attractive and less risky. Borrowers, on the other hand, particularly those engaged in agricultural and manufacturing, find the cost of loans too expensive and cannot break even after their operating costs have been met. A related issue is the high default rate of loans, due partly to the lack of information on borrowers as well as the high interest rates. Another major factor explaining the low level of credit to the pro-poor sectors of the economy is the lack of 'bankable' projects or proper business plans. Furthermore, the absence of a well-developed insurance market means that banks require borrowers to provide collateral security as a guarantee against future default. Unfortunately, the lack of proper title to land in Ghana has disqualified many people engaged in agriculture from accessing loans. As can be noted from the foregoing, although FSD can cause poverty reduction, this has not been the case in Ghana.

Conclusion and policy implications

This chapter sought to investigate the interrelationship between FSD, savings mobilization and poverty reduction in Ghana. The theoretical basis is that if FSD causes savings mobilization and savings causes poverty reduction then, by intuition, a developed financial market will promote poverty reduction. In order to investigate this relationship empirically, the chapter used annual data from 1970–2001 to ascertain the causal relationship between these variables, and made very interesting findings. First, it found that although FSD does not Granger-cause savings mobilization in Ghana, FSD does cause poverty reduction. Second, the effect of financial development on poverty in Ghana is positive, but insignificant. This is because financial intermediaries in Ghana have not adequately channelled savings to the pro-poor sectors of the economy, the major reasons for which being the government deficit financing, high default rate, lack of collateral and lack of proper business proposals. Another interesting finding is that there is a long-run cointegration relationship between FSD and poverty reduction.

On the basis of the above findings, the chapter suggests some key issues for policy consideration. First, the interest rate margin between lending and borrowing rates is too high to stimulate domestic savings in Ghana. Thus, the central bank, in collaboration with the financial institutions, should ensure that holders of savings accounts receive realistic interest rates. A related suggestion is that government borrowing through the sale of treasury bills should be minimized, since it has not encouraged financial institutions to mobilize savings and lending on to private investors. The study also notes that, in Ghana, FSD promotes poverty reduction. This implies that even though the country's financial sector has not adequately mobilized domestic savings, they have affected poverty through investments in short- and long-term equity. Thus, the government could further stimulate the work of these intermediaries by offering tax concessions or reductions to the financial institutions that invest in the pro-poor sectors of the economy, particularly in the agricultural sector. Finally, the high interest rate margin between lending and borrowing rates offered to the private sector has been attributed to the high level of loan defaults. The study believes that the default rate could be minimized by the use of credit reference agency and insurance company services. In the case of the former, they could provide credit checks on potential borrowers to minimize the risk of making loans to less creditworthy entrepreneurs. Insurance companies could also provide cover on loans made to private investors. These two channels have not been explored in Ghana and the chapter suggests that the provision of such services be expedited.

Appendix

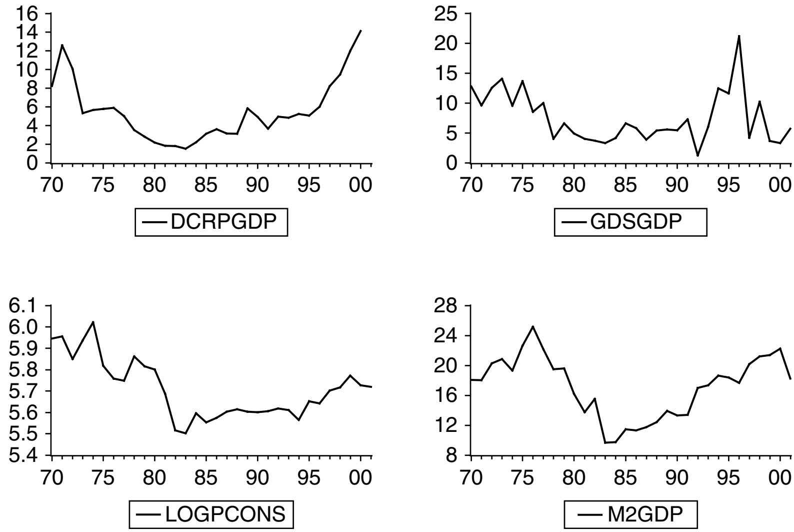

Figure A5.1 Graphs in levels
Source: World Bank (2004).

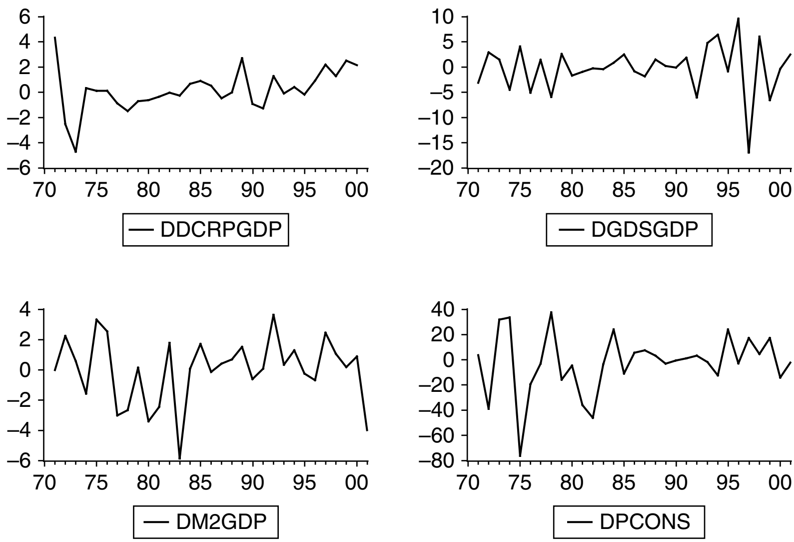

Figure A5.2 Graphs after first difference
Source: World Bank (2004).

Notes

1 The non-linear responses of each variable to one-off shocks in the others traced over time. It facilitates an evaluation of the economic importance of the estimated effects.
2 Agriculture accounts for about 40 per cent of GDP and employs 55 per cent of the labour force according to GLSS 4.

References

Anoruo, E., and Y. Ahmad (2001) 'Causal Relationship between Domestic Savings and Economic Growth: Evidence from Seven African Countries', *African Development Review*, 13 (2): 238–49.

Aryeetey, E. (2005) 'The Role of the Financial Sector in Securing Pro-Poor Growth in Sub-Saharan Africa', AERC Senior Policy Paper 7 (Nairobi: African Economic Research Consortium).

Bacchetta, P. and S. Gerlach (1997) 'Consumption and Credit Constraints: International Evidence', *Journal of Monetary Economics*, 40 (2): 207–38.

Bandiera, O., G. Caprio, P. Honohan and F. Schiantarelli (1998) 'Does Financial Reform Raise or Reduce Savings?', Boston College Working Papers in Economics 413 (Boston: Boston College Department of Economics).

Bandiera, O., G. Caprio, P. Honohan, and F. Schiantarelli (2000) 'Does Financial Reform Raise or Reduce Saving?', *Review of Economics and Statistics*, 82 (2): 239–63.

Banerjee, A.V. and A. Newman (1993) 'Occupational Choice and the Process of Development', *Journal of Political Economy*, 101 (2): 274–98.

Bank of Ghana Statistical Bulletins (various issues) (Accra: Bank of Ghana).

Beck, T., A. Demirgüç-Kunt and R. Levine (2004) 'Finance, Inequality, and Poverty: Cross-Country Evidence', Policy Research Working Paper Series 3338 (Washington, DC: World Bank).

Benhabib, J. and B. Jovanovic (1991) 'Externalities and Growth Accounting', *American Economic Review*, 81 (1): 82–113.

Blomstrom, M., R. Lipsey and M. Zejan (1996) 'Is Fixed Investment the Key to Economic Growth?', *Quarterly Journal of Economics*, 111 (1): 269–76.

Campbell, J.Y. and N.G Mankiw (1989) 'International Evidence on the Persistence of Economic Fluctuations', NBER Working Papers 2498 (Cambridge, MA: National Bureau of Economic Research).

Campbell, J.Y. and N.G. Mankiw (1990) 'Permanent Income, Current Income and Consumption', *Journal of Business and Economic Statistics*, 8 (3): 265–79.

Cardenas, M. and A. Escobar (1998) 'Saving Determinants in Colombia: 1925–1994', *Journal of Development Economics*, 57: 5–44.

Carroll, C.D. and D.N. Weil (1993) 'Saving and Growth: A Reinterpretation', NBER Working Papers 4470 (Cambridge, MA: National Bureau of Economic Research).

Clarke, G., L. Xu and H.-F. Fou (2002) 'Finance and Income Inequality: Test of Alternative Theories', Policy Research Working Paper Series 2984 (Washington, DC: World Bank).

de Brouwer, G. (1996) 'Consumption and Liquidity Constraints in Australia and East Asia: Does Financial Integration Matter?', RBA Research Discussion Papers rdp9602 (Sydney: Reserve Bank of Australia).

de Melo, J. and J. Tybout (1986) 'The Effects of Financial Liberalization on Savings and Investment in Uruguay', *Economic Development and Cultural Change*, 34 (3): 561–87.

Deininger, K. and L. Squire (1996) 'A New Data Set for Measuring Income Inequality', *World Bank Economic Review*, 10: 565–91.

Demetriades, P.O. and K.A. Hussein (1996) 'Does Financial Development Cause Economic Growth? Time-series Evidence from 16 Countries', *Journal of Development Economics*, 51 (2): 387–411.

Dollar, D. and A. Kraay (2001) 'Growth Is Good for the Poor', Policy Research Working Paper Series 2587 (Washington, DC: World Bank).

Edwards, S. (1996) 'Why Are Latin America's Savings Rates so Low? An International Comparative Analysis', *Journal of Development Economics*, 51 (1): 5–44.

Galor, O. and J. Zeira (1993) 'Income Distribution and Macroeconomics', *Review of Economic Studies*, 60: 35–52.

Ghana Statistical Service (2000) *Poverty Trends in Ghana in the 1990s* (Accra: Ghana Statistical Service).

Ghana Statistical Service (2003) 'Ghana Statistical Service Core Welfare Indicator Questionnaire, CWIQ, 2003' (Accra: Ghana Statistical Service).

GLSS (various years) 'Ghana Living Standards Survey, Waves 3 and 4' (Accra: Ghana Statistical Service).

Goudie, A. and P. Ladd (1999) 'Economic Growth, Poverty and Inequality', *Journal of International Development*, 11 (2): 177–95.

Government of Ghana (2003) 'Ghana Poverty Reduction Strategy 2003–2005: An Agenda for Growth and Prosperity' (a simplified version), August (Accra: Government of Ghana).

Greenwood, J. and B. Jovanovic (1990) 'Financial Development, Growth, and the Distribution of Income', *Journal of Political Economy*, 98 (5): 1076–107.

Hall, R.E. (1978) 'The Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence', *Journal of Political Economy*, 86 (6): 971–87.

Honohan, P. (2004) 'Financial Development, Growth and Poverty: How Close are the Links?', in C. Goodhart (ed.), *Financial Development and Economic Growth: Explaining the Links* (Basingstoke: Palgrave Macmillan).

ISSER (Institute of Statistical, Social and Economic Research) (2004) 'The State of the Ghanaian Economy in 2003' (Legon: ISSER).

Jalilian, H. and C. Kirkpatrick (2001) 'Financial Development and Poverty Reduction in Developing Countries', Working Paper 30 (Manchester: Institute for Development Policy and Management, University of Manchester).

Jappelli, T. and M. Pagano (1994) 'Saving, Growth and Liquidity Constraints', *Quarterly Journal of Economics*, 109 (1): 83–109.

Johansen, S. (1988) 'Statistical Analysis of Cointegrating Vectors', *Journal of Economics Dynamics and Control*, 12: 231–54.

Johansen, S. (1991) 'Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models', *Econometrica*, 59 (6): 1551–80.

Johansen, S. (1992) 'Cointegration in Partial Systems and the Efficiency of Single-Equation Analysis', *Journal of Econometrics*, 52 (3): 389–402.

Johansen, S. and K. Juselius (1990) 'Maximum Likelihood Estimation and Inference on Cointegration – with Applications to the Demand for Money', *Bulletin of Economics and Statistics*, 52 (2): 169–210.

Jung, W.J. (1986) 'Financial Development and Economic Growth: International Evidence', *Economic Development and Cultural Change*, 34 (January): 333–46.

Kelly, R. and G. Mavrotas (2003) 'Savings and Financial Sector Development: Panel Cointegration Evidence from Africa', WIDER Discussion Paper 2003/12 (Helsinki: UNU-WIDER).

King, M. (1986) 'Capital Market "Imperfections" and the Consumption Function', *Scandinavian Journal of Economics*, 88 (1): 59–80.

King, R.G. and R. Levine (1994) 'Capital Fundamentalism, Economic Development, and Economic Growth', Carnegie-Rochester Conference Series on Public Policy 40 (June): 259–92.

Ludvigson, S. (1996) 'The Macroeconomic Effects of Government Debt in a Stochastic Growth Model', *Journal of Monetary Economics*, 38 (1): 25–45.

Mavrotas, G. and R. Kelly (2001) 'Savings Mobilization and Financial Sector Development: The Nexus', *Savings and Development*, 25 (1): 33–66.

Mavrotas, G. and M. Santillana (1999) 'Savings and Financial Sector Development: Key Issues', Paper presented at the International Conference on Finance and Development, 9–10 July, Manchester.

McKay, A. (2002) 'Economic Growth and Distribution of Poverty in Developing Countries', in C. Kirkpatrick, R. Clarke and C. Polidano (eds), *Handbook on Development Policy and Management* (Cheltenham: Edward Elgar).

McKinnon, R.I. (ed.) (1973) *Money and Capital in Economic Development* (Washington, DC: Brookings Institution).

Muellbauer, J. and A. Murphy (1993) 'Income Expectations, Wealth and Demography in the Aggregate UK Function', Paper presented at the HM Treasury Academic Panel, London.

Ostry, J.D. and J. Levy (1995) 'Household Saving in France: Stochastic Income and Financial Deregulation', *IMF Staff Papers* 42 (Washington, DC: IMF).

Quartey, P. (1997) 'The Effect of Non-bank Financial Intermediaries on Monetary Policy in Ghana', mimeo, University of Ghana.

Ravallion, M. (2001) 'Growth, Inequality and Poverty: Looking beyond Averages', *World Development*, 29 (11): 1803–15.

Shaw, E.S. (1973) *Financial Deepening in Economic Development* (New York: Oxford University Press).

Squire, L. (1999) 'The Evolution of Thinking about Poverty: Exploring the Interaction', Ninth Bradford Development Lecture, DPPC, University of Bradford.

Toda, H.Y. and T. Yamamoto (1995) 'Statistical Inference in Vector Autoregressions with Possibly Integrated Processes', *Journal of Econometrics*, 66 (1–2): 225–50.

Wachtel, P. and P. Rousseau (1995) 'Financial Intermediation and Economic Growth: A Historical Comparison of the United States, United Kingdom and Canada', in M. Bordo and R. Sylla (eds), *Anglo-American Financial Systems: Institutions and Markets in the Twentieth Century* (New York: Irwin).

World Bank (2001) *World Development Report 2000/2001* (New York: Oxford University Press).

World Bank (2003) *World Development Indicators, 2003* (Washington, DC: World Bank).

World Bank (2004) *World Development Indicators, 2004* (Washington, DC: World Bank).

6

Finance and Growth: An Empirical Assessment of the Indian Economy

Pranab Kumar Das and Basudeb Guha-Khasnobis

Introduction

In recent times, a large body of literature has emerged that asserts the role of financial intermediation in the macroeconomic models.[1] The significance of financial institutions, mainly banks, lies in the following activities: (i) banks accept deposits of household savings and lend to a large number of agents; (ii) banks hold liquid reserves against predictable withdrawal demand; (iii) banks issue liabilities that are more liquid than their primary assets; (iv) banks reduce the need for self-financing of investment.

The implication of the above is that holding savings in bank deposits is safe in respect of returns compared to equities or direct lending to firms that have uncertain returns. The risk-averse agents would hold more of their savings in bank deposits than in equities or direct lending. The funds from deposit mobilization are lent to entrepreneurs to finance investment projects. Asymmetric information about the investment projects require ex ante evaluation and ex post monitoring which, in turn, require skill, as well as cost. An individual investor usually does not have the necessary skill and the cost is also prohibitive, while banks can do the job efficiently.[2] In the process, banks can exploit the *law of large numbers* to forecast the number of unsuccessful projects and, as a result, the expected returns of the loans advanced. The savers can be assured of a safe return. In short, the bank is the institution through which savings are channelled into investment in the absence of a perfect insurance market for loans. Thus the process is conducive to growth in the real economy. Levine (2004) gives an excellent survey of this literature.

On the other hand, however, many noted economists[3] hold a diametrically opposed view. For example, Robinson (1952) argues that the development of financial markets and institutions simply follows growth in the real sector. Lucas (1988) states that the role of financial markets is overstressed in the growth process. There is a third view,[4] which sees the role of finance in growth as a *negative* one. The proponents of this view argue that the development of financial systems hinders growth by reducing the availability of loans to domestic firms. This happens because, as financial development in the formal sector takes place, borrowers shift from the informal to the formal sector for loans. As a result, the total supply of credit shrinks, which affects the growth process in the negative direction.

Of these three hypotheses the first one dominates the literature. The empirical evidence generally supports the first hypothesis, though researchers have often found a bi-directional causality. The general strategy in the empirical literature on finance and growth has been to test the hypothesis of association between the level of financial development and the growth rate of GDP or GNP. The econometric tests are employed for cross-section, time-series and panel data. What is relatively under-researched is the exact transmission mechanism of how the financial system actually translates into higher growth in the real sector. The growth regression strategy in the tradition of cross-sectional studies has been severely criticized by Quah (1993), Caselli *et al*. (1996), Neusser and Kugler (1998) for several reasons, in particular, because it assumes the same coefficients for all the countries and also because causality tests cannot be conducted for the cross-sectional studies. The dynamic panel models are also not free from problems caused by coefficients. Hence, later studies such as Arestis and Demetriades (1997), Neusser and Kugler (1998), Luintel and Khan (1999) have favoured time-series methods. These studies employ time-series regressions for different countries.

The majority of the studies concentrate on a very high level of aggregation for the relevant variables, such as growth of GDP or GNP. Most developing countries are, however, characterized by a very dominant agricultural sector[5] and a modern industrial sector along with an informal sector in the urban or semi-urban areas. The present study addresses two of these issues in an econometric model for India. The econometric approach adopted is a multivariate time series for the aggregate economy and for the major sectors within the real part of the economy. The most important contribution of the present study is that instead of only concentrating on financial development and growth, it also considers how the transmission mechanism from financial sector to real sector operates. So, the focus is on financial development and the transmission mechanism on the one hand, and the transmission mechanism and income growth on the other.

Financial development and transmission mechanism

In the development economics literature, credit from banks and other financial institutions is treated, at least in the organized part of the economy, as the main source of finance for economic activities.[6] Though many developing countries, including India, have a long history of an established stock market, these were seldom a major source of finance in the past. The general argument was that the various informational problems that are more pronounced in these countries were not conducive to the development of the capital markets as the source of finance. Thus, it was advocated that banks and other financial institutions were the appropriate financial institutions for these economies. In the absence of private sector participation, either public sector banks and other non-banking financial institutions (henceforth NBFI) were established or those in the private sector were nationalized. In this way, governments gained control over the financial resources.

Government intervention took the form of administered interest rates – both deposit and lending – and directed credit programmes. These policies have led to what McKinnon (1973) and Shaw (1973) described as *financial repression*. Nevertheless, there has been a tremendous growth in branch expansions in India; the number of bank offices increased from 8,584 in 1969[7] to 66,535 in 2003–4. The per capita deposit increased from Rs 135 in December 1972 to Rs 12,554 in 2003–4, and per capita credit from Rs 97 to Rs 7,143 over the same period. Priority sector credit, which constitutes mainly agriculture and small-scale industry, has increased from 23 per cent of total bank credit in December 1972 to 37.6 per cent in 2003–4. During the same period, deposits per bank office increased from Rs 0.56 *Crore* to Rs 19.72 *Crore*.

Following the British tradition, Indian banks generally provided short-term loans. Specialized financial institutions were established to provide long-term finance to different sectors of the economy. For example, the Industrial Development Bank of India (IDBI), the Industrial Credit and Investment Corporation of India (ICICI) and state financial corporations, and so on, were set up to provide finance for the industrial sector while the National Bank for Agriculture and Rural Development (NABARD) was set up to serve the agricultural sector. In addition, the Export Import Bank (Exim Bank) was established to help export finance. The majority of these institutions were in the public sector, or there were various controls on the private sector units. India is, thus, a typical example of how financial systems emerged in many developing countries by way of government intervention. The question is, does the emergence of such a financial system help the growth process – at the aggregate level as well as in different sectors of the economy? If so, through which channels is this achieved? We examine these issues in the Indian context.

In a regime of an administered interest rate in the loan market an excess demand often emerged, as the real interest rate was generally set at a very low level. With the onset of financial liberalization, in the early 1990s in India (and in the 1970s in Latin America), the regime of administered interest rates was over, but that did not imply a regime of market-clearing interest rates. When the banks cannot distinguish between riskier and safer loans, a priori they prefer to charge a lower interest rate that will not encourage risky investors to ask for bank loans. This may often lead to an excess demand in the loan market and consequent rationing of credit.[8] Thus, the transmission mechanism between the real and financial sectors no longer operates through the interest rate but rather by the allocation of credit. In this respect, a distinction has to be made between short-term and long-term uses of credit.

It has been argued that there are two main uses of credit: short-term requirement, for financing working capital; and long-term requirement, for financing investment in fixed capital.[9] These two uses of credit have different effects on the real sectors of the economy. While credit for working capital affects the supply of goods, credit for fixed capital augments the demand side in the short run and enhances the capital stock in the long run. Working capital loans are short term in nature and affect the production in the real sector, while long-term loans are used to finance investment and thus affect productivity through the accumulation of capital.

The existing econometric literature on finance and growth does not adequately consider the transmission mechanism in the econometric models and only relates the degree of financial intermediation with income growth. We will consider an econometric model that relates the degree of financial intermediation and the flow of credit for short-term and long-term requirements on the one hand, and the relation between output and the two uses of credit on the other. These can be formalized in the following two sets of equations:

$$FD = f(LT, SL) \tag{6.1}$$

$$Y = g(LT, SL) \tag{6.2}$$

where *FD* = degree of financial intermediation (also called financial depth), *LT* = change in the long-term loan, *SL* = level of short-term loan and *Y* = output or income. Equations (6.1) and (6.2) are used both for the aggregate level as well as for different sectors of the economy. From the above theoretical discussion, it follows that *FD* should be positively related with *LT*, and *SL* and *Y* should be positively related with *LT* and *SL*.

The specified econometric model is a multivariate VAR with four sets of variables; namely, *FD*, *LT*, *SL* and *Y*. Our study relates to three sets of VARs – for the aggregate economy, for agriculture and for manufacturing. The general practice in the finance and growth literature is to work in terms of *growth rates*. We worked with *levels*, because the transmission mechanism outlined above actually operates in levels and not in growth rates. Thus, we derived the long-run statistical relationship between these four variables. The corresponding vector error correction model (VECM) of the set of cointegrated variables gives the short-run dynamics of the model.

We used the *Handbook of Statistics on Indian Economy* and *Banking Statistics: Basic Statistical Returns*, published by the Reserve Bank of India, for banking sector data. The *Handbook of Statistics on Indian Economy* provides separate data on short-term and long-term loans for agriculture. They include loans of both types from all sources, including cooperative and regional rural banks. Data on short-term loans by banks to the manufacturing sector, available in *Banking Statistics: Basic Statistical Returns*, were used to measure short-term loans. For all practical purposes, bank loans can be treated as the institutional source of working capital finance in India for the registered manufacturing sector. It may be noted that data provided by the *Banking Statistics* were published in December and June of each year in 1972–89. Thereafter, they were published in March. To make the banking sector's data comparable with the real sector, we interpolated them by a simple linear method between last year's December and current year's June data to arrive at current year's March data. Total term loans by banks are deducted from total bank loans to the manufacturing sector to arrive at total short-term bank loans to the manufacturing sector. Total disbursements from all financial institutions and change in long-term bank loans to the manufacturing sector are added to obtain the change in long-term finance to the manufacturing sector. Data on all financial institutions are provided by the IDBI in its publication 'Report on Development Banking in India', reproduced in the *Handbook of Statistics on Indian Economy*.

For the aggregate economy total short-term bank loans for trading, construction and electricity generation and distribution plus total short-term loans to agriculture from other sources were deducted from total short-term bank loans to arrive at total short-term loans. These loans were deducted, as they are not directly connected with production and a large part of them is meant for food credit (for example, trading) determined by government regulation or because their production structure is different from agriculture or manufacturing. For change in long-term loans, we employed total disbursements from all financial institutions plus change in long-term bank loans for manufacturing together with change in long-term loans for agriculture. Our data source for the real sector is the *National Accounts Statistics* published by the Central Statistical Organization. It provides aggregate as well as sectoral data on GDP, gross capital formation and so on.

The degree of financial intermediation or financial depth (FD) is measured by the ratio of bank deposits to nominal GDP lagged one period. This is a natural measure for FD and widely used in the literature. For the agricultural sector, FD is measured by the ratio of deposits in rural and semi-urban areas to one period lagged nominal GDP of agriculture. For the manufacturing sector, it is measured by the ratio of deposits in urban and metropolitan areas to one period lagged nominal GDP in the manufacturing sector. The output Y is in per capita terms. For the aggregate economy, Y is per capita GDP and for agriculture (manufacturing) it is GDP from agriculture (manufacturing) per capita. In the latter cases, the interpretation is per capita agricultural (manufacturing) output. Change in long-term loans, LT, is normalized by current nominal gross capital formation. Thus, our LT is changed in long-term loans as the proportion of the nominal value of investment. Short-term loans are normalized by the current nominal value of GDP. We also worked with the variables in logarithms, but this did not give better results.

Our analysis is conducted with annual data. Regarding the period of analysis, it may be noted that (depending upon the availability of data) the period of analysis for agriculture and the aggregate economy is 1972–3 to 2001–2 and for manufacturing it is 1973–4 to 2002–3.[10]

Empirical results

Table 6.1 gives the descriptive statistics for the four variables for each sector. As is evident from the table, mean FD for agriculture and the aggregate economy is less than one third of the value for manufacturing.[11] The same pattern is observed for the two types of credit variables

Table 6.1 Descriptive statistics: sectoral and aggregate

Var.	Sector	Mean	SD	Median	Max	Min
Depth	Agriculture	0.4203	0.1793	0.4680	0.7992	0.1283
	Manufacture	1.4352	0.4198	1.4531	2.4385	0.7557
	Aggregate	0.3947	0.1100	0.4324	0.5903	0.1950
Income	Agriculture	2559.47	220.23	2518.45	2937.96	2125.11
	Manufacture	1307.90	491.29	1208.24	2268.41	722.59
	Aggregate	7757.56	2139.12	7010.53	12227.05	5261.31
Δ term loan	Agriculture	0.1555	0.0737	0.1344	0.3350	0.0363
	Manufacture	0.3202	0.1505	0.2937	0.7060	0.1056
	Aggregate	0.1281	0.0501	0.1281	0.2310	0.0577
Short-term loan	Agriculture	0.0581	0.0103	0.0589	0.0729	0.0342
	Manufacture	0.4813	0.0522	0.4784	0.5811	0.3898
	Aggregate	0.1458	0.0203	0.1463	0.1893	0.1055

Notes: Data for agriculture and aggregate economy for the period 1972–3 to 2000–1, while for manufacturing 1973–4 to 2002–3.

for the two sectors. This is also true for the other measures of descriptive statistics.

In order to find out the long-run statistical relationship among the four variables *FD*, *Y*, *LT* and *SL*, we first start with unit root tests (Dickey–Fuller 1981 and Phillips–Perron 1988). The relevant test statistics for all the series and their logarithms do not reject the null hypothesis of the unit root in general. The test results are given in Tables 6.2, 6.3 and 6.4. As is evident from Table 6.2, the null hypothesis of unit root is not rejected for FD for agriculture both by Dickey–Fuller (DF) or Augmented Dickey–Fuller (ADF) as well as Phillips–Perron tests in levels. However, the null of unit root is not rejected at first difference by DF/ADF tests, while it is rejected in second difference. The Phillips–Perron test, however, rejects the null at first difference. Thus, we a have a problem in choosing the order of integration. We accept the result of the unit root test on the basis of the Phillips–Perron test. Again, the Phillips–Perron test for Y and LT shows that the null of the unit root is rejected at levels. But, as DF/ADF shows that the null is not rejected at levels, we take the result of the unit root test on the basis of DF/ADF to remain on the safe side. No such problem arises for the manufacturing sector or the aggregate economy. In both the cases, the null of unit root cannot be rejected at 95 per cent with the variables in levels by both DF/ADF and the Phillips–Perron test criteria. The null of unit root is rejected, however, in the first difference of the variables.

Table 6.2 Unit root test for agriculture

	DF/ADF test			**Phillips–Perron test**		
Variable	Calculated value	Critical value (at 5%)	Nature of test eqn	Calculated value	Critical value (at 5%)	Nature of test eqn
Depth	−1.877*	−3.587	Int, T, L=0	−1.753	−3.573	
Output	−2.911	−3.573	Int, T, L=0	−5.047**	−3.567	Int, L
Term loan	−1.345	−2.967	Int, L=1	−4.143**	−2.963	Int
Short-term loan	−2.001	−2.971	Int, L=1	−1.635	−2.697	

Notes: * Null of unit root is not rejected at a 5 per cent level in first difference;
** Null of unit root is rejected at 5 per cent for variables in levels;
Int = Intercept, T = time trend, L = number of lags for the first difference of the variables in the test equation.

Table 6.3 Unit root test for manufacturing

	DF/ADF test			**Phillips–Perron test**		
Variable	Calculated value	Critical value (at 5%)	Nature of test eqn	Calculated value	Critical value (at 5%)	Nature of test eqn
Depth	−1.902	−3.573	T, L=1	−1.420	−3.567	
Output	2.733	−1.953	L=0	−1.534	−3.567	T
Term loan	−3.419	−3.573	Int, T, L=1	−2.265	−3.567	
Short-term loan	−2.215	−2.967	Int, L=0	−1.721	−2.963	

Notes: Int = Intercept, T = time trend, L = number of lags for the first difference of the variables in the test equation.

The presence of unit root in all the four series prompts us to test for cointegration among the four variables in all the three cases. The test of cointegration is conducted by Johansen's ML method (Johansen 1991; Johansen and Juselius 1992). The results are given in Table 6.5 for the maximum eigenvalue test and for the trace test for all three sectors. For manufacturing and the aggregate economy, the null of two cointegrating vectors are accepted both by trace as well as maximum eigenvalue tests. For agriculture, though, the null of two cointegrating vectors are accepted by the trace test; the maximum eigenvalue test cannot reject the null of the presence of three cointegrating vectors. However, as the trace test is

Table 6.4 Unit root test for aggregate economy

	DF/ADF test			Phillips–Perron test		
Variable	Calculated value	Critical value (at 5%)	Nature of test eqn	Calculated value	Critical value (at 5%)	Nature of test eqn
Depth	−2.028	−3.5796	Int, T, L=1	−1.765	−3.573	Int
Output	4.820	−1.954	L=0	7.622	−1.953	
Term loan	−2.422	−3.5796	Int, T, L=0	−1.861	−2.967	Int
Short-term loan	−2.516	−3.573	Int, T, L=0	−2.527	−3.573	Int, T

Notes: Int = Intercept, T = time trend, L = number of lags for the first difference of the variables in the test equation.

more robust than the maximum eigenvalue test, we accept the result of the trace test.

The cointegrating vector is not unique in either case, thus we have to impose some restrictions on the variables. The a priori restriction that we impose is that a long-run relation exists between *FD*, *LT* and *SL*, and another exists between *Y*, *LT* and *SL*. Thus, we posit a long-run relation between financial development and flow of credit for the two uses. This is how financial development leads to credit flow to different uses and for different sectors, and another long-run relation between *Y*, *LT* and *SL*. Unlike in the finance and growth literature, we assume that financial development does not directly affect income, but it does directly affect credit flows and then, through credit flows, the production side. In this way, we incorporate the transmission mechanism in the finance–growth relationship. Thus, the coefficient of *Y* in Equation (6.1) is restricted to zero and the coefficient of *FD* in Equation (6.2) is restricted to zero in the cointegrating relations. These two restrictions are Johansen's exactly identified restrictions. In order to test significance of one or more coefficients in the cointegrating framework, we test over-identifying restriction. As a matter of fact, this was done for the manufacturing and the aggregate economy.

As is revealed by Tables 6.6, 6.7(a) and 6.8(a), *FD* is: (i) positively associated[12] with outstanding short-term loans and negatively associated with the change in long-term loans in agriculture; (ii) positively associated with both loans in manufacturing; and (iii) positively associated with change in long-term loans for the aggregate economy. The association between *FD* and short-term loans, though positive, is

Table 6.5 Cointegration test: maximum eigenvalue and trace tests

(a) Maximum eigenvalue test

H_0	H_1	Agriculture		Manufacturing		Aggregate	
		Calculated statistic	Critical value (at 5%)	Calculated statistic	Critical value (at 5%)	Calculated statistic	Critical value (at 5%)
r = 0	r = 1	18.51	28.27	30.30	23.93	44.50	23.92
r<=1	r = 2	18.38	22.04	18.88	17.68	14.52	17.68
r<=2	r = 3	13.57	15.87	5.88	11.03	8.55	11.03
r<=3	r = 4	5.14	9.16	0.00029	4.16	1.128	4.16

(b) Trace test*

H_0	H_1	Agriculture		Manufacturing		Aggregate	
		Calculated statistic	Critical value (at 5%)	Calculated statistic	Critical value (at 5%)	Calculated statistic	Critical value (at 5%)
r = 0	r>=1	55.59	53.48	55.05	39.81	68.70	39.81
r<=1	r>=2	37.09	34.87	24.75	24.05	24.20	24.05
r<=2	r>=3	18.71	20.18	5.88	12.36	9.68	12.36
r<=3	r = 4	5.14	9.16	0.00029	4.16	1.13	4.16

Notes: * r is the number of cointegrating vectors;
For agriculture the test equation is restricted intercept and no trend in VAR with order of VAR = 2, no intercept or trend in VAR with order of VAR = 3 for manufacturing and no intercept or trend in VAR with order of VAR = 1 for aggregate economy.

non-significant for the aggregate economy. The positive association of *FD* and the credit variables makes perfect sense. But a negative association with change in long-term loans for agriculture calls for an explanation. Plotting *FD* and change in long-term loans in agriculture shows that, over time, *FD* has increased in rural and semi-urban areas, while change in long-term loans has decreased. Splitting the dataset into two sub-periods – from 1972–3 to 1985–6 and 1986–7 to 2001–2 – shows that there is a significant change across the periods in the average values of *FD*, *LT* and *SL* (0.2592, 0.1785, 0.055 and 0.561, 0.1353, 0.061, respectively). For manufacturing, the association between *FD* and the credit variables is expected and significant.

The second cointegrating vector shows the long-run statistical relation between *Y*, *LT* and *SL*. It is evident from the tables that *Y* is related positively to *SL* and negatively with *LT* at the 5 per cent level of significance

Table 6.6 Cointegrating vectors for agriculture: exactly identified restrictions

$(\text{Depth})_t$	$(\text{Output})_t$	$(\text{Term loan})_t$	$(\text{Short-term loan})_t$	Intercept
1	0	3.306	−27.530	0.658
		(0.985)	(9.240)	(0.330)
0	1	277.540	−172.500	−1634.400
		(5.580)	(−14.270)	(505.40)

Notes: Number of cointegrating vectors = 2;
Eigenvalues: (0.48361, 0.48129, 0.38417, 0.16754, 0.00);
Standard errors are given in parentheses.

Table 6.7 Cointegrating vectors for manufacturing: exactly identified and over-identified restrictions

$(\text{Depth})_t$	$(\text{Output})_t$	$(\text{Term loan})_t$	$(\text{Short-term loan})_t$
(*a*) *Exactly identified*			
1	0	−3.2875	−1.7540
		(1.4150)	(0.4640)
0	1	−2268.5000	−186.0700
		(851.8100)	(280.5500)
(*b*) *Over-identified*			
1	0	−3.666	−2.042
		(2.246)	(0.331)
0	1	−2029.700	0
		(1300.500)	

Notes: Number of cointegrating vectors = 2;
Eigenvalues: (0.6744, 0.503, 0.1956, 0.000011);
Standard errors are given in parentheses;
Likelihood ratio test of over identifying restriction $\chi^2(1) = 0.254$ [0.615].

for agriculture. The negative association between *FD* and *LT* is robust as given by the *t*-value, and we also tested an over-identifying restriction with a zero restriction for the coefficient of *LT*, which is rejected (not reported in the table). This therefore calls for interpretation. The simplest explanation that can be advanced is that *LT* has both a supply-side effect on output, by adding to capital stock of this sector, and it also has a demand effect on the agricultural sector. In the market equilibrium equation for the agricultural sector, these two effects operate in opposite directions. The cointegrating relation being a reduced form relation, the coefficient of *LT* exhibits the net effect, which is negative in this case

Table 6.8 Cointegrating vectors for aggregate economy: exactly identified and over-identified restrictions

(Depth)$_t$	**(Output)$_t$**	**(Term loan)$_t$**	**(Short-term loan)$_t$**
(*a*) *Exactly identified*			
1	0	−4.868	−0.476
		(3.910)	(1.682)
0	1	−14982.600	−17529.200
		(32807.800)	(13863.800)
(*b*) *Over-identified*			
1	0	−6.47	0.00
		(3.39)	
0	1	0.00	−21723.8
			(10775.4)

Notes: Number of cointegrating vectors = 2;
Eigenvalues: (0.7941, 0.58111, 0.24932, 0.000);
Standard errors are given in parentheses;
Likelihood ratio test of over identifying restriction $\chi^2(2) = 0.1109$ [0.946].

(that is, the demand effect dominates). For manufacturing, the relation between *Y* and *LT* is positive and significant at the 5 per cent level, but is non-significant between *Y* and *SL*. Therefore, we re-estimated the model with an additional over-identifying restriction, that the coefficient of *SL* for Equation (6.2) is zero. The χ^2 value for one degree of freedom is not rejected. Thus, for the manufacturing sector, the second cointegrating vector shows that *SL* has no effect on output. For the aggregate economy, the relation between *Y* and *SL* is positive and significant at a 5 per cent level, while the relation between *Y* and *LT* is non-significant at a 5 per cent level. The corresponding over-identifying test confirms this.

It has been shown by Engle and Granger (1982) that every cointegrating relation has an ECM (error-correction model), giving us the adjustment of the system (described by the two equations for each sector in our model). We have also estimated the ECM for all the cases; these are reported in Tables 6.9, 6.12 and 6.15. The t-values of the coefficients in these tables show their role in the adjustment mechanism as and when disequilibrium occurs. It is revealed by Table 6.9 that any deviation of *FD* for the agricultural sector from long-run equilibrium is taken care of by itself in the next period. The adjustment does not take place in the long-run equilibrium. But any disequilibrium in the output equation for agriculture is corrected both by adjustment in the first

Table 6.9 Vector error correction model for agriculture

Explanatory variable	**Dependent variable**			
	Δ(Depth)$_t$	**Δ (Output)$_t$**	**Δ (Term loan)$_t$**	**Δ (Short-term loan)$_t$**
ec_{t-1}[a]	0.0252	1959.6	−0.141	0.002
	(0.19)	(3.95)	(−0.46)	(0.13)
ec_{t-1}[b]	0.000019	−1.414	0.00002	0.00007
	(0.225)	(−4.353)	(0.101)	(0.65)
Δ (Depth)$_{t-1}$	0.846	−1503.5	0.053	0.009
	(3.00)	(−1.421)	(0.081)	(0.24)
Δ (Output)$_{t-1}$	−0.000083	0.267	0.00002	−0.00002
	(−1.44)	(1.23)	(0.119)	(−2.13)
Δ (Term loan)$_{t-1}$	0.034	309.20	−0.396	−0.008
	(0.337)	(0.818)	(−1.69)	(−0.60)
Δ (Short-term loan)$_{t-1}$	−2.04	7192.5	−2.02	0.277
	(1.25)	(1.172)	(0.532)	(1.24)
R^2	0.199	0.642	0.458	0.485

Notes: *t*-statistics are given in parentheses;
[a,b] are error correction terms corresponding to the cointegrating vector given respectively in the first and second row of Table 6.6.

cointegrating relation (with positive sign) and the second cointegrating relation (with negative sign). There is no adjustment in the VECM for a term loan, while, for a short-term loan, output adjusts in the next period with a negative sign, though the coefficient of adjustment is very low.

In the case of the manufacturing sector, the disequilibrium in the long-run path of *FD* is taken care of by adjustment through the second cointegrating equation with a positive sign and through adjustment in output with a one period lag, but with a negative sign. For the output equation, adjustment operates through the first cointegrating equation and lagged output (with positive sign) and short-term loan (with negative sign). Thus, causality runs from output to *FD*, rather than vice versa, for the manufacturing sector. For the change in term loans equation, causality operates through output and short-term loans.

For the aggregate economy adjustments take place only through *LT* and *SL* through both cointegrating vectors. No significant causality can be found to exist between *FD* and output, or vice versa. For this sector, *LT* takes the burden of adjustment for any disequilibrium in *FD* and *Y*. The above results show that *FD* is exogenous for all the sectors. However, for manufacturing there is a causal relation from output to *FD*, though no such relation exists either for agriculture or the aggregate economy.

Tables 6.10, 6.13 and 6.16 report an estimated long-run matrix of coefficients by Johansen's estimation method. Tables 6.11, 6.14 and 6.17 report the variance decomposition analysis for agriculture, manufacturing and the aggregate economy, respectively. It shows the generalized variance decomposition to one standard error shock in each of the four variables after five years and ten years. It is revealed by the three tables that variance to own shock is higher for all the variables, compared to that for shock to any other variable. For agriculture, however, *FD* has a higher variance due to *Y* for agriculture. This points to a possible endogenity of *FD* to *Y* in agriculture, though the corresponding VECM does not establish any such result.

Table 6.10 Estimated long-run matrix in Johansen's estimation for agriculture

	Depth	**Income**	**Long-term loan**	**Short-term loan**	**INTERCEPT**
Depth	0.0252	0.000019	0.1711	−1.266	−0.015
Income	1959.6	−1.414	77.89	−12221.8	3599.6
Long-term loan	−0.1406	0.00002	−0.373	3.271	−0.1257
Short-term loan	0.0023	0.000008	0.0424	−0.291	−0.011

Table 6.11 Generalized error variance decomposition for agriculture (%)

Shock to	**Horizon**	**Depth**	**Income**	**Long-term loan**	**Short-term loan**
Depth	After 5 years	90.66	0.54	10.56	27.26
	After 10 years	89.57	0.19	7.54	22.53
Income	After 5 years	42.19	32.80	5.65	6.76
	After 10 years	62.57	11.61	2.18	5.34
Long-term loan	After 5 years	7.36	4.94	94.59	46.84
	After 10 years	4.40	4.65	88.93	44.00
Short-term loan	After 5 years	29.50	7.27	78.40	72.60
	After 10 years	32.32	5.63	81.54	70.03

Table 6.12 Vector error correction model for manufacturing

Explanatory variable	**Dependent variable**			
	Δ (Depth)$_t$	**Δ (Output)$_t$**	**Δ (Term loan)$_t$**	**Δ (Short-term loan)$_t$**
ec_{t-1}[a]	0.0073	−116.49	0.190	0.05
	(0.098)	(−2.28)	(2.73)	(1.68)
ec_{t-1}[b]	0.00022	−0.097	0.0003	0.00008
	(1.97)	(−1.26)	(3.16)	(1.69)
Δ (Depth)$_{t-1}$	−0.0412	130.60	0.136	−0.039
	(−0.163)	(0.752)	(0.574)	(−0.38)
Δ (Depth)$_{t-2}$	0.244	−70.72	0.144	0.005
	(1.163)	(−0.492)	(0.734)	(0.06)
Δ (Output)$_{t-1}$	−0.0013	0.535	−0.0007	−0.0002
	(−3.97)	(2.39)	(−2.14)	(−1.14)
Δ (Output)$_{t-2}$	−0.00032	−0.071	−0.0005	−0.000002
	(−0.71)	(−0.229)	(−1.07)	(−0.012)
Δ (Term loan)$_{t-1}$	0.416	−310.32	−0.079	0.135
	(1.00)	(−1.09)	(−0.203)	(0.809)
Δ (Term loan)$_{t-2}$	0.033	18.97	−0.013	0.067
	(0.114)	(0.095)	(−0.049)	(0.579)
Δ (Short-term loan)$_{t-1}$	−0.692	151.82	0.094	−0.054
	(−1.165)	(0.373)	(1.7)	(−0.227)
Δ (Short-term loan)$_{t-2}$	−0.6003	−1024.3	1.359	0.149
	(−0.995)	(−2.48)	(2.41)	(0.617)
R^2	0.643	0.549	0.742	0.345

Notes: t-statistics are given in parentheses;
[a,b] are error correction terms corresponding to the cointegrating vector given respectively in the first and second row of Table 6.7(a).

Table 6.13 Estimated long-run matrix in Johansen's estimation for manufacturing

	Depth	**Income**	**Long-term loan**	**Short-term loan**	**INTERCEPT**
Depth	–0.0413	0.00024	–0.410	0.028	–0.0413
Income	–131.76	-0.093	643.32	248.39	–131.76
Long-term loan	0.180	0.00034	–1.355	–0.379	0.180
Short-term loan	0.0531	0.000074	–0.343	–0.107	0.0531

Table 6.14 Generalized error variance decomposition for manufacturing (%)

Shock to	**Horizon**	**Depth**	**Income**	**Long-term loan**	**Short-term loan**
Depth	After 5 years	60.57	33.53	1.89	18.95
	After 10 years	64.41	29.19	1.81	20.64
Income	After 5 years	2.17	80.14	12.23	6.37
	After 10 years	5.62	82.51	7.19	9.47
Long-term loan	After 5 years	12.36	11.36	61.60	24.73
	After 10 years	12.86	12.04	61.77	24.53
Short-term loan	After 5 years	2.17	18.55	44.66	83.01
	After 10 years	2.65	18.63	43.01	85.72

Table 6.15 Vector error correction model for aggregate economy

	Dependent variable			
Explanatory variable	**Δ (Depth)$_t$**	**Δ (Output)$_t$**	**Δ (Term loan)$_t$**	**Δ (Short-term loan)$_t$**
ec_{t-1}[a]	−0.0115	−347.17	0.101	0.025
	(−0.402)	(−1.04)	(3.48)	(1.572)
ec_{t-1}[b]	0.0000016	0.0223	0.00001	0.000003
	(0.57)	(0.673)	(3.84)	(1.96)
Δ (Depth)$_{t-1}$	–	–	–	–
Δ (Output)$_{t-1}$	–	–	–	–
Δ (Term loan)$_{t-1}$	–	–	–	–
Δ (Short-term loan)$_{t-1}$	–	–	–	–
R^2	0.001	0.276	0.325	0.111

Notes: *t*-statistics are given in the parentheses;
[a,b] are error correction terms corresponding to the cointegrating vector given respectively in the first and second row of Table 6.8(a).

Conclusion

The chapter specifies the relationships in India between financial development and the allocation of credit on the one hand, and the transmission mechanism between real and financial sectors and the allocation of credit on the other. It tries to identify the missing link between financial development and output.

Table 6.16 Estimated long-run matrix in Johansen's estimation for aggregate economy

	Depth	Income	Long-term loan	Short-term loan	INTERCEPT
Depth	–0.0226	0.000002	0.083	–0.021	–0.0226
Income	530.56	0.0286	2154.6	–248.60	530.56
Long-term loan	0.099	0.00001	–0.649	–0.241	0.099
Short-term loan	0.0234	0.000003	–0.160	–0.066	0.0234

Table 6.17 Generalized error variance decomposition for aggregate economy (%)

Shock to	Horizon	Depth	Income	Long-term loan	Short-term loan
Depth	After 5 years	97.6	2.70	16.0	6.61
	After 10 years	91.5	1.43	19.17	11.79
Income	After 5 years	2.40	91.93	1.20	1.61
	After 10 years	1.40	83.46	2.31	6.43
Long-term loan	After 5 years	15.65	6.69	75.95	15.36
	After 10 years	16.05	11.13	56.21	27.08
Short-term loan	After 5 years	5.61	2.73	16.33	88.27
	After 10 years	6.10	4.62	18.24	85.74

The research question of the chapter is addressed in a multivariate time-series model for the aggregate economy, as well as the broad sectors. The presence of non-stationary variables leads to the testing for cointegrating relations. There are two cointegrating relations, of which one is specified as the long-run relationship between financial development and allocation of credit between different uses and the other as the long-run relation between growth of output and two uses of credit – short term and long term. The latter cointegrating relation represents the transmission mechanism in an imperfect credit market. However, the nature of these cointegrating relationships differs across sectors.

FD has a positive association with short-term loans, while the nature of association with long-term loans is negative for agriculture. As the latter result is counterintuitive, we explored it further and found that the observation is driven by a significant change in the relevant variables in the second part of the sample period; namely, 1985–6 to 2001–2. This is the period when financial reforms began. The relation between *FD* and the two uses of credit for the manufacturing sector is positive. But there is no significant relation between *FD* and short-term loans in the aggregate data, though the relation with long-term loans is positive. The second cointegrating relation shows that output of agriculture has a positive relation with short-term loans and a negative relation with long-term loans. The latter finding is interpreted as the net effect of a reduced-form relation. In the case of the manufacturing sector, short-term loans have no effect on output. On the whole, for the aggregate economy there is no relation between output and long-term loans, though the relation with short-term loans is positive and significant.

We also estimated the VECMs for all three cases, which represents the short-run dynamics. The relevant estimates show that there are differences across sectors in respect of the adjustment mechanism when the system deviates from its long-run equilibrium. The error correction mechanism for agriculture mainly operates through adjustment in output for agriculture. Similar results are also observed for the manufacturing sector. It is also observed that the causality runs from output to *FD* for the manufacturing sector. For the aggregate economy, no significant causal relation can be established between *FD* and output. The variance decomposition analysis, however, shows that a shock to output affects financial development quite significantly in the agricultural sector.

Our results indicate that the nature of relation between *FD* and allocation of credit, or between output and allocation of credit are different across the sectors of the economy. It is also true concerning causal relation between the variables. So, a general credit policy will not give similar results across the sectors of the economy. This calls for the deployment of carefully nuanced policy for the development of financial institutions in India, and perhaps developing countries in general. The development of financial institutions backed by the government was very pronounced in India in the 1970s and 1980s, and was reflected in the rate of expansions of bank branches. This led to different types of effect on the growth of different sectors of the real economy.

Notes

1 See, for example, Bernanke and Gertler (1987), Gertler (1988), Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), de Mezza and Webb (1992), King and Levine (1993a, 1993b), Demirgüç-Kunt and Levine (2001) and many others.
2 See Williamson (1987) for a detailed discussion on this issue.

3 See Robinson (1952), Kuznets (1955) and Lucas (1988) who, among others, are known to hold this view.
4 See Van Wijnbergen (1983), Buffie (1984).
5 For example, the proportion of agriculture in the GDP is 26–28 per cent in India and a sizable 65–68 per cent of the population depend on agriculture for livelihood. In many African countries, over 90 per cent of the GDP is contributed by agriculture.
6 See Blinder and Stiglitz (1983), Taylor (1983, 1993), Blinder (1987) and Rakshit (1987, 1999).
7 In India, the first phase of bank nationalization took place in 1969.
8 See Stiglitz and Weiss (1981).
9 See, particularly, Rakshit (1987) on this issue. Also, McKinnon (1973) and Shaw (1973) discussed these issues in detail.
10 Considering the fact that it involves cointegration analysis, the period may not appear to be satisfactory. However, two things should be borne in mind. First, it is a demonstration of the econometric model that incorporates the transmission mechanism in the finance–growth literature. Second, for the Indian economy there is unsatisfactory coverage of credit data for the years before 1970 at the disaggregate level.
11 The value of some of the descriptive statistics for the aggregate economy is sometimes even lower than that for agriculture. This is because of the fact that aggregate economy includes some other sectors that are not exhausted by the union of agriculture and manufacturing.
12 The cointegrating vectors as reported in Tables 6.7(a) and 6.8(a), and also 6.7(b) and 6.8(b). Actually, take *FD* to the left and *SL* and *LT* to the right, thus a negative value for the coefficient of *LT* or *SL* implies a positive association between *FD* and *LT* or *SL* and vice versa.

References

Arestis, P. and P. Demetriades (1997) 'Financial Development and Economic Growth: Assessing the Evidence', *Economic Journal*, 107 (442): 783–99.

Bencivenga, V.R., and B.D. Smith (1991) 'Financial Intermediation and Endogenous Growth', *Review of Economic Studies*, 58a (2a): 195–209.

Bernanke, B. and M. Gertler (1987) 'Banking and Macroeconomic Equilibrium', in W.A. Barnett and K.J. Singleton (eds), *New Approaches to Monetary Economics* (Cambridge: Cambridge University Press).

Blinder, A.J. (1987) 'Credit Rationing and Effective Supply Failure', *Economic Journal*, 97 (386): 327–52.

Blinder, A.J. and J.E. Stiglitz (1983) 'Money, Credit Constraints and Economic Activity', *American Economic Review, Papers and Proceedings*, 73 (2): 297–302.

Buffie, E.F. (1984) 'Financial Repression, the New Structuralists and Stabilization Policy in Semi-industrialized Countries', *Journal of Development Economics*, 14 (3): 305–22.

Caselli, F., G. Esquivel, and F. Lefort (1996) 'Reopening the Convergence Debate: A Look at Cross-Country Growth Empirics', *Journal of Economic Growth*, 1 (3): 363–89.

Central Statistical Organization (various years) *National Accounts Statistics* (New Delhi: Government of India).

de Mezza, D. and D.C. Webb (1992) 'Efficient Credit Rationing', *European Economic Review*, 36 (6): 1277–90.

Demirgüç-Kunt, A. and R. Levine (2001) *Financial Structure and Economic Growth: A Cross Country Comparison of Banks, Markets, and Development* (Cambridge, MA: MIT Press).

Dickey, D.A. and W.A. Fuller (1981) 'Distribution of Estimators for Autoregressive Time Series with a Unit Root', *Econometrica*, 49 (4): 1057–72.

Engle, R.F. and C.W.J. Granger (1982) 'Cointegration and Error Correction: Representation, Estimation and Testing', *Econometrica*, 55 (2): 251–76.

Gertler, M. (1988) 'Financial Structure and Aggregate Economic Activity: An Overview', *Journal of Money, Credit and Banking*, 3 (2): 559–88.

Greenwood, J. and B. Jovanovic (1990) 'Financial Development, Growth and the Distribution of Income', *Journal of Political Economy*, 98 (5): 1076–107.

Industrial Development Bank of India (various years) *Report on Development Banking in India* (Mumbai: Industrial Development Bank of India).

Johansen, S. (1991) 'Estimation and Hypothesis Testing of Cointegrating Vectors in Gaussian Vector Autoregression Models', *Econometrica*, 59 (6): 1551–80.

Johansen, S. and K. Juselius (1992) 'Some Structural Hypotheses in a Multivariate Cointegration Analysis of Purchasing Power Parity and Uncovered Interest Rate Parity for the UK', *Journal of Econometrics*, 53 (1–3): 211–44.

King, R.G. and R. Levine (1993a) 'Finance and Growth: Schumpeter Might Be Right', *Quarterly Journal of Economics*, 108 (3): 717–38.

King, R.G. and R. Levine (1993b) 'Finance, Entrepreneurship and Growth: Theory and Evidence', *Journal of Monetary Economics*, 32 (3): 513–42.

Kuznets, S. (1955) 'Economic Growth and Income Inequality', *American Economic Review*, 45: 1–45.

Levine, R. (2004) 'Finance and Growth: Theory and Evidence', NBER Working Paper 10766 (Cambridge, MA: National Bureau of Economic Research).

Lucas, R.E. Jr (1988) 'On the Mechanics of Economic Development', *Journal of Monetary Economics*, 22 (1): 3–42.

Luintel, K.B. and M. Khan (1999) 'A Quantitative Reassessment of the Finance-Growth Nexus: Evidence from a Multivariate VAR', *Journal of Development Economics*, 60 (2): 381–405.

McKinnon, R.I. (1973) *Money and Capital in Economic Development* (Washington, DC: Brookings Institution).

Neusser, K. and M. Kugler (1998) 'Manufacturing Growth and Financial Development: Evidence from OECD Countries', *Review of Economics and Statistics*, 80 (4): 638–46.

Phillips, P.C.B. and P. Perron (1988) 'Testing for a Unit Root in Time Series Regression', *Biometrika*, 75 (2): 335–46.

Quah, D. (1993) 'Empirical Cross-Section Dynamics in Economic Growth', *European Economic Review*, 37 (2–3): 426–34.

Rakshit, M.K. (1987) 'Monetary Policy in a Developing Economy', Working Paper (Calcutta: Presidency College, Centre for Economic Studies).

Rakshit, M.K. (1999) ‘Money, Credit and Government Finance in a Developing Economy’, in A. Bose, A. Sinha and M. Rakshit (eds), *Issues in Economic Theory and Public Policy: Essays in Honour of Professor Tapas Majumdar* (New Delhi: Oxford University Press).

Reserve Bank of India (various years) *Banking Statistics: Basic Statistical Returns*, various issues (Mumbai: Reserve Bank of India).

Reserve Bank of India (various years) *Handbook of Statistics on Indian Economy*, various issues (Mumbai: Reserve Bank of India).

Robinson, J. (1952) *The Rate of Interest and Other Essays* (New York: Macmillan).

Shaw, E.S. (1973) *Financial Deepening in Economic Development* (Oxford: Oxford University Press).

Stiglitz, J.E. and A. Weiss (1981) ‘Credit Rationing in Markets with Imperfect Information’, *American Economic Review*, 71 (3): 393–410.

Taylor, L. (1983) *Structuralist Macroeconomics* (New York: Basic Books).

Taylor, L. (1993) ‘The Rocky Road to Reform’, in L. Taylor (ed.), *The Rocky Road to Reform: Adjustment, Income Distribution and Growth in the Developing World* (Cambridge, MA: MIT Press for UNU-WIDER).

Van Wijnbergen, S. (1983) ‘Interest Rate Management in LDCs’, *Journal of Monetary Economics*, 12 (3): 433–52.

Williamson, S.J. (1987) ‘Recent Developments in Modeling Financial Intermediation’, *Federal Reserve Bank of Minneapolis Quarterly Review*, 11 (3): 19–29.

7

Does Financial Openness Promote Economic Integration?

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Introduction

The steady expansion of financial flows across the borders and the rapid increase in the number of regional economic integration agreements are two of the most evident aspects of globalization in the 1990s. The purpose of this chapter is to study the link between the two. In particular, we estimate the extent to which financial openness promotes regional economic integration in Europe and the Commonwealth of Independent States (CIS). We focus on two specific dimensions of the integration process: the convergence of per capita incomes across countries in a regional cluster and the intensity of trade in goods and services between countries. With regard to financial openness, we delineate between capital account liberalization and international financial integration. These two concepts have often been used interchangeably in the literature but, in fact, they represent a mean–goal relationship.[1] Capital account liberalization is the process of lifting administrative or legal restrictions on capital movements – hence, creating the necessary conditions for the integration of the domestic financial system into the global market. International financial integration, instead, refers to the actual volume of capital flows that take place across the borders. Thus, financial openness is essential to achieve international financial integration; however, the former does not necessarily lead to the latter. Operationally, the analysis in this chapter will employ different proxies to measure international financial integration: (i) an index of capital account liberalization; and (ii) the volume of portfolio-based and equity-based capital flows.

Several innovations characterize our study vis-à-vis the existing literature. First, most of the literature on the effects of financial openness (or financial integration) on economic performance essentially looks at economic growth.[2] Instead, this chapter directly considers the income difference between richer and poorer countries in a regional cluster, thus assessing the differential impact of financial openness on the speed of catching up. Moreover, in studying the contribution of financial openness to international trade, this chapter extends the existing literature on trade empirics by considering variables not included in the gravity equations used in previous studies.[3]

Second, specific attention is devoted to disentangling the effect of financial openness from that of domestic financial development. As it is expected that the two phenomena will be positively correlated, the variables used to proxy for financial openness might also capture the effect of domestic financial development on the economic performance. The consequence might be the overestimation of the actual impact of financial openness. To address this problem, the econometric model will include indicators of the depth of domestic financial markets in addition to measures of financial openness.[4]

Third, our investigation looks at two separate groups of countries: the formerly centrally planned economies (referred to as ‘emerging market economies’) and a cluster of western advanced economies. The estimates effectively indicate the existence of some significant differences between the two groups with respect to the structural channels linking financial openness and economic integration.

Finally, relative to our latest research on this topic (Carmignani and Chowdhury 2006), we explicitly take into account the endogenous relationship between the two dimensions of economic integration (trade and income convergence) by estimating a system of two (simultaneous) equations. We therefore let trade integration be a determinant of the speed of convergence and, at the same time, the income gap will be a determinant of trade intensities. A three-stages least squares estimator will then be used to allow for non-zero covariances between the residuals of the two equations.

The key results of the analysis can be summarized as follows. Financial openness significantly strengthens both income convergence and trade integration of the emerging market economies with the EU-15. These effects appear to work over and above any effect stemming from the development of domestic financial systems. In the case of advanced economies, however, the effect of financial openness on trade integration is almost negligible. Finally, system estimations confirm that deeper trade integration facilitates income convergence, while faster convergence also promotes trade integration. This suggests that initially poorer and less integrated emerging market economies could fall into an 'isolation trap'. For these economies, financial openness proves to be a powerful instrument to avoid marginalization.

Theoretical background

This chapter evaluates the effect of financial openness on two dimensions of economic integration: international trade in goods and services; and convergence of per capita income across countries. The theoretical underpinnings of the analysis are spelled out in this section.[5]

Financial openness and convergence of per capita income

Economic growth theory provides the rationale for linking financial openness (and financial integration) to per capita income. In both neoclassical and endogenous growth models, per capita income at a generic time, *t*, is determined by technology and rates of accumulation of production factors (labour, physical and human capital).[6] Several arguments have been proposed in the literature to show that financial openness has an impact on such determinants of per capita income.

One channel points to possible technological spillovers arising from capital account liberalization, which spurs capital inflows and investments from abroad. Related arguments emphasize the spillovers eventually stemming from transfers of skills and increased competition. Another strand of research suggests that financial openness will broaden risk-sharing opportunities for domestic investors, thus reducing the cost of equity capital and increasing investment and the rate of capital accumulation. Moreover, better risk-sharing options will allow countries to shift their investment mix towards riskier, hence, higher-return projects. On a different ground, the political economy literature has pointed out the role of financial openness as a commitment technology device. When economic policies are dynamically inconsistent, capital account liberalization signals government's intention to stick to macroeconomic and financial discipline. This, in turn, reduces economic uncertainty, favouring longer-term investment and factors accumulation. Finally, financial openness might be linked to income growth through the domestic financial system. In this view, lifting capital account restrictions promotes faster development of domestic financial intermediation, leading to a greater volume of credit being available to finance profitable projects, as well as higher efficiency in the allocation of resources.[7]

The central message of this literature is that financial openness positively correlates with per capita income (and with the rate of economic growth). Hence, the implication is that: *if a country maintains capital* *account restrictions and limits the degree of international integration of its financial markets, it will then experience a widening gap in per capita income relative to a partner that is more financially open*. That is, for a given level of financial openness of the partner country, the income gap between the partner country and the domestic country will be greater the lower the degree of financial openness of the domestic country.

However, this prediction does not go unchallenged. Several models emphasize possible counter-effects of financial openness on income – which might, in turn, complicate the relationship between financial openness and the catching up of income. If domestic institutions are weak, increasing financial openness will lead to capital flight (even if the country is capital-scarce). This will hamper investment and, hence, long-term growth prospects. Similarly, since the capital account is a channel of contagion in financial crises, its liberalization will make the country more vulnerable to speculative attacks, sudden stops and capital reversal – which are, in turn, all likely to have large negative output effects. Finally, informational asymmetries and/or pre-existing distortions (such as, trade restrictions) might well imply that foreign capital will be allocated inefficiently; for instance, going to sectors where the country has a comparative disadvantage.[8] Thus, all of these counter-arguments point to the possibility that an increase in financial openness might, in fact, have perverse effects on the income gap of the domestic country relative to richer partners.

Financial openness and international trade

Assuming that internationally well-integrated capital markets will effectively emerge from it, financial openness can influence the extent of international trade in goods and services through two main channels. The first operates through risk-sharing and production specialization.[9] Consider a region where countries are affected by idiosyncratic shocks. If such shocks are large and volatile or, alternatively, if households are risk-averse to a sufficient degree, then incentives to diversify domestic production will be stronger – thus, leading to low specialization. Open and well-integrated financial markets facilitate the diversification of ownership. This, in turn, has two effects. First, if economic agents in one country hold debt and equity claims on the output of the other country, then the dividend, interest and rental income derived from these holdings contributes to smoothing shocks across countries. This is, thus, a form of ex ante international insurance. Second, to achieve the smoothing of consumption, households in each country will undertake ex post adjustment of their asset portfolios following the realization of idiosyncratic shocks in the region. Again, this will lead to smoothing the income of all countries. Once insurance is available through international trade in financial assets, each country will have stronger incentive to specialize in one production (or technology) in order fully to exploit economies of scale (or technological competitive advantage). Specialization in production will then create greater scope for international trade in goods and services, as predicted from a standard neo-classical trade theory.

The second channel relies on the ability of the financial sector to divert savings to the private sector. When domestic financial intermediation is weak and inefficient, firms in export-orientated sectors are burdened by significant liquidity constraints and, hence, trade less. Financial openness can help overcome those constraints by making more external finance available to domestic firms. An implication of this model is that international trade will tend to increase, particularly in those sectors that rely more heavily on external finance, such as projects in the manufacturing sector. A related argument is that financial openness, by eventually facilitating the development of financial intermediation and, hence, contributing to the establishment of efficient systems of international payments, can work as a trade facilitation factor.[10]

Overall, with respect to international trade, the prediction on the effects of financial openness is that: *countries that are more financially open should experience greater volumes of international trade; that is, financial openness should facilitate a country's trade integration with any partner.*

Methodology and data

Based on the previous discussion, the chapter estimates two equations: one links financial openness to the difference in per capita income across countries; the other links financial openness to a country's international trade. Modelling strategy and estimation methodology are described below.

Equation I: the income gap across countries

The log of per capita income y, in country i, at time t, is assumed to be a function of K variables plus the degree of financial openness, z (as suggested by the arguments reviewed on pp. 143–4):

$$y_{it} = f(x_{1,it}, x_{2,it}, \ldots x_{K,it}, z_{it}) \tag{7.1}$$

Let *j* be the partner country, then the income gap between *i* and *j* can be written as

$$y_{jt} - y_{it} = f((x_{1,jt} - x_{1,it}), (x_{2,jt} - x_{2,it}), \ldots (x_{K,jt} - x_{K,it}), (z_{jt} - z_{it})) \qquad (7.2)$$

Denoting by *d* the difference between country *j* and country *i* (that is, $dx_{1,t} = x_{jt} - x_{it}$), Equation (7.2) can be rewritten in the more compact form:

$$dy_t = \alpha_0 + \alpha_1 dz_t + \alpha_2 dx_{1t} + \alpha_3 dx_{2t} + \ldots + \alpha_4 dx_{Kt} + \varepsilon_t \qquad (7.3)$$

where, $\alpha_0 = c_j - c_i$, ε_t is a normally distributed stochastic disturbance term, and the αs are parameters to be estimated. Note that if $\alpha_1 > 0$, then the more country *i* falls behind country *j* in terms of financial openness, the larger the income gap will be. This means that to reduce the income gap, country *i* will have to increase its degree of financial openness for any given degree of financial openness achieved by the partner *j*. The role of financial openness in the process of per capita income convergence can, thus, be tested through the null hypothesis H_0: $\alpha_1 = 0$.

The baseline specification of (7.3) includes the following regressors (expressed in difference between reference country *j* and country *i*): (i) the rate of labour accumulation (*dn*); (ii) the rate of human capital accumulation (*dh*); (iii) the depth of domestic financial intermediation (*dq*). The first two variables are standard, theory-based determinants of income per capita;[11] the third variable is included so as to disentangle the effect of financial openness on convergence from the effect of domestic financial development: the baseline will then be integrated by the rate of physical capital accumulation (*dk*) and an indicator of the quality of institutions (*dIquality*).

Equation II: the gravity equation

The second equation is a gravity model of bilateral trade. The gravity approach posits that the volume of trade between two partners is positively related to their economic size and inversely related to their distance. This approach has received wide empirical support, and recent studies have shown how it can be closely linked to formal theories of international trade.[12] Therefore, it seems to be the most appropriate tool to test whether financial openness promotes trade integration.

For a given year *t*, the gravity equation expresses trade of country *i* with the partner country *j* (T_{ij}) as a function of the economic size of the two countries (Y), the geographical distance between them (D) and a set of additional geographical, economic and environmental variables (W):

$$T_{ij,t} = \frac{Y_{i,t}Y_{j,t}}{D_{ij,t}} \exp(W_{ij,t}) \tag{7.4}$$

$$\ln(T_{ij,t}) = \ln(Y_{i,t}Y_{j,t}) - \ln(D_{ij,t}) + W_{ij,t} \tag{7.5}$$

Following the arguments presented in the previous section, financial openness of country $i(z_i)$ will be included in the set W. Similarly to the specification of the per capita income gap equation, a proxy for domestic financial depth in country i will also enter the right-hand side so as to disentangle the effect of financial openness from that of financial development. Thus, the gravity equation to be estimated is

$$\ln(T_{ij,t}) = \beta_0 + \beta_1 \ln(Y_{i,t}Y_{j,t}) + \beta_2 \ln(D_{ij,t}) + \beta_3 z_{i,t} + \beta_4 q_{i,t} + \upsilon_{ij,t} \tag{7.6}$$

where υ is a stochastic disturbance term, and βs are the parameters to be estimated. It goes without saying that, while formally indexed by the subscript t, distance D is constant over time. Again, the sign and statistical significance of the coefficient β_3 will provide empirical evidence on the impact of financial openness on the degree of trade integration of country i with partner j. A statistically significant and positive value of β_3 would indicate that financial openness promotes trade integration.

Drawing on the gravity literature, Equation (7.6) will be expanded by adding some dummy variables to the set W in order to isolate specific trade facilitating conditions. Furthermore, as recently shown by de Groot *et al.* (2003), ineffective institutions tend to increase transaction costs and therefore reduce trade. An indicator of institutional quality in country i (*Iquality*) will then be added to the set of regressors.

Estimation methodology and data

Sample and data

Equations (7.3) and (7.6) are estimated on two groups of countries. The first group includes only formerly planned economies (so-called emerging market economies). The second group consists of advanced western economies. The sample covers the period 1990–2003.[13] For each variable, convergence is measured relative to the EU-15 average. In other words, Equations (7.3) and (7.6) are estimated using the EU-15 average as the reference partner j. This makes it possible to assess the effect of financial openness on the process of economic integration of country *i* with the EU-15. In fact, the main findings are qualitatively unchanged if the United States or the richest among EU-15 economies are used as reference partners.

To operationalize Equation (7.3), *y* is measured by a country's real per capita GDP; *n* is proxied by the fertility rate; *h* is proxied by the enrolment rate in tertiary schooling; *k* is proxied by the real investment share of GDP, and *q* is defined as a country's ratio of M2 minus narrow money to narrow money. In Equation (7.6), instead, trade is measured by a country's exports to, and imports from, the EU-15 in a logarithm of millions US$ (*tradeeu*); *Y* is given by real aggregate GDP, and *dst* is the logarithm of distance (in kilometres) between the capital of a country and Frankfurt am Main. Finally, drawing on Henisz (2000), institutional quality *Iquality* is measured by an index of effectiveness of political and institutional constraints on policy changes. A complete list of variables, definitions and sources is given in the Appendix.

Crucial to the estimation of Equations (7.3) and (7.6) is the empirical definition of the variable *z*, the degree of financial openness. Previous studies have employed two types of proxies: indicators of capital account liberalization, and measures of the actual volume of capital flows across countries. Since capital account liberalization and international financial integration constitute two distinct, *albeit* tightly correlated, concepts of financial openness, we make use of different indicators to capture the effect of both.

A first suitable strategy – indeed, rather common in the literature – is to construct an index of capital account liberalization using the information available from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAR).[14] We follow the approach proposed by Chinn and Ito (2002) and construct our first proxy z_1 as follows.

From the AREAR, we define four dummies for each country and each year: (i) R_1 takes value 1 in the absence of multiple exchange rates; (ii) R_2 takes value 1 if current account transactions are not restricted; (iii) R_3 takes value 1 if capital account transactions are not restricted; and (iv) R_4 takes value 1 in the absence of a requirement of surrender of export proceeds. A variable $SHARE_3$ is then constructed for each year as the average of R_3 in that year and in the four preceding years. Finally, *z* is obtained for each country and each year as the first standardized principal component of R_1, R_2, $SHARE_3$ and R_4. Thus, z_1 is an indicator of overall cross-border capital liberalization: higher values denote greater financial openness.

To measure the degree of international financial integration of country I, instead we follow Lane and Milesi-Ferretti (2003) and define the following two indices:

$$z_{2,it} = \frac{FA_{it} + FL_{it}}{GDP_{it}}$$

and

$$z_{3,it} = \frac{PEA_{it} + PEL_{it} + FDIA_{it} + FDIL_{it}}{GDP_{it}}$$

where, as usual, i denotes a country and t a given year; FA is the stock of foreign assets; FL is the stock of foreign liabilities; PEA and PEL are the stocks of portfolio equity assets and liabilities respectively, and $FDIA$ and $FDIL$ are the stock of foreign direct investment assets and liabilities respectively. Thus, the variable z_2 measures the overall volume of cross-holdings for a given country in a given year. The variable z_3 measures, instead, the volume of cross-holdings in equity.

Estimation methodology

Two different estimation methods are used. With the first (single equation estimation), each equation is estimated independently from the other. To account for reverse causality – that is, for the possibility that financial openness is determined by trade volumes and per capita income growth – two-stages weighted least squares (2SLS) are applied, using lagged and initial values of endogenous variables as instruments. The estimator is then further corrected to account for the fact that the annual panel is unbalanced.[15]

The second method (system estimation) allows for non-zero covariances between the residuals of the two equations. Open economy growth models indicate that trade integration is likely to speed up convergence.[16] To account for this effect, the income gap equation should then include bilateral trade between the country and the EU-15 among the regressors. Since bilateral trade is the dependent variable of the gravity model, we can gain in efficiency by estimating the two equations as a system through three-stages least squares (3SLS). Again, endogenous variables are instrumented by their lagged values.

Econometric results

Financial openness and per capita income gaps

The results for the income gap equation (dy is the dependent variable) are reported in Table 7.1. The estimates for the group of emerging market

Table 7.1 Income gap equation

	Emerging market economies					Western economies				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
constant	1.112***	0.807***	0.401	1.724***	1.205***	0.011	−0.083***	−0.005	0.013	−0.020
dq	0.706***	0.709***	0.559***	0.813***	0.211	−0.038	0.016	0.059	−0.031	−0.010
dz_1	0.126***			0.150***	0.083**	0.258***			0.264***	0.265***
ds	2.352***	3.131***	3.769***	1.125***	1.976***	0.252**	0.015	0.336**	0.224**	0.010
dn	–3.488	−17.142	27.575	−27.881***	33.045***	12.675***	−17.153***	−7.659	13.134***	5.923
dz_2		0.002***					0.001***			
dz_3			0.007***					0.002***		
dk				1.441***					−0.108	
dIqual					0.092*					0.068***
N. Obs	110	66	55	109	96	189	138	110	188	185

Notes: Dependant variable is the difference between log average real per capita income in the European Union and a country's log real per capita income (*dy*);
Estimation is by weighted two-stages least squares;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by *, ** and *** respectively.
See Appendix for details on variables definition.

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economies are shown in columns 1 to 5; the estimates for the full sample of western economies are displayed in columns 6 to 10.

To start with emerging market economies, the baseline specification in column 1 clearly indicates that a larger gap in financial openness (greater values of dz_1) implies a greater income gap (*dy*). Thus, the less financially open an emerging market economy is relative to the EU-15 average, the more difficult it will be for this economy to catch up with the EU-15. This effect holds over and above any difference in financial depth (*dq*), human capital accumulation (*ds*) and demographic dynamics (*dn*). Columns 2 and 3 show the same baseline equation re-estimated with measures of international financial integration (dz_2 and dz_3). The evidence is complementary to that in column 1: countries that fall behind the EU-15 average in terms of their degree of international financial integration tend to experience greater income gaps. In column 4, the baseline specification is augmented by differences in physical capital accumulation, *dk*. The strength and statistical significance of dz_1 are not substantially modified. This suggests that the mechanism through which differences in the degree of financial openness affect income convergence with the EU-15 does not work through the rate of investment. Interestingly, *dq* also does not lose significance when *dk* is added to the model. The interpretation is that the different stage of financial development matters not so much because it determines different rates of capital accumulation, but rather because it implies a different level of allocative efficiency. Finally, the model in column 5 includes the indicator of institutional quality *dIquality*. In broad terms, dz_1 still plays its role, while domestic financial depth becomes insignificant. As a matter of fact, the estimated coefficient of *dIquality* could, to some extent, already capture the contribution of *dq* to the determination of the income gap. Indeed, the development of the domestic financial system heavily relies upon the establishment of efficient institutions to protect economic rights. It then follows that the two variables *dIquality* and *dq* might be representing partially overlapping effects on *dy* and, hence, they might be collinear.

Turning to the group of western economies, the basic result concerning financial openness seems to be confirmed. In all specifications, *dz* is positive and statistically different from zero, irrespective of the three proxies used. At the same time, *dq* always fails to pass a zero restriction test. This lack of effect of domestic financial depth, together with the equally negligible role played by *dk*, is probably the most striking change, relative to emerging market estimates. In fact, column 10 of Table 7.1 seems to suggest that in advanced economies the income gap *dy* is a function only of differences in institutional quality and in financial openness.

Various robustness checks have been performed to test the sensitivity of the results. First, to test for the impact of 'absolute' rather than 'relative' financial openness, the income gap equation has been re-estimated using country *i*'s level of financial openness (z) rather than the difference between the EU-15 and country *i* (dz). Similarly, dq has been replaced by q. In the basic specification without dk, the estimated coefficient on z turns out to be −0.121 (significant at 1 per cent) for the emerging market economies and −0.234 (significant at 1 per cent) for the western advanced economies. This means that, as expected, countries that are more financially open in absolute terms tend to experience smaller per capita income gaps vis-à-vis the EU-15 average.

Second, different proxies for human capital accumulation and labour force growth have been tried (for example, enrolment in secondary rather than tertiary school, population growth rather than fertility rate). Similarly, different indicators of the depth of domestic financial intermediation have been considered (for example, the M2 to GDP ratio and the domestic credit to the private sector to GDP ratio). In general, the coefficient on dz always retains its sign and level of statistical significance.

Financial openness and trade in goods and services

Estimates of the gravity equation (7.6) are presented in Table 7.2 (*tradeeu* is the dependent variable). As before, columns 1 to 5 refer to estimates for the group of emerging economies; columns 6 to 10 refer to estimates for the group of western countries.

All variables in the baseline specification estimated for emerging market economies exhibit highly significant coefficients with the expected sign. Trade flows between a country and the EU-15 increase, the larger the economic size of the country and the geographically closer the country is to the EU-15. Financial openness stimulates trade integration. Again, this effect is present over and above the positive impact on trade of a more developed domestic financial system. Using different proxies for financial openness (columns 2 and 3) and introducing dummy variables to account for landlockedness and common borders (column 4) does not change the results. In line with the findings of de Groot *et al*. (2003), we also find (column 5) that better institutions help trade integration with the EU-15. However, this effect adds to, instead of replacing, the effect of the financial variables q and z.

An intriguing pattern emerges from the sample of western economies. When measured by Chinn and Ito's (2002) index of capital account liberalization, financial openness does not appear to play any significant role

Table 7.2 Gravity equation

	Emerging market economies					Western economies				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
constant	−36.664***	−31.852***	−31.203***	−34.902***	−32.689***	−24.173***	−21.581***	−22.164	−25.926***	−25.182***
q	0.252***	0.192***	0.165***	0.221***	0.175***	−0.128***	−0.154***	−0.055***	−0.056***	−0.042**
z_1	0.167***			0.164***	0.115***	−0.001			0.000	0.000
dst	−0.862***	−0.678***	−0.517***	−0.886***	−0.780***	−0.254***	−0.201***	−0.431***	−0.109***	−0.107***
YY	0.971***	0.854***	0.825***	0.943***	0.884***	0.696***	0.639***	0.673***	0.690***	0.675***
z_2		0.003***					0.001***			
z_3			0.014***					0.001***		
border				0.117***	0.168***				0.847***	0.813***
Llock				−0.140***	−0.171***				0.256***	0.216***
Iqual					0.073***					0.006
N. Obs.	139	110	92	139	114	311	216	174	311	279

Notes: Dependant variable is log trade between a country and the European Union (*tradeeu*);
Estimation is by weighted two-stages least squares;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by *, ** and *** respectively;
See Appendix for details on variables definition.

in the gravity model. However, when proxies of international financial integration are used, the effect of financial openness becomes strongly significant and positive. To some extent, the lack of statistical significance of z_1 might be due to the limited variability that this indicator has in the sample of advanced economies. On the contrary, actual capital flows display greater variability both across countries and over time. This makes the estimation of the coefficients of z_2 and z_3 more precise. Another difference relative to the emerging market economies concerns landlocked countries. In the group of western economies, apparently, being landlocked does not cause economic marginalization. Finally, it is worth noting the marginally insignificant contribution of institutional quality to trade integration in this group of countries.

Robustness checks analogous to those performed for Equation (7.3) are carried out for the gravity model (that is, changes in the definition of q and inclusion of additional variables on the right-hand side of the model). Of some specific interest is the inclusion of a dummy variable to control for the existence of a preferential trade agreement between a country and the EU15. This dummy turns out to have a large and positive coefficient. Furthermore, the variable *dst* (distance) has been recomputed using different cities as the EU-15 reference. Overall, results on financial openness are qualitatively unchanged.

System estimates

If trade integration facilitates income convergence, then Equation (7.3) has to be extended with the inclusion of *tradeeu* on the right-hand side; however, since *tradeeu* is the dependent variable of Equation (7.6), some efficiency gain in estimation can be obtained by applying a 3SLS system estimator that allows for correlation of residuals across the two equations. Equations (7.3) and (7.6) are thus estimated as a system. These estimates are reported in Table 7.3. As usual, we separate the group of emerging market economies (columns 1 to 5) from the group of western economies (columns 6 to 10). Financial openness is always measured using Chinn and Ito's indicator of capital account liberalization. Results obtained by using the other two proxies are not different from those discussed below and they can be obtained from the authors upon request.

Column 1 combines the two baseline specifications, with the inclusion of *tradeeu* in the income gap equation. Qualitatively, results are not different from those obtained from the single equation 2SLS squares. In particular, financial openness still plays its important role in determining economic integration: (i) a less financially open economy (relative to the EU-15 average) will experience a wider gap in per capita incomes relative

Table 7.3 System estimation

	Emerging market economies					Western economies				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Equation 1: dependent variable *dy*					**Equation 1: dependant variable *dy***				
constant	4.766***	4.721***	4.403***	5.122***	4.719***	0.249	0.383	0.211	0.008	0.413
dz	0.088**	0.093***	0.103***	0.105**	0.088**	0.223***	0.222***	0.236***	0.245***	0.213***
dq	0.288***	0.300***	0.468***	0.325***	0.320***	−0.030	−0.031	−0.031	−0.014	−0.020
dn	−14.633***	−14.507***	−27.087***	−17.924**	−17.905***	14.472***	14.830***	14.439***	7.338	12.113**
ds	1.340***	1.379***	0.965***	1.349***	1.381***	0.577**	0.480**	0.336	0.053	0.488*
tradeeu	−0.349***	−0.347***	−0.284***	−0.392***	−0.344***	−0.021	−0.033	−0.018	−0.001	−0.036
dk			0.913***					−0.305		
dIqual				−0.029					0.075***	
	Equation 2: dependent variable *tradeeu*					**Equation 2: dependent variable *tradeeu***				
constant	−35.767***	−34.861***	−35.271***	−32.415***	−28.605***	−21.944***	−24.185***	−24.393***	−23.527***	−23.251***
q	0.245***	0.189***	0.194***	0.053	0.128**	−0.177***	−0.090**	−0.086*	−0.074	−0.029
z	0.223***	0.221***	0.224***	0.152***	0.163***	0.062*	0.031	0.028	0.019	−0.075**
dst	−0.843***	−0.834***	−0.809***	−0.681***	−0.305**	−0.219***	−0.146***	−0.144***	−0.140***	−0.121***
YY	0.952***	0.937***	0.941***	0.872***	0.777***	0.652***	0.667***	0.670***	0.647***	0.645***
Border		0.156	0.143	0.124***	0.190**		0.651***	0.662***	0.067***	0.734***
Landl		−0.052	−0.051	0.287**	0.017		0.282***	0.256**	0.691***	−0.001
Iqual				−0.150					0.280***	
dy					−0.624***					−0.735***
N. Obs.	230	230	228	198	230	393	393	392	374	393

Notes: Estimation is by three stages least squares;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by *, ** and *** respectively.;
See Appendix for details on variables definition.

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to the EU-15; and (ii) a less financially open economy will trade less with the EU-15. Since *tradeeu* turns out to reduce dy, then the trade-enhancing effect of financial openness feeds back on income convergence through *tradeeu*. We can thus conclude that financial openness affects the speed of convergence through two channels: a direct effect, captured by the positive coefficient of dz_1 in the income gap equation; and an indirect effect, captured by the positive coefficient of z_1 in the gravity equation combined with the negative coefficient of *tradeeu* in the income gap equation.

Columns 2 to 4 expand the baseline specifications in line with what was described above. The key findings concerning the role of financial openness are all confirmed. In the income gap equation, the variable dk has a positive and significant coefficient, while both financial variables dq and dz_1 remain significant. This confirms the previous findings that differences in financial openness and in domestic financial depth do not affect the income gap through the investment rate. Greater allocative efficiency is a plausible transmission channel. In addition, one can think of transmission through increased policy discipline. The liberalization of international capital flows as well as the existence of more efficient financial intermediaries can put pressure on authorities to stabilize and improve the macroeconomic framework, which would in turn foster a more rapid catching up.

Differently from single equation estimates, instead, the dummy variables in the gravity equation are statistically significant only when the income gap equation includes dk. Institutional quality also fails to be significant both in the gravity equation and in the income gap equation. It would be desirable in future work to focus more on the causes that determine these differences between single equation and system equation estimates. A final note concerns the coefficient of population growth dn in the income gap equation. While in single equation estimates this coefficient displayed some instability, in the system estimates it is always negative, as expected from the neo-classical theory of growth, and different from zero.

Column 5 proposes a fully endogenous model, with the income gap dy that enters the gravity model. That is, each of the two dependant variables now figures as regressor in the other equation. The results on all other variables are unchanged; at the same time, dy exhibits a negative coefficient in the gravity equation. Thus, poorer countries tend to trade less with the EU-15 than richer countries. The endogenous relation between trade integration and income gap may lead to an 'isolation trap': countries whose per capita GDP is significantly below the EU-15 average tend to trade less with the EU-15, but weaker trade integration reduces the speed of catching up, so the country is trapped in an equilibrium characterized by low integration with the EU-15. Our results suggest that financial openness is a way to break this vicious circle. By opening more to international capital flows, initially poorer emerging market economies can catch up faster and, at the same time, trade more with the EU-15.

Estimates on the sample of western advanced economies point to a more ambiguous role for financial openness. While the coefficient of dz_1 is always positive and significant in the income gap equation, the contribution of z to trade integration is negligible, or even negative. Therefore, an increase in financial openness relative to the average of the EU-15 has different effects on different dimensions of the integration process. The negative trade effect of the income gap is confirmed. However, there is no evidence of an 'isolation trap' for western advanced economies, since *tradeeu* does not significantly feed back on the income gap. Institutional quality now matters: *dIqual* increases *dy* while *Iqual* increases trade. Institutional reforms are thus a key factor fostering the economic integration of western economies.

Conclusion and directions of future research

The main result of the empirical analysis is that financial openness facilitates the economic integration of emerging market economies with the EU-15. This integration effect takes the form of faster per capita catching up in relation to income and greater bilateral trade in goods and services. Furthermore, the effect of financial openness occurs over and above the effect of domestic financial deepening. Since system estimates show that trade integration feeds back on the income gap and, at the same time, the income gap reduces trade integration, financial openness is a powerful instrument through which initially poorer and less integrated countries can overcome their marginalization. Thus, our results add to the literature on the benefits of capital account liberalization.

However, a number of qualifications are necessary. First, with respect to per capita income convergence, the regressions show that even if a country were to achieve the same degree of financial openness as the EU-15, the gap in per capita income levels would persist as long as there are differences in technology and in the rates of factors accumulation, particularly human capital accumulation. Therefore, financial liberalization is only one of the several policies that countries need to implement in order to sustain the catching up of income. Similarly, with respect to international trade, the empirical evidence indicates that financial openness ought to be embedded in a broader context of policies for trade facilitation, including the abatement of tariff and non-tariff barriers (for example, inefficient custom procedures, inadequate transport infrastructures). Furthermore, some ambiguity on the role of financial openness exists in the case of more advanced western economies. In particular, for these countries there is evidence that reducing the financial openness gap with the EU-15 also reduces the income gap, but the effect of greater capital account liberalization on trade is negligible, and might even be negative.

Possibly, the most crucial qualification of all concerns the possible side effects and downward risks of financial openness. While our empirical analysis emphasizes the benefits of free international capital movements for the process of economic integration, the experience of several other emerging economies worldwide calls for a careful design and implementation of financial and capital account liberalization in the formerly centrally planned economies.[17] The increased economic vulnerability that is associated with integration into global financial links needs to be managed by combining capital account liberalization with: (i) domestic financial sector reforms to strengthen regulation and supervision, enforce sound and prudential lending practices, achieve high standards of governance of banks and other financial institutions; (ii) trade policy and competition policy reforms to eradicate distortions that financial openness might exacerbate; (iii) implementation of a coherent macroeconomic policy mix characterized by low inflation and fiscal stability; and (iv) design of redistributive tools to shield the most vulnerable socio-economic groups against the potential damages of increased volatility. Finally, in the transition towards financial liberalization, temporary and market-based capital controls might eventually be considered to tilt the composition of inflows towards longer-term maturities, and so prevent a maturity mismatch between investment projects and financing.[18]

A number of issues deserve investigation in future research; one concerns a better understanding of the channels through which financial openness affects the per capita catching up of income. Several theoretical possibilities exist, and our empirical analysis indicates that financial openness does not produce its impact only through the development of domestic financial systems and a faster accumulation of physical capital. A more structural model is therefore needed to evaluate other possible mechanisms, such as allocative efficiency and policy discipline. Future work should also consider whether, in addition to the two considered in this chapter, financial openness affects other dimensions of economic integration, such as the sustainability of fixed exchange rate regimes and macroeconomic policies convergence. Finally, our estimates point to a difference between emerging market economies and advanced western economies in the contribution of financial openness to economic integration. On the one hand, this difference should not come as a surprise since the two groups of countries are still characterized by some sharp differences in economic structures. On the other hand, they suggest that the research should be expanded to examine other clusters of countries in order to establish the structural conditions under which financial openness is more (or less) favourable to economic integration. This requires re-estimating equations such as (7.3) and (7.6) on samples of countries selected along different criteria (that is, membership in a given regional economic community, initial level of per capita income and so on), and then comparing the estimated strength of the relationship between financial openness and economic integration dimensions across clusters.

Appendix: descriptions of variables

Variables	Definition	Source
Dy	Per capita income gap. Difference between EU average log per capita income and country's log per capita income	WDI
Dn	Difference between EU average log fertility rate and country's log fertility rate	WDI
Dh	Difference between EU average tertiary school enrolment rate and country's tertiary school enrolment rate	WDI
Dk	Difference between EU average real investment share of GDP and country's real investment share of GDP	WDI and PWT
q	Index of domestic financial development: country's ratio of liquid liabilities to narrow money. Alternative definitions used for sensitivity analysis: domestic credit to private sector to GDP ratio and liquid liabilities to GDP ratio	IFS
Iqual	Indexes of intensity/effectiveness of political and institutional constraints on policy changes	Henisz (2000)
Dq	Difference between EU average q and country's q	IFS

Variables	Definition	Source
Tradeeu	Log of country's exports to and imports from EU	DoTS
$Y_i Y_j$	Log of country's aggregate GDP times EU's aggregate GDP	WDI
Locked	Dummy variable taking value if country is landlocked	CIA World Factbook
Border	Dummy variable taking value 1 if country shares a land border with any EU-15 member	CIA World Factbook
Dst	Log of distance (in km) between country and Frankfurt am Main	CIA World Factbook
z_1	Index of capital account openness	See text
z_2, z_3	Index of international financial integration. Two versions are proposed: p_1 and p_2	See text
Dz	Difference between EU average open and country's open	
Dp	Difference between EU average integer and country's p. Two versions are computed: dp_1 uses p_1 and dp_2 uses p_2	
dIqual	Difference between EU average value of institutions and country's institutions	

Notes: WDI: *World Development Indicators* Database 2004, World Bank;
IFS: *International Financial Statistics* Database June 2004, IMF;
PWT: Heston, Summers and Aten, *Penn World Tables* Version 6, CICUP, October 2002;
DoTS: *Direction of Trade Statistics* 2004, IMF.

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Notes

1 See, for instance, the discussions in de Brouwer (1999) and Le (2000).
2 See Hali *et al.* (2004), for a survey.
3 Rose (2004) surveys the variables and channels that are most often investigated in the literature on the macroeconomic determinants of international trade.

4 Guiso *et al.* (2004) provide an in-depth analysis of the link between financial development and financial integration, focusing on the EU countries. They claim that most of the growth pay-off from financial integration occurs through domestic financial development.

5 This section draws on our previous work, Carmignani and Chowdhury (2006).

6 For a formal treatment of the neo-classical model, see Mankiw *et al.* (1992). For a review of models of endogenous growth, see Barro and Sala-i-Martin (1995: chs 4 and 5).

7 Bailliu (2000) proposes a simple formalization of several links between financial openness and growth within an AK setting. Bekaert and Lundblad (2001) and Henry (2003) discuss the effect of financial openness on the cost of capital. Obstfeld (1994) shows that financial openness, when resulting in capital market integration, supports risk-taking. Bartolini and Drazen (1997) examine the argument that capital account liberalization can work as a signal.

8 See Boyd and Smith (1992) for a critique of the perverse effects of financial openness when domestic institutions are inefficient. Rodrik (1998) puts forward a sceptical view of capital account liberalization based on various arguments. The empirical literature also provides mixed evidence on the growth effects of financial liberalization. For a broad assessment, see Eichengreen (2001).

9 For a discussion of the theoretical and empirical link between capital markets, risk-sharing and production specialization, see Kalemli-Ozcan *et al.* (2003). For more empirical evidence, see Imbs (2003).

10 Kletzer and Bardhan (1987) provide a first formalization of the second channel. Further theoretical advances and some supporting empirical evidence are reported by Beck (2001).

11 See Mankiw *et al.* (1992).

12 For a discussion of gravity equations, see, inter alia, Evenett and Keller (2002).

13 The panel is, however, unbalanced as for some countries the first available observation comes later than 1990. The group of emerging market economies includes: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, Ukraine. The group of advanced economies consists of: Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA.

14 See Miniane (2004), for a survey of various approaches adopted in the construction of such indices.

15 The unbalanced panel estimator follows Verbeek and Nijman (1996). An alternative to the 2SLS instrumental variable estimator would be a 3SLS system estimator (see Wooldridge 2002). In this case, Equations (7.3) and (7.6) are estimated as a system together with an equation where financial openness is the dependent variable, and trade and per capita income enter as explanatory variables. In fact, a set of estimates from the 3SLS procedure is available from the authors upon request. The qualitative thrust of results does

not change relative to the single equation 2SLS presented in the next section. We prefer reporting the 2SLS and not the 3SLS because the focus of this analysis is more on the estimation of reduced-form equations than on structural models.

16 Ben-David (1996) provides evidence of income convergence among major trade partners.

17 See, for instance, the discussion in Johnston *et al.* (1997), Dailami (2000) and Daianu and Vranceanu (2002).

18 Successful experiences with those types of controls are reported for Chile and other Latin American and East Asian economies. See, inter alia, Edwards (2002) and World Bank (2000).

References

Bailliu, J.N. (2000) 'Private Capital Flows, Financial Development, and Economic Growth in Developing Countries', Bank of Canada Working Paper 2000–15.

Barro, R.J. and X. Sala-i-Martin (1995) *Economic Growth* (New York: McGraw-Hill).

Bartolini, L. and A. Drazen (1997) 'Capital Account Liberalization as a Signal', American Economic Review, 87: 138–54.

Beck, T. (2001) 'Financial Development and International Trade. Is there a Link?', mimeo (Washington, DC: World Bank).

Bekaert, G. and C. Lundblad (2001) 'Does Financial Liberalization Spur Growth?', NBER Working Paper 8425 (Cambridge, MA: NBER).

Ben-David, D. (1996) 'Trade and Convergence Among Countries', *Journal of International Economics*, 40: 279–98.

Boyd, J.H. and B.D. Smith (1992) 'Intermediation and the Equilibrium Allocation of Investment Capital: Implications for Economic Development', *Journal of Monetary Economics*, 30: 409–32.

Carmignani, F. and A. Chowdhury (2006) 'The Impact of Financial Openness on Economic Integration: Evidence from Europe and the CIS', in L. Vinhas de Souza and O. Havrlyshyn (eds), *Return to Growth in the CIS* (Berlin: Springer).

Chinn, M. and H. Ito (2002) 'Capital Account Liberalization, Institutions, and Financial Development: Cross-Country Evidence', mimeo, Department of Economics, University of California at Santa Cruz.

Daianu, D. and R. Vranceanu (2002) 'Opening the Capital Account of Transition Economies: How Much and How Fast', William Davidson Working Paper 511, University of Michigan.

Dailami, M. (2000) 'Managing Risks of Capital Mobility', mimeo (Washington, DC: World Bank).

de Brouwer, G. (1999) *Financial Integration in East Asia* (Cambridge: Cambridge University Press).

de Groot, H., G.J. Linders and P. Rietveld (2003) 'Why Do OECD-countries Trade More?', Tinbergen Institute Discussion Paper TI 2003 092/3.

Edwards, S. (2002) 'Capital Mobility, Capital Controls and Globalization in the 21st Century', *Annals AAPSS*, 579: 261–70.

Eichengreen, B. (2001) 'Capital Account Liberalization: What Do Cross-Country Studies Tell Us?', *World Bank Economic Review*, 15 (3): 341–65.

Evenett, S. and W. Keller (2002) 'On the Theories Explaining the Success of the Gravity Equation',*Journal of Political Economy*, 110 (2): 281–316.

Guiso, L., T. Jappelli, M. Padula and M. Pagano (2004) 'Financial Market Integration and Economic Growth in the EU', *Economic Policy*, 40: 523–77.

Hali, J., M. Klein, L.A. Ricci., T. Slok (2004) 'Capital Account Liberalization and Economic Performance: Survey and Synthesis', *IMF Staff Papers*, 51 (2): 220–56.

Henisz, W. (2000) 'The Institutional Environment for Economic Growth', *Economics and Politics*, 12(1): 1–31.

Henry, P.B. (2003) 'Capital Account Liberalization, The Cost of Capital, and Economic Growth', *American Economic Review Papers and Proceedings*, May.

Imbs, J. (2003) 'Trade, Finance, Specialization and Synchronization', IMF Working Paper 03/81.

Johnston, R.B., S. Darbar and C. Echeverria (1997) 'Sequencing Capital Account Liberalization: Lessons from the Experiences in Chile, Indonesia, Korea, Thailand', IMF Working Paper 97/157.

Kalemli-Ozcan, S., B. Sorensen and O. Yosha (2003) 'Risk Sharing and Industrial Specialization: Regional and International Evidence', *American Economic Review*, 93: 903–18.

Kletzer, K. and P. Bardhan (1987) 'Credit Markets and Patterns of International Trade', *Journal of Development Economics*, 27: 57–70.

Lane, P. and G.M. Milesi-Ferretti (2003) 'International Financial Integration', IMF Working Paper 03/86.

Le, H.G. (2000) 'Financial Openness and Financial Integration', Asia Pacific School of Economics and Management Working Paper 00–4.

Mankiw, N.G., D. Romer, D. Weil (1992) 'A Contribution to the Empirics of Economic Growth', *Quarterly Journal of Economics*, 107: 408–37.

Miniane, J. (2004) 'A New Set of Measures on Capital Account Restrictions', *IMF Staff Papers*, 51: 276–308.

Obstfeld, M. (1994) 'Risk-taking, Global Diversification, and Growth', *American Economic Review*, 84: 1310–29.

Rodrik, D. (1998) 'Who Needs Capital-Account Convertibility?', in S. Fisher, R.N. Cooper, R. Dornbusch, P.M. Garber, C. Massad, J.J. Polak, D. Rodrik and S.S. Tarapore (eds), *Should the IMF Pursue Capital Account Convertibility?* Princeton Essays in International Finance, 207 (New Jersey: Princeton).

Rose, A. (2004) 'Macroeconomic Determinants of International Trade', *NBER Reporter*, Autumn.

Verbeek, N. and T. Nijman (1996) 'Incomplete Panel and Selection Bias', in L. Matyas and P. Sevestre (eds), *The Econometrics of Panel Data* (The Hague: Kluwer).

Wooldridge, J.M. (2002) *Econometric Analysis of Cross-section and Panel Data* (Cambridge, MA: MIT Press).

World Bank (2000) *The Quality of Growth* (New York: Oxford University Press for the World Bank).

8

Does Financial Liberalization Influence Saving, Investment and Economic Growth? Evidence From 25 Emerging Market Economies, 1973–96

Niels Hermes and Robert Lensink

Introduction

During the past two decades, many countries have reformed their domestic financial markets. In many cases, these reforms were triggered by both domestic and international developments. Domestically, many government policies that focused on controlling financial markets – known in the literature as financial repression – became increasingly criticized, for it was felt that these policies were blocking the efficient functioning and development of financial institutions. The idea that stagnating economic growth and economic crisis were related to financial repression policies has gained ground since the early 1970s (McKinnon 1973, Shaw 1973).[1] Internationally, the globalization of markets, including financial markets, also put pressure on governments to reconsider financial market controls.

One region that has experienced major changes with respect to financial market policies in recent years is the Central and Eastern European region. This group of countries has gone through a major transition process, including the restructuring of financial sectors and markets, privatization of banks and opening up domestic banking markets to foreign competitors (Balling *et al.* 2004). To illustrate this last point: in Eastern Europe the rise of foreign control went up from almost 8 per cent in 1994 to 52 per cent in 1999 (IMF 2000: 153). The profoundness of these reforms in Central and Eastern Europe, but also elsewhere in the world, may raise the question of what the potential consequences are of financial liberalization on economic growth.

Reforms of financial markets may include several specific policies that, in one way or another, aim to improve the development of the financial system of a country. Ultimately, this should contribute to higher economic growth. Several authors claim that liberalization of financial markets contributes to the efficiency with which these markets can transform saving into investment and growth. At the same, however, financial liberalization policies themselves have been criticized for their share in triggering financial and economic crises in the past. The question, therefore, is whether these policies indeed lead to a more developed and efficient financial sector and/or whether they lead to higher economic growth. There are several papers that have looked into this debate from an empirical point of view. The general picture that emerges from a survey of this empirical literature is that the evidence remains inconclusive. One reason for these inconclusive results may be that the precise measurement of financial liberalization appears to be rather difficult.

This chapter seeks to address this issue. It aims to investigate the relationship between financial liberalization and economic growth using a new dataset for measuring financial liberalization in 25 emerging market economies during the period 1973–96.[2] This dataset, developed by Abiad and Mody (2005), improves on other datasets used in the literature in that it takes into account the fact that financial liberalization is both a multidimensional as well as a gradual process.

Another issue this chapter wishes to address is to see whether the process of financial liberalization contributes to increased mobilization of resources for investment, and whether this leads to increasing the quantity of investments made. Therefore, the empirical analysis not only focuses on the relationship between financial liberalization and growth, but also on saving, and private and public investment.

Financial liberalization and economic growth: a brief review of the existing literature

Financial liberalization and growth: the debate

The financial system performs a number of important functions in an economy. Basically, it takes care of mobilizing financial resources, facilitating risk management, distributing resources to the most efficient projects, monitoring the use of financial resources (exerting corporate governance), and providing a payment system that makes trade among economic participants more efficient (Levine 1997). Financial development occurs when a financial system is able to improve on performing these functions. There is a large body of theoretical and empirical work emphasizing that financial development is positively related to economic growth.[3]

Closely related to the discussion of the relationship between finance and growth is the discussion of the role that financial liberalization can play in this relationship. The main idea is that financial liberalization might affect financial development, which, in turn, affects economic growth. There is an ongoing debate about whether the role of financial liberalization with respect to the finance–growth nexus is positive or negative. Before going into detail with respect to this debate,[4] we first provide a short description of what we think is generally meant by financial liberalization.

While there may be several different characterizations of what financial liberalization contains,[5] in our view financial liberalization includes official government policies that focus on deregulating credit controls, deregulating interest rate controls, removing entry barriers for foreign financial institutions, privatizing financial institutions and removing restrictions on foreign financial transactions. So, financial liberalization has both a domestic and a foreign dimension. Moreover, it focuses on introducing or strengthening the price mechanism in the market, as well as improving the conditions for market competition.

In the literature, several arguments in favour of liberalization have been put forward. Most of these arguments implicitly start from the neoclassical perspective, which assumes that markets are most efficient in allocating scarce resources. The discussion on liberalizing financial markets more or less started with the seminal publications of McKinnon (1973) and Shaw (1973). They both wrote their work as a critique of government policies, which were focused on restricting and controlling financial markets, also known as financial repression. McKinnon and Shaw held these policies responsible for the low growth rates of many developing countries during the 1950s and 1960s. They both argued in favour of liberalizing financial markets on the grounds that this would lead to progressively more efficient investment, which, in turn, would lead to higher economic growth rates. In the 1990s, when the role of financial institutions in economic growth became intensively discussed in the literature, several authors explicitly modelled the relationship between finance and growth, while others focused on investigating the empirical support for these models.

Basically, the following arguments have been made in support of the positive relationship between financial liberalization, financial development and economic growth. First, it is claimed that introducing market principles and competition in financial markets increases interest rates on deposits, which leads to higher rates of saving. This, in turn, increases the amount of resources available for investment (McKinnon 1973). If financial liberalization includes opening up the capital account, capital inflows may increase, again raising the availability of funds for investment and growth. Thus, in both cases, financing constraints of firms are reduced and investment will rise, leading to higher growth.

Second, competition puts pressure on profit margins, in particular on the loan rates demanded for loans. This reduces the cost of capital, leading to a rise in investment and growth. Moreover, financial liberalization contributes to increased possibilities of risk diversification by financial institutions such as banks. This also reduces the cost at which loans are offered and, further, to a decrease of the cost of capital, and a rise of investment and growth. Again, this argument would support the idea that financial liberalization reduces financial constraints of firms, which ultimately increases macroeconomic growth.

Third, if markets are liberalized, financial intermediaries are stimulated to become more efficient by reducing overhead costs, improving on overall bank management, improving risk management, and offering new financial instruments and services to the market to keep up with their competitors. Moreover, if financial liberalization means opening up domestic markets to foreign competition, this may lead to the import of bank and risk management techniques, as well as of new financial instruments and services. All these effects will help to improve the efficiency of financial intermediation in a country, contributing to higher returns to investment and, thus, to higher rates of economic growth. So, whereas the previous two arguments focused on the quantity effect of financial liberalization, this argument focuses on the quality effect of financial liberalization.

On the other hand, it has also been argued that financial liberalization in many cases has led to disappointing results and, in some cases, even to economic and financial crises. Stiglitz (2000) and others have pointed out that financial liberalization, as such, does not solve the problem of asymmetric information. This may prevent financial intermediation from becoming more efficient in a liberalized market. Many papers, among which is the seminal contribution of Stiglitz and Weiss (1981), have indeed shown that problems of asymmetric information prevail in financial markets.

Some papers even make the point that financial liberalization may actually increase information problems. When financial markets become liberalized and competition is increased, this may lead to a reduction of relationship lending, since borrowers may have more opportunities and will look for the cheapest way of financing their investment. However, a reduction of relationship lending also destroys information capital and thereby increases asymmetric information (Boot 2000).

More competition in financial markets may also mean a reduction of profit margins and an increased financial fragility of financial intermediaries such as banks. Hellmann *et al.* (1996, 1997, 2000) make the point in a series of articles that liberalization reduces the franchise value of banks, which makes them more prone to financial disruption and stimulates risk-taking in order to try to increase profits under the pressure of falling interest rate margins. Reduced margins might also stimulate banks to economize on screening and monitoring efforts, and they might be more willing to opt for a gambling strategy when allocating loans; that is, putting less emphasis on risk and more on profit. Thus, financial liberalization may trigger crises if it leads to excessive risk-taking under the pressure of increased competition (Demirgüç-Kunt and Detragiache 1998).

Increased risk-taking in financial markets, and the consequent increase in the number of failures of banks and other institutions, might in itself trigger bank runs (Diamond and Dybvig 1983). Bank runs are another source of weakening the financial stability of financial institutions, but this time even in a situation where some of them might be economically viable.

One way to curb the adverse effects of financial liberalization on the stability of the financial system is to install financial market regulations. Such regulations should reduce risk-taking by banks and should, at least to some level, bail out depositors when their bank goes bankrupt. Such a deposit insurance system aims to reduce the probability of bank runs taking place in times of financial distress. This is why financial liberalization in combination with a weak regulatory structure may have strongly adverse effects on growth (Andersen and Tarp 2003). Examples of this abound: Chile and Argentina in the early 1980s experienced the negative effects of financial liberalization. The same holds for Mexico (in 1994–5) and recently the countries affected by the Asian crisis (1997–8), to name just a few.

Financial liberalization and growth: the evidence

In recent years, several papers have been published on the relationship between financial liberalization and growth. Some studies focus on the quantity effects of liberalization, while others concentrate on the quality effects of liberalization. These studies use firm-level, as well as cross-country data.

Laeven (2003), in a recent study, finds evidence for the hypothesis that financial liberalization reduces financial constraints of firms. His study is based on information from 13 developing countries. Similarly, positive effects of financial liberalization on reducing financial constraints are found, among others, by Harris *et al.* (1994) for Indonesia, Guncavdi *et al.* (1998) for Turkey, Gelos and Werner (2002) for Mexico and Koo and Shin (2004) for Korea. At the same time, however, studies by Jaramillo *et al.* (1996) on Ecuador and Hermes and Lensink (1998) on Chile find much less supportive evidence for the positive effect of financial liberalization on reducing financial constraints. All studies mentioned here use firm-level panel data.

Other studies have used cross-country panel data. Nazmi (2005) uses data for five Latin American countries and finds evidence that deregulation of financial markets increases investment and growth. Bekaert *et al.* (2005) examine a large sample of countries, looking at liberalization of the stock market, in particular their opening up to foreign participation. They find support for the view that this type of liberalization spurs economic growth through reducing the cost of equity capital and increasing investment. Other cross-country analyses are less positive about the quantity effect of financial liberalization. Bonfiglioli (2005), using information for 93 countries, shows that financial liberalization only marginally affects capital accumulation. Bandiera *et al.* (2000) look at the impact of financial liberalization on saving, based on information from eight developing countries over a 25-year period. They suggest that saving rates actually fall, rather than increase, after financial liberalization.

Other studies have empirically investigated the impact of financial liberalization on the allocative efficiency of financial markets. Some of these studies use firm-level panel data. One example of this is a study by Galindo *et al.* (2005), in which supportive evidence is found for the qualitative effect of financial liberalization based on firm-level data from 12 developing economies. Abiad *et al.* (2004) find strong evidence that financial liberalization improves the allocation of capital, using data from five emerging markets. Other studies based on firm-level data that find supportive evidence for the quality effect are, among others, Cho (1988) for Korea and Siregar (1995) for Indonesia. In contrast to these studies, Capoglu (1991), for Turkey, shows that allocative efficiency decreased after liberalization, whereas Schiantarelli *et al.* (1994), for Ecuador, and Hermes (1996), for Chile, find no evidence for any effect on allocative efficiency after liberalizations took place in these countries. Demir (2005) shows evidence for a very specific but related effect of financial liberalization based on firm-level panel data from three developing countries. In his study, he investigates the investment decision of firms after liberalization between fixed and financial investment. He shows evidence that, due to increased risk after liberalization, firms choose to invest more in financial investment and reduce their fixed investment. This may be interpreted as a reduction of the allocative efficiency of financial resources due to financial liberalization.

Some studies use cross-country panel data to investigate the quality effect of financial liberalization. Bonfiglioli (2005) finds supportive evidence that financial liberalization spurs productivity growth, based on panel data from 93 countries. Levine (2001) focuses on the effects of international financial liberalization on the efficiency of domestic financial markets and growth. In his paper, international financial liberalization refers to opening up stock markets as well as domestic bank markets to foreign participation. Levine finds evidence for the fact that liberalization improves the efficiency of stock markets, since it increases the liquidity of these markets. Moreover, foreign bank entry improves the efficiency of domestic banks. Both these effects in turn help to increase economic growth. In an interesting study, Tornell *et al.* (2004) present supportive evidence for the idea that financial liberalization in the short term leads to financial fragility, but in the longer term contributes positively to economic growth. Eichengreen and Leblang (2003) empirically investigate the experience with capital account liberalization and its effect on growth over a lengthy period of time (1880–1997). They show that the evidence on the effects is mixed and very much depends on the context. In particular, they point out that in times of financial instability, capital account controls are positive because then countries do not experience massive and disruptive outflows of capital. Yet, if financial markets are stable, capital controls have a negative impact on growth because the negative effect of capital controls on the efficient allocation of capital dominates. In a review of the literature on the growth effects of capital account liberalization, Eichengreen (2001) also shows that these effects are indeed mixed.

The conclusion of the above review of the literature must be that the theory as well the evidence on the relationship between financial liberalization and growth is mixed. A summary of the studies discussed above, together with an overview of their main findings, can be found in Table 8.1. This table clearly shows the differences in the results reported in these studies on the relationship between financial liberalization and growth.

Table 8.1 Overview of empirical studies on the financial liberalization–growth relationship

Author(s) and year of publication	**Focus on quantity or quality effect**	**Type of data used**	**Positive (+), negative (–) or no relationship (o)**
Harris *et al.* (1994)	Quantity	Firm-level	+
Jaramillo *et al.* (1996)	Quantity	Firm-level	o
Guncavdi *et al.* (1998)	Quantity	Firm-level	+
Hermes and Lensink (1998)	Quantity	Firm-level	o
Gelos and Werner (2002)	Quantity	Firm-level	+
Laeven (2003)	Quantity	Firm-level	+
Koo and Shin (2004)	Quantity	Firm-level	+
Bandiera *et al.* (2000)	Quantity	Country-level	–
Bekaert *et al.* (2005)	Quantity	Country-level	+
Bonfiglioli (2005)	Quantity	Country-level	+/o
Nazmi (2005)	Quantity	Country-level	+
Cho (1988)	Quality	Firm-level	+
Capoglu (1991)	Quality	Firm-level	–
Schiantarelli *et al.* (1994)	Quality	Firm-level	o
Siregar (1995)	Quality	Firm-level	+
Hermes (1996)	Quality	Firm-level	o
Abiad *et al.* (2004)	Quality	Firm-level	+
Demir (2005)	Quality	Firm-level	–
Galindo *et al.* (2005)	Quality	Firm-level	+
Levine (2001)	Quality	Country-level	+
Eichengreen and Leblang (2003)	Quality	Country-level	–
Tornell *et al.* (2004)	Quality	Country-level	+
Bonfiglioli (2005)	Quality	Country-level	+

The empirical analysis in this chapter aims to contribute to the empirical literature by investigating the relationship between financial liberalization and growth, using a newly available dataset that allows us to measure financial liberalization and its effects on growth more effectively.

Data and methodology

The financial liberalization dataset

The analysis in this chapter makes use of a newly constructed dataset for financial liberalization. The data are provided by Abiad and Mody

(2005). Their measure of financial liberalization takes into account six different dimensions of financial market policies for a set of 35 countries during the period 1973–96.[6] The six dimensions they consider are:

- *Credit controls*: directed credit towards favoured sectors or industries, ceilings on credit towards sectors, and high reserve requirements
- *Interest rate controls*: direct interest rate controls by the government, or interest rate controls through the use of floors, ceilings and interest rate bands
- *Entry barriers*: licensing requirements for newly established domestic financial institutions, entry barriers for foreign banks, and restrictions on certain types of banking practices, such as specialized bank services or establishing universal banks
- *Operational restrictions for securities markets*: restrictions on staffing, branching and advertising, and the establishment of securities markets
- *Privatization of financial institutions*
- *Restrictions on international financial transactions*: capital account controls and the use of multiple exchange rates.

For each of these six dimensions, a country gets a score that runs from 0 to 3. The meaning of the scores is as follows:

- 0 means that, for a particular dimension of financial market policies, the country is fully repressed
- 1 means partial repression
- 2 means largely liberalized
- 3 means fully liberalized.

The way the financial liberalization measure is constructed allows for identifying changes in financial market policies and quantifying the extent to which they contribute to liberalizing financial markets. It also allows us to take into account periods in which governments decide to recontrol markets; for instance, during or after periods of severe financial and/or economic crisis. In short, the measure enables us to determine more exactly the magnitude and timing of changes of various dimensions of financial market policies.[7]

This financial liberalization dataset improves on data used in earlier papers in a number of ways. In most cases, the data in these earlier papers have one or more of the following weaknesses. First, many papers take a crude measure of financial liberalization; for instance, by taking a value of 0 for the years in which a particular financial market is not liberalized and a value of 1 from that year onwards when the market is officially liberalized. Harris *et al.* (1994), Jaramillo *et al.* (1996), Hermes and Lensink (1998) and Bekaert *et al.* (2005), to name a few, use this type of measure. Yet, financial liberalization is a process, rather than a single event.

Second, in several papers the analysis focuses on just one or a few dimensions of financial liberalization. Levine (2001), for example, looks only at opening up domestic banking and stock markets to foreigners, Eichengreen and Leblang (2003) consider only capital account liberalization and Bekaert *et al.* (2005) focus on stock market liberalization. These papers thus do not analyse the effects of financial liberalization in all its important dimensions.

Third, some studies only look at the effects of financial liberalization in the short term of, say, up to ten to 15 years. This is true for all studies using a firm-level approach and this is not surprising, given the difficulty of getting consistent firm-level data for a lengthy time period. However, even some of the country-level studies take a relatively short perspective. Bekaert *et al.* (2005) investigate the relationship using data for the period 1980–97.

Finally, several studies focus on a single country case or a limited set of countries when investigating financial liberalization policies. Of the studies that use data for a sample of countries, Guncavdi *et al.* (1998) have information for three countries, Laeven (2003) for 13 countries, Abiad *et al.* (2004) for five Asian countries, and Nazmi (2005) for five Latin American countries, to give just a few examples.

The dataset we use enables us to look at financial liberalization as a process that evolves over time. Moreover, we are able to study the joint effect of financial liberalization policies in six different dimensions, rather than sticking to just one or a few of these dimensions. Additionally, the dataset allows us to investigate the relationship using a reasonable time span, including information about liberalization over 24 years. Interestingly, this includes the 1970s, during which several countries experimented with financial liberalization.[8] Finally, the dataset includes information about 25 emerging market economies, which is considerably more than in several of the earlier studies.

Methodology

In the empirical analysis we use data from 25 emerging markets. The original Abiad–Mody dataset also includes ten developed countries. For this chapter, we wish to focus on the emerging market economies. The

Table 8.2 Financial liberalization measures of 13 Asian emerging market economies

Country	Period	Financial liberalization measure	Country	Period	Financial liberalization measure
Bangladesh	1974–7	0	Philippines	1974–7	3
	1978–81	0		1978–81	4.5
	1982–5	2		1982–5	7.5
	1986–9	2.25		1986–9	8.25
	1990–3	6		1990–3	9.5
	1994–6	7.33		1994–6	10.67
India	1974–7	0	Singapore	1974–7	15
	1978–81	0		1978–81	16
	1982–5	0		1982–5	16
	1986–9	0		1986–9	16
	1990–3	2.75		1990–3	16
	1994–6	6		1994–6	16
Indonesia	1974–7	1	Sri Lanka	1974–7	0.25
	1978–81	1		1978–81	6.5
	1982–5	3.25		1982–5	7
	1986–9	6.25		1986–9	7.25
	1990–3	9.25		1990–3	7.25
	1994–6	10.33		1994–6	9
Korea	1974–7	0	Thailand	1974–7	2
	1978–81	0.75		1978–81	3.5
	1982–5	6.75		1982–5	5
	1986–9	8.75		1986–9	6
	1990–3	9.5		1990–3	11.25
	1994–6	10		1994–6	13
Malaysia	1974–7	6	Turkey	1974–7	1
	1978–81	9.5		1978–81	3.5
	1982–5	9.75		1982–5	5.25
	1986–9	11.5		1986–9	9.25
	1990–3	13		1990–3	12
	1994–6	12		1994–6	12
Nepal	1974–7	0	Taiwan	1974–7	0
	1978–81	0		1978–81	0
	1982–5	0.75		1982–5	0
	1986–9	2.5		1986–9	1.5
	1990–3	4		1990–3	5
	1994–6	6		1994–6	6
Pakistan	1974–7	0.5			
	1978–81	0			
	1982–5	0			
	1986–9	0			
	1990–3	3.75			
	1994–6	9.33			

Source: Abiad and Mody (2005).

complete list of countries and scores on the financial liberalization indicator are presented in Tables 8.2 and 8.3. The data for the indicator are four-year averages for the periods 1974–7, 1978–81, 1982–5, 1986–9, 1990–3 and 1994–6.[9] This means that the dataset we use consists of a panel of six four-year periods for a total of 25 countries.

As can be seen from Tables 8.2 and 8.3, most countries started serious liberalization of their financial markets in the 1980s or 1990s. Only Argentina, Chile and, to a lesser extent, South Africa had made significant progress with respect to liberalizing financial markets in the 1970s. Singapore had almost fully liberalized financial markets during the whole period of investigation. These countries can be seen as the very early reformers. Of these countries, Argentina was forced to reverse liberalizations during most of the 1980s due to serious domestic financial problems.

Most of the other countries in the dataset, which includes all other Latin American and African countries, only started to implement serious liberalization policies in the 1990s. For countries such as India, Pakistan, Taiwan, Colombia, Venezuela, Egypt and Morocco, to name just a few, values of the financial liberalization measure of 6 or higher are reported only since the period 1990–3 or later. Seven Asian countries started serious implementation of policies in the 1980s. Among them, Korea, Malaysia, the Philippines and Sri Lanka were so-called early reformers, as their reforms were taking place during the first half of the decade. The other three (Indonesia, Thailand and Turkey) were later reformers, taking serious measures during the second half of the decade. The general picture emerging from these figures is that Asian countries were leading the wave of financial liberalization, while, in Latin America and Africa, most countries lagged behind, except for a few very early reformers.

In this chapter, we estimate a set of equations to investigate the relationship between, on the one hand, financial liberalization and, on the other, saving, investment and growth. The econometric specification we use in this chapter can be generally described as follows:

$$y_g = \alpha_j + \beta_j FINLIB_{jt} + \gamma_j X_{jt} + \varepsilon_{jt} \tag{8.1}$$

$$s_y = \alpha_j + \beta_j FINLIB_{jt} + \gamma_j X_{jt} + \varepsilon_{jt} \tag{8.2}$$

$$i_y = \alpha_j + \beta_j FINLIB_{jt} + \gamma_j X_{jt} + \varepsilon_{jt} \tag{8.3}$$

$$ipr_y = \alpha_j + \beta_j FINLIB_{jt} + \gamma_j X_{jt} + \varepsilon_{jt} \tag{8.4}$$

$$ipb_y = \alpha_j + \beta_j FINLIB_{jt} + \gamma_j X_{jt} + \varepsilon_{jt} \tag{8.5}$$

Table 8.3 Financial liberalization measures of seven Latin American and five African emerging market economies

Country	Period	Financial liberalization measure	Country	Period	Financial liberalization measure
Argentina	1974–7	2.75	Egypt	1974–7	1
	1978–81	11		1978–81	1
	1982–5	3		1982–5	1
	1986–9	5		1986–9	1
	1990–3	9		1990–3	7
	1994–6	12		1994–6	9.33
Brazil	1974–7	2	Ghana	1974–7	0
	1978–81	1.75		1978–81	0
	1982–5	2		1982–5	0
	1986–9	3.25		1986–9	2.25
	1990–3	5.75		1990–3	5
	1994–6	7		1994–6	7.67
Chile	1974–7	9.75	Morocco	1974–7	1
	1978–81	13.5		1978–81	1
	1982–5	13.25		1982–5	1
	1986–9	15		1986–9	1.25
	1990–3	15		1990–3	3.75
	1994–6	15		1994–6	9
Colombia	1974–7	3.25	South Africa	1974–7	6
	1978–81	3.5		1978–81	8
	1982–5	3		1982–5	12.25
	1986–9	3		1986–9	12
	1990–3	8.25		1990–3	13.75
	1994–6	9		1994–6	16
Mexico	1974–7	4	Zimbabwe	1974–7	2
	1978–81	4		1978–81	2
	1982–5	2		1982–5	2
	1986–9	4		1986–9	2
	1990–3	11.25		1990–3	5.25
	1994–6	12.33		1994–6	8
Peru	1974–7	0			
	1978–81	0			
	1982–5	0			
	1986–9	0			
	1990–3	7.25			
	1994–6	13			
Venezuela	1974–7	2			
	1978–81	2			
	1982–5	2			
	1986–9	2.5			
	1990–3	7			
	1994–6	4.67			

Source: Abiad and Mody (2005).

where y_g is the per capita growth rate, s_y is the domestic saving to GDP ratio, i_y is the total investment to GDP ratio, ipr_y is the private investment to GDP ratio, ipb_y is the public investment to GDP ratio, α_j is a country-specific constant, *FINLIB* is our measure of financial liberalization and X is a vector of control variables. We include variables in this vector that are normally used in this type of cross-country panel studies. The variables used are specified in the notes to the tables, as well as in the data appendix. The subscripts j and t refer to a specific country and time period, respectively, and ε is an error term. All variables are four-year averages, using the same time periods as mentioned above for the financial liberalization index. When estimating Equations (8.1)–(8.5), we use fixed effects.

Regression results

We start the discussion of the results by reporting the association between financial liberalization and economic growth, since most other studies focus on this relationship. Table 8.4 provides the main results. The results support the view that financial liberalization is associated with higher economic growth. In all specifications presented, the financial liberalization measure is positively and highly significantly related to growth. The coefficient we find is between 0.20 and 0.29, which means that it does not differ much between the different specifications

Table 8.4 Financial liberalization and GDP per capita growth

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	35.971***	35.129***	38.154***	38.683***	28.368***	29.238***
	(4.08)	(4.02)	(3.60)	(3.48)	(2.71)	(2.88)
FINLIB	0.283***	0.246***	0.199**	0.210**	0.215***	0.212***
	(3.55)	(2.99)	(2.40)	(2.32)	(3.07)	(3.05)
LGDP	−5.069***	−4.872***	−5.175***	−5.401***	−4.004***	−4.080***
	(−3.95)	(−3.81)	(−3.53)	(−3.48)	(−2.77)	(−2.81)
SEC	0.007	−0.002				
	(0.23)	(−0.08)				
INFL	−2.299***	−2.323***	−2.369***	−1.960**	−2.363***	−2.334***
	(−3.61)	(−3.74)	(−3.68)	(−2.52)	(−3.48)	(−3.44)
TOTINV	0.204***					
	(3.81)					
PRIVINV		0.257***	0.215***	0.238***	0.286***	0.267***
		(4.06)	(2.96)	(2.93)	(4.21)	(4.04)
PUBINV		0.092	0.109	0.167	0.100	0.106
		(1.00)	(1.03)	(1.42)	(1.24)	(1.32)

Table 8.4 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
ASSASS	−0.081					
	(−0.54)					
STOCKTURN			2.997*			
			(1.79)			
STOCKCAP				1.858*		
				(1.74)		
CRED					−1.919	
					(−0.90)	
LLY						−1.643
						(−0.63)
No. of obs.	126	126	115	107	125	126
R^2	0.176	0.191	0.192	0.172	0.225	0.232

Notes: All models presented in this table are estimated using fixed effects;
All variables used in the analysis are four-year averages, except for the three-year period 1994–6. The four-year periods in the model are: 1974–7, 1978–81, 1982–5, 1986–9 and 1990–3;

The dependent variable is GDP per capita growth;

The independent variables are defined as follows:

FINLIB	the financial liberalization measure as discussed in the main body of the text;
LGDP	the value of GDP per capita at the beginning of the four-(three-)year period;
SEC	the secondary school enrolment rate;
INFL	the average annual inflation rate;
TOTINV	the total investment to GDP ratio;
PRIVINV	private investment to GDP ratio;
PUBINV	public investment to GDP ratio;
ASSASS	the number of assassinations per year;
STOCKTURN	the average annual value of the trade in stocks in the stock market as a percentage of GDP;
STOCKCAP	the average annual market value of the stocks listed in the stock market as a percentage of GDP;
CRED	value of the loans to the private sector disbursed by commercial banks as a percentage of GDP; and
LLY	value of M2 to GDP;

The figures in parentheses are *t*-test statistics;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.
R^2 is the adjusted R^2.

presented. The outcomes in Table 8.4 lead us to the conclusion that the relationship between financial liberalization and growth is positive and robust.

Of the usual control variables, the initial value of GDP (*LGDP*) and the inflation rate (*INFL*) are always statistically significant and have the expected negative sign. The secondary education variable (*SEC*) and the political instability variable (*ASSASS*) are not significant. Total investment to GDP (*TOTINV*) is positive and significant. Yet, if we break up total investment into private (*PRIVINV*) and public (*PUBINV*) investment, it turns out that private investment is always positive and strongly significant in all specifications. Finally, adding various measures of financial development shows that whereas measures of stock market development (*STOCKTURN* and *STOCKCAP*) are positive and significantly related to growth, measures of bank development (*CRED* and *LLY*) do not show any relation to growth.

Next, we turn to the relationship between financial liberalization, and saving and investment. Table 8.5 shows the results of the estimations. We have experimented with a number of different specifications of both the saving and investment equations. The table shows the most interesting outcomes.

Whereas the full specifications of the saving and investment models – that is, including the control variables – are less satisfying than those for the growth model, the results with respect to financial liberalization stand out clearly. We now briefly discuss the main conclusions we draw from the results in the table.

First, the results in Table 8.5 indicate that financial liberalization is not associated with higher total investment. In the specifications presented in the table, but also in other specifications we have tried (not presented), the financial liberalization measure is positive, but it is never statistically significant.

Second, we separate total investment into private and public investment. While some papers have looked at the relationship between financial liberalization and investment (see, for example, Nazmi 2005, Bekaert *et al.* 2005), we are not aware of any paper separating total investment into private and public investment. Our results suggest, however, that this separation does seem to be important in understanding how financial liberalization might affect growth. We find that financial liberalization is positively and significantly related to private investment. At the same time, we find a negative and statistically significant relationship between financial liberalization and public investment. This finding is consistent with the fact that financial liberalization is not associated with total investment. This indicates that financial liberalization stimulates private investment activities, whereas it is associated with reduced public investment activities.

Combined with the results presented in Table 8.4, it also suggests that this apparent substitution from one type of investment to the other

Table 8.5 Financial liberalization, investment and savings

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Dependent	*TOTINV*	*TOTINV*	*PRIVINV*	*PRIVINV*	*PUBINV*	*PUBINV*	*SAVING*	*SAVING*
Constant	49.917	−3.745	63.166	18.153	−11.622	−18.456	65.461	76.904
	(0.50)	(−0.06)	(1.02)	(0.36)	(−0.27)	(−0.43)	(1.01)	(1.25)
FINLIB	0.0996	0.168	0.302**	0.358***	−0.205**	−0.196*	−0.138	−0.240
	(0.57)	(1.17)	(2.08)	(3.02)	(−2.02)	(−1.94)	(−0.89)	(−1.59)
LGDP	12.263***	5.055**	6.815***	0.525	5.385***	4.467***	12.10***	13.244***
	(5.98)	(2.53)	(3.98)	(0.32)	(4.50)	(3.17)	(6.83)	(7.71)
SEC	−0.044	−0.105*	0.038	−0.013	−0.082**	−0.089**	0.077	0.091*
	(−0.68)	(−1.98)	(0.71)	(−0.29)	(−2.15)	(−2.32)	(1.35)	(1.66)
INFL	−1.054	−1.478	−0.899	−1.330	−0.223	−0.277	0.559	1.928*
	(−0.87)	(−1.47)	(−0.90)	(−1.63)	(−0.32)	(−0.39)	(0.50)	(1.69)
LPOP	−6.918	−1.203	−5.991*	−1.107	−0.997	−0.270	−8.100**	−9.374**
	(−1.63)	(−0.33)	(−1.69)	(−0.37)	(−0.40)	(−0.39)	(−2.15)	(−2.60)
ASSASS	−0.069	−0.176			0.025	0.012	0.198	0.267
	(−0.25)	(−0.76)			(0.15)	(0.07)	(0.76)	(1.07)
GOVC							−0.153	−0.162
							(−1.12)	(−1.24)
SAVING		0.625***		0.540***		0.080		
		(6.78)		(7.12)		(1.23)		
GDPG								0.517***
								(3.41)

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Table 8.5 (continued)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
No. of obs.	126	126	126	126	126	126	132	132
R^2	0.035	0.423	0.050	0.546	0.023	0.047	0.200	0.214

Notes: All models presented in this table are estimated using fixed effects. All variables used in the analysis are four-year averages, except for the three-year period 1994–96. The four-year periods in the model are: 1974–7, 1978–81, 1982–5, 1986–9 and 1990–3; The dependent variables are: total investment to GDP ratio, private investment to GDP ratio, public investment to GDP ratio and domestic saving to GDP ratio;

The independent variables are defined as follows:

FINLIB the financial liberalization measure as discussed in the main body of the text;
LGDP the value of GDP per capita at the beginning of the four- (three-)year period;
SEC the secondary school enrolment rate;
INFL the average annual inflation rate;
TOTINV the total investment to GDP ratio;
PRIVINV private investment to GDP ratio;
PUBINV public investment to GDP ratio;
SAVING the domestic saving to GDP ratio;
ASSASS the number of assassinations per year;
LPOP the log of the total population;
GOVC the government consumption to GDP ratio;
GDPG the GDP per capita growth rate;

The figures in parentheses are *t*-test statistics;
Significance at 1 per cent, 5 per cent and 10 per cent denoted by ***, ** and * respectively.
R^2 is the adjusted R^2.

due to liberalization leads to higher economic growth. In Table 8.4, we showed that private investment is positively and significantly related to growth, while public investment does not seem to have a relationship to growth. Thus, financial liberalization is associated with higher growth rates due to the fact that it changes the allocation of resources from public to private investment. The way we have estimated the model, this is a quantity rather than a quality effect of financial liberalization on growth. However, there is some evidence that there is also a quality effect of these liberalizations, given that in the growth regressions in Table 8.4 the financial liberalization measure remains significant, even though investment variables (which should pick up the quantity effect) are included in the growth equation.

Finally, the table shows the results of the saving equations we have estimated. It generally shows that the financial liberalization measure is not significant at the usual significance levels. The fact that we do not find a statistically significant relationship between saving and financial liberalization is in line with our result that total investment is not associated with financial liberalization either.

At the same time, however, we also note that the coefficients we find for the financial liberalization variable are negative and that the coefficient is almost significant at the 10 per cent level. This result seems to suggest, albeit very weakly, that domestic saving is negatively associated with financial liberalization. This finding is not new, as Bandiera *et al.* (2000) already found some evidence for the fact that financial liberalization might be associated with falling levels of saving. They explain their results by pointing out that the effect of interest rate liberalization on saving is ambiguous, since both income and substitution effects are involved, and both these effects work in opposite directions when it comes to changing the saving rate. Moreover, financial liberalization may lead to increased access to consumer credit and/or mortgages to finance housing, which reduces saving (Jappelli and Pagano 1994).

Of course, we realize that the analysis of the association between financial liberalization and the saving rate needs to be further elaborated. However, if the rate of saving is indeed reduced by financial liberalization, then this would indicate that such liberalizations stimulate capital inflows. Bandiera *et al.* (2000) and Bartolini and Drazen (1997) suggest that this type of liberalization might even bring back capital flight. These issues definitely deserve more attention in future research.

Conclusion

This chapter has investigated the relationship between financial liberalization on the one hand and saving, investment and economic growth on the other hand. Whereas recently a number of papers have been published on the relationship between financial liberalization and growth, our chapter adds to the existing empirical evidence in two ways.

First, we use a newly constructed dataset for measuring financial liberalization. This financial liberalization dataset improves on data used in earlier papers in a number of ways. Most importantly, the dataset we use enables us to look at financial liberalization as a process that evolves over time. Moreover, we are able to study the joint effect of financial liberalization policies in six different dimensions, rather than sticking to just one or a few of these dimensions, as most other papers have done. Additionally, the dataset allows us to investigate the relationship using a reasonable time span, including information about liberalization over 24 years. Finally, the dataset includes information about 25 emerging market economies, which is considerably more than in several of the earlier studies.

Second, the analysis in this paper explicitly considers the relationship between financial liberalization on the one hand, and saving and investment on the other hand. This allows us to investigate whether the process of financial liberalization contributes to increased mobilization of resources for investment and whether this leads to increasing the quantity of investments made. As part of this analysis, we separate total investment into its private and public components. As far as we are aware, this separation has not been carried in earlier studies. Yet, our results suggest that this separation is indeed important in understanding how financial liberalization may be related to growth.

The results of the empirical analysis in the study can be summarized as follows. First, we find no evidence that financial liberalization affects domestic saving and total investment. Yet, there are some signs to lead us to believe that liberalization might actually reduce rather than increase domestic saving. Second, financial liberalization is positively associated with private investment, as well as with per capita GDP growth. We find a negative relationship between financial liberalization and public investment. These results suggest that financial liberalization leads to a substitution from public to private investment, which may contribute to higher economic growth.

Combining the (admittedly weak) result that financial liberalization might reduce saving with the result on investment (no effect on total investment) might indicate that capital inflows from abroad are stimulated by financial liberalization. We have not studied this issue in this chapter, and this is certainly the way to go in the future. We note, however, that evidence for this effect has been given in other papers, for instance in Levine (2001) and Bekaert *et al.* (2005).

Another issue we may address in future research is the efficiency effect of financial liberalization. Does it contribute to reallocating resources to more efficient investment projects by making the financial system more efficient when making decisions regarding allocation? Several papers have investigated this issue already by looking at changes in the efficiency of investment using individual firm data. An alternative way of investigating this issue is by looking at how the efficiency of the banking system changes due to liberalization, using individual bank data.

Yet another extension of the current research is to take into account the quality of the existing financial regulation. As we identified, it has been argued by some authors that financial liberalization in combination with a weak regulatory structure might have strongly adverse effects on growth. Re-estimating growth, and saving and investment models, including measures of the quality of financial regulation, might be a fruitful way forward here.

A final extension of the research in this chapter would be to increase the number of countries included in the dataset. As was already mentioned in the introduction to this chapter, one region that has experienced major changes with respect to financial market policies in recent years is the Central and Eastern European region. The analysis in this chapter, we believe, is especially relevant to them. Yet, comparable financial liberalization data for these countries are not available at the moment. Therefore, an interesting and important way to go beyond the analysis presented in this study would be to create comparable data for countries in this region.

Appendix: data sources

In the empirical analysis of this chapter we have used the following data and data sources:

GDPG = GDP per capita growth
FINLIB = financial liberalization measure (discussed in the main text)

LGDP	=	value of GDP per capita at the beginning of the four- (three-)year period
SEC	=	secondary school enrolment rate
INFL	=	average annual inflation rate
TOTINV	=	total investment to GDP ratio
PRIVINV	=	private investment to GDP ratio
PUBINV	=	public investment to GDP ratio
ASSASS	=	number of assassinations per year
STOCKTURN	=	average annual value of the trade in stocks at the stock market as a percentage of GDP
STOCKCAP	=	average annual market value of the stocks listed at the stock market as a percentage of GDP
CRED	=	value of the loans to the private sector disbursed by the commercial banks as a percentage of GDP
LLY	=	value of M2 to GDP
SAVING	=	domestic saving to GDP ratio
LPOP	=	log of the total population
GOVC	=	government consumption to GDP ratio.

Most of the data are taken from a dataset provided by David Roodman (2005) and are available at: www.cgdev.org/Publications/?PubID=36

Exceptions are:

- *FINLIB*, which is taken from the dataset to the paper by Abiad and Mody (2005). Data can be downloaded from the website of the *American Economic Review.*
- *SEC*, *TOTINV*, *PRIVINV* and *PUBINV*, taken from a dataset provided by William Easterly and Mirwat Sewadeh (latest version of the Global Development Network Growth Database), available at the World Bank website: www.worldbank.org/research/growth/GDNdata.htm
- *LLY*, *CRED*, *STOCKTURN* and *STOCKCAP*, which are taken from a dataset provided by David Beck and Ross Levine and which is available on the Finance Research website of the World Bank: http://econ.worldbank.org/wbsite/external/extdec/extresearch/extprograms/extfinrs/0,,contentMDK:20367320~menuPK:713352~pagePK:64168182~piPK:64168060~theSitePK:478060,00.html
- All variables have been transformed from annual data into four- (three-)year averages for the periods: 1974–7, 1978–81, 1982–5, 1986–9, 1990–3 and 1994–6.

Notes

1 See Fry (1995) for a comprehensive overview of the discussion on financial repression.
2 Originally, this study aimed at investigating whether financial liberalization has an impact on the efficiency of allocating resources for investment, using data from a number of Central and Eastern European countries. The approach we took was similar to the one used in studies such as Abiad *et al.* (2004) and Galindo *et al.* (2005); see also our section on 'a brief review of the existing literature' for a discussion of these papers. However, due to a lack of data we had to decline this research project and turned to a more general analysis of the effects of financial liberalization on economic growth.
3 We refer to some of the most comprehensive reviews available, among which are Berthélemy and Varoudakis (1996) and Levine (1997).
4 We note that, due to the limited scope of this chapter, our review of the literature is necessarily likewise limited. For more comprehensive reviews of the debate, the reader is referred to reviews by, among others, Gibson and Tsakalotos (1994); Fry (1997); Singh (1997) and Andersen and Tarp (2003).
5 In fact, empirical studies on the effects of financial liberalization take different measures of this phenomenon, which indicates that there are different views on what financial liberalization exactly is or should be.
6 Unfortunately, no Central and Eastern European countries are included in the dataset.
7 In the analysis, we do not focus on the impact of individual dimensions of financial liberalization on growth, saving and investment, because the Abiad and Mody (2005) dataset does not provide details of liberalization scores for the six dimensions.
8 Unfortunately, it does not allow us to take into account the analysis of the effects of more recent liberalizations, such as in Asia and Latin America during the late 1990s and early 2000s, as the dataset available to us does not provide information on financial liberalizaton policies after 1996.
9 Due to data limitations the last observation is based on a three-year period.

References

Abiad, A. and A. Mody (2005) 'Financial Reform: What Shakes It? What Shapes It?', *American Economic Review*, 95 (1): 66–88.

Abiad, A., N. Oomes and K. Ueda (2004) 'The Quality Effect: Does Financial Liberalization Improve the Allocation of Capital?', IMF Working Paper WP/04/112 (Washington, DC: IMF).

Andersen, T. and F. Tarp (2003) 'Financial Liberalization, Financial Development and Economic Growth in LDCs', *Journal of International Development*, 15 (2): 189–209.

Balling, M., F. Lierman, and A. Mullineux (eds) (2004) *Financial Markets in Central and Eastern Europe: Stability and Efficiency* (London: Routledge).

Bandiera, O., G. Caprio, P. Honohan and F. Schiantarelli (2000) 'Does Financial Reform Raise or Reduce Saving?', *Review of Economics and Statistics*, 82 (2): 239–63.

Bartolini, L. and A. Drazen (1997) 'Capital Account Liberalization as a Signal', *American Economic Review*, 87 (1): 138–55.

Bekaert, G., C.R. Harvey and C. Lundblad (2005) 'Does Financial Liberalization Spur Growth?', *Journal of Financial Economics*, 77 (1): 3–55.

Berthélemy, J.-C. and A. Varoudakis (1996) 'Models of Financial Development and Growth: A Survey of Recent Literature', in N. Hermes and R. Lensink (eds), *Financial Development and Economic Growth: Theory and Experiences from Developing Countries* (London: Routledge): 7–34.

Bonfiglioli, A. (2005) 'How Does Financial Liberalization Affect Economic Growth?', Seminar Paper 736 (Stockholm: Institute for International Economic Studies, Stockholm University).

Boot, A.W.A. (2000) 'Relationship Banking: What Do We Know?', *Journal of Financial Intermediation*, 9 (1): 7–25.

Capoglu, G. (1991) 'The Effect of Financial Liberalization on the Efficiency of the Turkish Financial System: 1980–88', Paper presented at the EEA Annual Conference, Lisbon.

Cho, Y.-J. (1988) 'The Effect of Financial Liberalization on the Efficiency of Credit Allocation: Some Evidence from Korea', *Journal of Development Economics*, 29 (1): 101–10.

Demir, F. (2005) 'Financial Liberalization, Private Investment and Low Growth Traps in Argentina, Mexico and Turkey: Limits of Growth without Investment', mimeo, University of Notre Dame, IN.

Demirgüç-Kunt, A. and E. Detragiache (1998) 'The Determinants of Banking Crises in Developing and Developed Countries', *IMF Staff Papers*, 45 (1): 81–109.

Diamond, D.W. and P.H. Dybvig (1983) 'Bank Runs, Deposit Insurance, and Liquidity', *Journal of Political Economy*, 91 (3): 410–19.

Eichengreen, B. (2001) 'Capital Account Liberalization: What Do Cross-Country Studies Tell Us?', *World Bank Economic Review*, 15 (3): 341–65.

Eichengreen, B. and D. Leblang (2003) 'Capital Account Liberalization and Growth: Was Mr. Mahathir Right?', *International Journal of Finance and Economics*, 8 (3): 205–24.

Fry, M.J. (1995) *Money, Interest, and Banking in Economic Development*, 2nd edn (Baltimore: Johns Hopkins University Press).

Fry, M.J. (1997) 'In Favour of Financial Liberalization', *Economic Journal*, 107: 754–70.

Galindo, A., F. Schiantarelli and A. Weiss (2005) 'Does Financial Liberalization Improve the Allocation of Investment?', mimeo (Washington, DC: Inter-American Development Bank).

Gelos, R.G. and A.M. Werner (2002) 'Financial Liberalization, Credit Constraints and Collateral: Investment in the Mexican Manufacturing Sector', *Journal of Development Economics*, 67: 1–27.

Gibson, H.D., and E. Tsakalotos (1994) 'The Scope and Limits of Financial Liberalization in Developing Countries: A Critical Survey', *Journal of Development Studies*, 30 (3): 578–628.

Guncavdi, O., M. Bleaney, and A. McKay (1998) 'Financial Liberalization and Private Investment: Evidence from Turkey', *Journal of Development Economics*, 57 (2): 443–55.

Harris, J.R., F. Schiantarelli, and M.G. Siregar (1994) 'The Effects of Financial Liberalization on the Capital Structure and Investment Decisions of Indonesian Manufacturing Establishments', *World Bank Economic Review*, 8 (1): 17–47.

Hellmann, T., K. Murdock and J.E. Stiglitz (1996) 'Deposit Mobilization through Financial Restraint', in N. Hermes and R. Lensink (eds), *Financial Development and Economic Growth: Theory and Experiences from Developing Countries* (London: Routledge): 219–46.

Hellmann, T., K. Murdock, and J.E. Stiglitz (1997) 'Financial Restraint: Toward a New Paradigm', in M. Aoki, H.-K. Kim and M. Okuno-Fujiwara (eds), *The Role of Government in East Asian Economic Development: Comparative Institutional Analysis* (Oxford: Clarendon Press): 163–207.

Hellmann, T., K. Murdock, and J.E. Stiglitz (2000) 'Liberalization, Moral Hazard in Banking and Prudential Regulation: Are Capital Requirements Enough?', *American Economic Review*, 90 (1): 147–65.

Hermes, N. (1996) 'Financial Reform and Financial Intermediation in Chile, 1983–1992', in N. Hermes and R. Lensink (eds), *Financial Development and Economic Growth: Theory and Experiences from Developing Countries* (London: Routledge): 310–35.

Hermes, N. and R. Lensink (1998) 'Banking Reform and the Financing of Firm Investment: An Empirical Analysis of the Chilean Experience, 1983–92', *Journal of Development Studies*, 34: 27–43.

International Monetary Fund (IMF) (2000) *International Capital Markets: Developments, Prospects and Key Policy Issues* (Washington, DC: IMF).

Jappelli, T. and M. Pagano (1994) 'Saving, Growth and Liquidity Constraints', *Quarterly Journal of Economics*, 109 (1): 83–109.

Jaramillo, F., F. Schiantarelli and A. Weiss (1996) 'Capital Market Imperfections Before and After Financial Liberalization: An Euler Equation Approach to Panel Data for Ecuadorian Firms', *Journal of Development Economics*, 51: 367–86.

Koo, J. and S. Shin (2004) 'Financial Liberalization and Corporate Investments: Evidence from Korean Firm Data', *Asian Economic Journal*, 18 (3): 277–92.

Laeven, L. (2003) 'Does Financial Liberalization Reduce Financing Constraints?', *Financial Management*, 32 (1): 5–34.

Levine, R. (1997) 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35 (2): 688–726.

Levine, R. (2001) 'International Financial Liberalization and Economic Growth', *Review of International Economics*, 9 (4): 688–702.

McKinnon, R.I. (1973) *Money and Capital in Economic Development* (Washington, DC: Brookings Institution).

Nazmi, N. (2005) 'Deregulation, Financial Deepening and Economic Growth: The Case of Latin America', *Quarterly Journal of Economics and Finance*, 45 (4–5): 447–59.

Roodman, D. (2005) 'An Index of Donor Performance', CGD Working Paper 67, Washington, DC, Center for Global Development, available at: www.cgdev.org/Publications/?PubID=36

Schiantarelli, F., A. Weiss, M. Gultom and F. Jaramillo (1994) 'Financial Liberalization and the Efficiency of Investment Allocation', Working Paper 266, Boston College.

Shaw, E.S. (1973) *Financial Deepening in Economic Development* (New York: Oxford University Press).

Singh, A. (1997) 'Financial Liberalization, Stock Markets and Economic Development', *Economic Journal*, 107 (442): 771–82.

Siregar, M.G. (1995) *Indonesia's Financial Liberalization: An Empirical Analysis of 1981–1988 Panel Data* (Singapore: Institute of Southeast Asian Studies).

Stiglitz, J.E. (2000) 'Capital Market Liberalization, Economic Growth, and Instability', *World Development*, 28 (6): 1075–86.

Stiglitz, J.E. and A. Weiss (1981) 'Credit Rationing in Markets with Imperfect Information', *American Economic Review*, 71 (3): 393–410.

Tornell, A., F. Westerman and L. Martinez (2004) 'The Positive Link between Financial Liberalization, Growth and Crises', NBER Working Paper 10293 (Cambridge, MA: National Bureau of Economic Research).

9

The Corporate Debt Market in India: An Analytical Study of Macroeconomic and Institutional Issues

Basudeb Guha-Khasnobis and Saibal Kar

Introduction and brief literature review

Prior to the reforms of the early 1990s, development policy in India was based on centralized planning dominated by the public sector, with the marked absence of well-developed corporate industrial and banking systems, as well as an efficient market for secondary and tertiary activities. While there had been some private initiatives in the industrial scene, participation of private banks and institutions in the financial market was almost non-existent. Public sector banks and financial institutions accounted for nearly 75–80 per cent of financial intermediation in India. Economic development in India hinged on captive investments in government securities by the public financial institutions, and on direct lending to the public sector units. Rates of interest on government debt were administered and the rate of interest on central bank financing was hugely subsidized. At the same time, exposure to foreign capital was limited.

Over-reliance on public sector financial intermediation prevented the growth of equity and debt markets for corporate financing in India. Since the early 1990s, however, significant structural changes in the Indian capital market, particularly in the equity market, have allowed Indian firms to choose their capital structure optimally. Despite such changes, the corporate debt market in India is yet to develop sufficiently, although debt instruments – ranging from fixed deposits, debentures to convertible debentures – are known to be cheaper sources of finance in view of the tax advantage on interest payments. In this chapter, we first focus on the macroeconomic and institutional prerequisites necessary for the development of a sound domestic debt market in India – particularly the development of the primary and secondary debt markets – subsequently explaining why the volume of trade is meagre in the secondary market. We then test for the pattern of debt equity choice by Indian firms during the post-financial liberalization period, and test the significance of the factors that are likely to (and known to, in the developed economy context) have strong influence on a firm's choice of participation in the debt market.

One segment of the financial market, which has for long remained almost completely unregulated and therefore highly risky, is the non-government bond market. Although the volume of primary issues in this market is growing steadily, the development of the market continues to be lopsided, with the secondary market lacking liquidity. Almost all the issues in this non-government securities market (in other words, the corporate bond market) are by way of private placements. While the aggregate value of primary issues in corporate debt grew from about Rs 120 billion in 1995–6 to Rs 530 billion in 2002–3, the proportion of issues through the public issue route declined from 22.6 per cent of the total issues in 1995–6 to 8.8 per cent of the total in 2002–3.[1]

Although issuers have preferred private placement over transparent public issues, there seem to be no reliable estimates of the outstanding stock of privately placed debt. By some measures, the total outstanding stock of privately placed corporate bonds is estimated at around Rs 2,000 billion. This is a fairly large market and problems in such a market can easily have destabilizing effects for the entire financial sector.

Traditionally, the debt market is an institutional market all over the world. Banks and financial institutions contribute more in terms of trading volume. Many of these investors are also issuers of debt instruments. The small number of large players has resulted in the debt market becoming a somewhat concentrated wholesale and negotiated dealings market. Most of the debt issues are privately placed or auctioned to participants. Secondary market transactions take place through telephonic negotiations among the market participants. The trading intensity in the corporate bond market in India is much smaller than in the case of government securities or equities. The daily secondary market trading in corporate bonds is placed around Rs 3–4 billion, although since early November 2003 the volume has fallen significantly following the new regulations imposed by the Security and Exchange Board of India (SEBI) – according to which, disclosures need to be made at the time of issuing the bond and during subsequent trading on the exchanges. This is accompanied by the Reserve Bank of India's (RBI) new regulations on investments in non-statutory liquidity ratio instruments/securities by banks.

In general, for a number of reasons, trading intensity in the debt market around the world is significantly higher than that in the equities market. Bonds are bought and sold by the investors for two main reasons. The first is to deploy funds in safe fixed income instruments, keeping in view their relative risk–reward nature. For example, debt-orientated mutual funds invest in bonds to offer a reasonable rate of return for their investors. Such mutual funds trade in bonds whenever they need to reshuffle their portfolios or need to meet redemption demand from the investors. The open-ended debt funds have to enter into buy/sell transactions depending on the inflow and outflow of investor funds. There are also long-term investors in bonds, such as trusts or households in search of a steady rate of return on their investible surpluses. The most important factor influencing secondary market transactions in bonds is the management of temporary or short-term liquidity. All those with fluctuating levels of liquidity requirement prefer to invest temporarily idle funds in liquid bonds, so that such funds earn a reasonable rate of return.

The debt market in India comprises two main segments: the government securities market and the corporate securities market. It is the former that dominates the market in terms of outstanding issues, market capitalization and trading volume; it sets the benchmark for the rest of the market. The main instruments in the government securities market are dated securities that include floating rate bonds, zero-coupon bonds, securities with embedded derivatives, and treasury bills and state government bonds. The corporate debt segment includes private corporate debt: debentures, fixed deposits, commercial papers, bonds issued by public sector units, infrastructure related institutions, and bonds issued by development financial institutions. During 2002–3 the total amount raised through primary issues in the debt market stood at Rs 2,350,956 million, which is an increase of 15 per cent over the previous year (see Table 9.1). Out of this, 77.4 per cent was raised by the government while the rest was raised by the corporate sector through public and private placements.

Table 9.1 Primary issues market (Rs million)

Issuer	**2001–2**	**2002–3**
Government	1,525,080	1,819,790 (77%)
Corporate	515,610	531,166 (23%)
Total	2,040,690	2,350,956

Source: ISMR (2004).

Government securities form the oldest and the most dominant segment of the debt market in India. The major investors of the government securities are the banks, insurance companies, primary dealers and financial institutions. Historically, banks and other financial institutions were forced to invest in government securities due to the statutory liquidity ratio (SLR). In this way, a captive market for government securities emerged that helped the government to appropriate a sizable amount of funding at a very low rate of interest. In the post reform period (that is, since 1991), a number of measures taken, notably a market-determined rate of interest, have totally reversed the scenario. As a matter of fact, the banking sector presently invests 12 per cent more in government securities over and above the SLR requirement, which now stands at 25 per cent.

Apart from the central and state government securities, various public sector units, development finance institutions and the infrastructure-related institutions also raise funds through bond issues. However, a major portion is raised through private placement. The major subscribers in this segment are banks, financial institutions and other corporates.

It should also be noted that the Indian private corporate sector raises a large part of their financial requirements through bank loans. Other than this, they rely on debt issues, which comprises bonds and commercial papers. Most of the bond issues are routed through private placement – around 93 per cent during 2002–3. It is argued that there are several inherent advantages in relying on private placement. It is both cost- and time-effective, and is tailor-made to meet the needs of the investors in terms of interest payments and redemption. Moreover, it does not require detailed compliance with formalities as required for public and rights issues. The latter may be a source of many unscrupulous activities by issuers. It is often commented that private placement is crowding out public issues.

In recent times a number of innovations have taken place in the corporate bond market – such as securitized products, corporate bond scrips and a variety of floating rate instruments with floors and caps, and bonds with embedded put and call options. However, the secondary market has not yet developed in the debt segment of the Indian capital market. As is evident from Table 9.2, the aggregate turnover in the secondary market rose by 25 per cent compared to that in the previous year, while the trade in corporate securities accounts for a meagre 1.81 per cent.

There is another, albeit less dominant, segment in the debt market; namely, short-term paper issued by banks, mostly in the form of certificates of deposit. The Indian debt market also has a large, non-securitized,

Table 9.2 Turnover in secondary market (Rs million)

Security	**2001–2**	**2002–3**
Government	1,5738,927	1,9557,312
Corporate	197,289	360,388
Total	15,936,216	19,917,700

Source: ISMR (2004).

transactions-based segment comprising call and notice money markets, an inter-bank market for term money, a market for inter-corporate loans and a market for ready forward deals (repos). The players in this market segment are able to lend and borrow among themselves.

The most important reason for lack of development of a healthy corporate bond market in India during the last decade appears to be unwillingness on the part of the market regulator, until recently, to play a proactive role in its development. Since the securities scam hit the Indian financial market in 1991–2, there have been several significant initiatives for upgrading the quality of the market, through development of infrastructure and the regulatory framework. This applies to both the equity market and the government securities market in India. However, despite such palpable attempts in related markets, the corporate debt market failed to attract sufficient attention from the market regulator (SEBI). The National Stock Exchange (NSE) on its part has attempted to encourage growth of the corporate debt market by providing the necessary trading and settlement infrastructure; but its efforts have not yielded the desired results because there is no regulatory compulsion on the market intermediaries to direct their transactions to the exchange trading and settlement system.

As per the Securities Contracts Regulation Act 1956, the regulatory powers in respect of the equity markets (including equity-based derivatives) and corporate debt market vest fully with SEBI. While SEBI did take considerable interest in continually upgrading the quality of its regulatory and surveillance framework in respect of the equity and equity-based derivatives markets, it showed scant interest with regard to the corporate debt market. The first important circular issued by SEBI on market dealings in corporate bonds was on 14 September 1999, when it banned all negotiated deals in listed corporate debt securities and made it mandatory for all the members of stock exchanges to execute all deals in corporate bonds on the order-matching screen of the stock exchanges, just as in the case of equities.

However, SEBI failed to follow up its directive in ensuring that the corporate bond market becomes transparent and adopts an efficient price discovery process. Brokers evaded the SEBI directive by taking shelter under the guidelines regarding spot deals – that is, deals taking place outside the stock exchanges – which are required to be settled within 48 hours and are outside the purview of the stock exchange regulations. Available data on transactions in corporate debt reported to NSE and the deals in corporate debt settled in National Securities Depository Ltd (NSDL) indicate that only a small proportion of the deals are reported to the NSE. During the six-month period January–July 2002, only about 27.7 per cent of the deals in corporate debt settled in NSDL were actually reported to NSE. What is more significant is that hardly any of these deals were actually matched on NSE's order matching system. Thus, the SEBI directives were totally ignored by the market. Despite this, SEBI did not deem fit to pull up concerned brokers or take any action against them. All these years, market players have been ignoring the SEBI directive for the simple reason that they have not anticipated any punitive action; there was a general impression in the market that SEBI itself was not serious about disciplining the secondary market in corporate debt.

In summary, therefore, existing deficiencies in the secondary debt market in India are as follows:

(i) There are strong entry barriers to participation in the trading of government securities. As in equity markets, everyone should have access to market participation. Trades are negotiated bilaterally over telephones or by negotiated dealing settlements. The enforcement of such trades is difficult as they are by nature 'over the counter';

(ii) Another deficiency of the market is that, as such, it has no liquidity. The parties have to search for counter-parties and negotiate the best price. Though the NSE introduced automated screen-based trading – which is an automated order-matching system – the banks and the financial institutions (who are the major players) showed little interest. Regulatory fiat is needed to enforce transparency in financial deals. Anonymity in trading is a necessary condition for the market to function competitively. The knowledge of parties affects the terms of trade and can lead to the formation of cartels. The market is not transparent; only the parties who trade have information about the trade;

(iii) Finally, and yet no less importantly, the market remains highly fragmented.

While these stated conditions prevail and necessitate need for further reforms, a host of reformatory policies had nonetheless been announced earlier. The reforms initiated by the RBI and the government of India in the debt market recently include:

- setting up of a comprehensive system of primary dealers
- adoption of a Delivery Versus Payment (DVP) system for settlement of government securities transactions
- abolition of tax deduction at source on government securities
- permitting Foreign Institutional Investors (FIIs) to invest in debt instruments, including government stock, and allowing them to hedge their foreign currency risk in the forward market
- introduction of Treasury bills of varying maturities
- placing investments of banks in preference shares/debentures/bonds of corporates outside the 5 per cent limit.

In a bid to increase transparency in operations, the RBI has been disseminating information on its transactions in gilts and publishing the calendar of auctions in respect of Treasury bills and repos. Soon, the RBI proposes to publish data on banks' investments in corporate and Public Sector Units (PSU) debt in the 'Weekly Statistical Supplement' to the *RBI Bulletin*. To foster inter-institutional coordination, a Technical Advisory Committee for government securities and a Standing Committee on the Money Market have been set up. Major issues confronting the debt and money markets are discussed in these committees. These committees have been found to be useful by all participants.

Based on these specifications, we formulate the agenda for research and propose to investigate the following issues:

(i) An econometric model for the financing pattern of Indian firms will be formulated with proximate determinants used for most other developing countries. In this context, competing theories for firms' debt equity choice based on the tax advantage of debt over equities and the pecking order theory in Myers and Majluf (1984) can be tested. We will use a comprehensive database of Indian firms for the period 1992–3 to 2002–3 compiled by the Centre for Monitoring Indian Economy (CMIE).

(ii) It has been observed that the Indian corporate sector resorted to equity financing in a booming stock market between 1991 and 1995–6. Thereafter, they have relied more on debt, primarily in the form of bank loans, for financing their investment projects. However, they also raise money by means of other debt instruments, such as debentures, fixed deposits and commercial papers. The latter has been popular in recent times, particularly as a short-term debt instrument. The fact that firms resorted to equity financing in a booming stock market can be ascribed to the fact that, in such situations, firms can raise more funds with lesser dilution of the existing shareholding pattern. On the other hand, when the share market is low, firms prefer debt as the means of financing, as equity becomes costlier in terms of the dilution of shares. Thus, the firms take advantage of a positive 'bubble' in the stock market, if there be any, for financing its investment projects (see Chirinko and Schaller 2001). This does not support the pecking order hypothesis. However, this phenomenon will depend to a large extent on firm-specific characteristics in addition to the general stock market situation, because all firms cannot equally obtain the benefit of a booming stock market.

(iii) Based on the existing observations, we formulate an econometric model that addresses the issue of private versus public placement in the debt market. Prima facie, it appears that the firms envisage a high transaction cost of public placement, which is further influenced by many firm-specific factors. It is further argued that one of the other reasons why firms prefer private placements is the lack of stringent disclosure norms associated with this form. Looking at the history of capital issues of firms for the period 1992–3 to 2002–3, we address this issue in an econometric model.

Data, model and results

First, we provide a brief discussion of the factors that determine a firm's capital structure, which factors we have used in the following econometric model. Modigliani and Miller (1958) earlier hypothesized that a firm's leverage is uncorrelated with its market value under a perfectly complete capital market. However, there is extensive literature explaining that each firm can have a different optimal capital structure minimizing capital cost in the real world, where there exist bankruptcy costs, agency costs, asymmetric information and incompleteness in product and factor markets.[2]

The determinants of debt structure given particular emphasis in earlier theoretical and empirical studies include firm size, growth rate, the value of tangible fixed assets, profitability and industry classification.[3] In addition, we also incorporate the age of the firm as calculated from its date of incorporation and whether it is listed in either the NSE or the Bombay Stock Exchange (BSE). In fact, our empirical results are based on observations on 450 firms listed in either of these stock exchanges, during a period of 12 years between 1992 and 2003.

We propose two dependent variables in order to observe the effect of a set of explanatory variables on them, separately. The first one is termed *DEBTINTO* and is calculated as the sum of fixed deposits, commercial papers and debentures, which are elements of the total borrowing of a firm. The alternative dependent variable is more traditionally defined as leverage, and is calculated as the ratio of total debt and total assets at the firm level. The purpose behind such alternative measures is to provide a more comprehensive analysis of the issue at hand: the determination of corporate debt structure in India.

Description of the variables and the descriptive statistics

Tables 9.3–9.6 describe the panel data, which is extracted from the CMIE database. The data covers a period of 12 years (1992–2003) for 450 firms sorted from a group of 653 firms on the basis of listing information at the NSE and BSE. We next offer a description of the data, which includes detailed descriptive statistics (Table 9.3), a variance–covariance matrix (Table 9.4) and a correlation matrix (Table 9.5). Outcomes of the panel regression are provided later in Table (9.6) and in a detailed description of the data given below.

Sales growth (SALES_GR)

Equity holders in highly leveraged firms may choose not to invest in projects that would help increase the firm's value, if they consider that, while they bear the entire cost of the investment, the returns from the investment are captured mainly by the debt-holders. If this agency cost of debts were significant, fast-growing firms operating in highly lucrative businesses would tend to have more equity and less debt financing. Therefore, the firm with higher growth opportunities has lower leverage, especially in relation to long-term debts. This suggests that short-term debt ratios might be positively related to growth rates if growing firms reduce their agency cost by substituting short-term liabilities for long-term liabilities (Titman and Wessels 1988).

Age

If the age of the firm as calculated from the date of incorporation provides a positive influence on the firms' attitude towards high leverage or a

Table 9.3 Descriptive statistics

Variables	Mean	Std dev.	Skewness	Kurtosis	Minimum	Maximum	No. of obs.
SHARE_PRI	103.305	266.794	13.1232	249.988	0.27	6876.06	5237
LOGSALES	2.06022	0.697816	−0.106934	3.75682	−1.69897	4.87178	5388
SALES_GR	18.4623	195.29	47.0849	2357.32	−96.0971	10585.7	4937
NETSALES	1.05347	0.534085	1.54642	9.39005	−0.00090886	5.84082	5388
NFATOTAA	0.432907	0.231221	1.97379	15.278	0.00570994	2.76407	5388
LONG_TER	127.815	577.437	14.3578	289.414	0	16780.2	5388
AGE	31.1414	21.4679	1.21103	4.16249	1	124	5388

Table 9.4 Variance–covariance matrix

Variables	**SHARE_PRI**	**LOGSALES**	**SALES_GR**	**NETSALES**	**NFATOTAA**	**LONG_TER**	**AGE**
SHARE_PRI	73975.4	31.3688	−358.933	3.5804	−4.35924	6305.09	764.276
LOGSALES	31.3688	0.479796	−0.793323	0.0679571	−0.00719788	153.851	4.82355
SALES_GR	−358.933	−0.793323	38811.9	0.358854	0.57731	428.666	−185.708
NETSALES	3.5804	0.0679571	0.358854	0.283665	−0.0344321	−44.3804	1.56946
NFATOTAA	−4.35924	−0.00719788	0.57731	−0.0344321	0.0527382	16.24	−0.662776
LONG_TER	6305.09	153.851	428.666	−44.3804	16.24	349937	1024.56
AGE	764.276	4.82355	−185.708	1.56946	−0.662776	1024.56	461.782

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Table 9.5 Correlation matrix

	AGE	SHARE_PRI	LONG_TER	NETSALES	LOGSALES	SALES_GR	NFATOTAA	SALESGFA*
AGE	1.00000	0.13321	0.08333	0.14260	0.33610	–0.00971	–0.14081	0.05199
SHARE_PRI	0.13321	1.00000	0.04050	0.02437	0.16425	–0.01202	–0.06680	0.02869
LONG_TER	0.08333	0.04050	1.00000	–0.14092	0.37307	–0.00449	0.11853	–0.07769
NETSALES	0.14260	0.02437	–0.14092	1.00000	0.18085	0.03472	–0.29228	0.51307*
LOGSALES	0.33610	0.16425	0.37307	0.18085	1.00000	–0.01164	–0.05072	0.09668
SALES_GR	–0.00971	–0.01202	–0.00449	0.03472	–0.01164	1.00000	–0.00537	0.02634
NFATOTAA	–0.14081	–0.06680	0.11853	–0.29228	–0.05072	–0.00537	1.00000	–0.43005
SALESGFA	0.05199	0.02869	–0.07769	0.51307*	0.09668	0.02634	–0.43005	1.00000

* SALESGFA is the ratio of sales to gross fixed assets.

Note: We drop one of the variables for our regression analysis in the presence of high correlation (*) between two variables (correlation coefficient > 0.5).

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high debt component in total borrowing, it should imply the firm's high credit-worthiness.

Share price (SHARE_PRI)

Whether a firm chooses corporate debt as an important means of financing might also depend on its status in the stock exchange. Thus, we allow for the share price of each firm as an explanatory variable, to observe if it should have any positive and significant effect on the borrowing pattern (debt) of the firm.

Fixed assets

The variable we actually use is defined as *NFATOTAA* (net fixed assets/total assets). The asset structure of a firm significantly affects the firm's capital structure. Since tangible fixed assets, serving as collateral, can lower the risk of the lender suffering the agency cost of debt, a greater portion of tangible fixed assets on the balance sheet leads to higher leverage. Grossman and Hart (1982), however, show that a firm's tangible fixed assets can be negatively correlated with its leverage. According to them, a firm with limited tangible fixed assets has less collateralized debts and more difficulty monitoring the extravagancy of its employees because of asymmetric information. In this case, a firm can attempt to reduce its agency costs by increasing leverage, which allows the firm to be more stringently monitored by creditors such as bondholders and financial intermediaries. Therefore, a firm with limited tangible fixed assets can raise its leverage. In addition, if the company has huge tangible fixed assets, then the proportion of fixed operating costs, instead of flexible operating costs, in the total operating costs for the firm's production and sales activities increases, thus raising its operational risk and the probability of bankruptcy. In this case, an increase in tangible fixed assets can also lead to lower leverage. If an increase in tangible fixed assets raises a firm's bankruptcy – such as the cost of asset sales – the firm's leverage could also be lowered.

Size of the firm (LOGSALES, NETSALES)

The size of a firm is closely related to leverage, since it affects the firm's risk of default and bankruptcy costs. As a firm becomes sizable and diversifies its operations, the risk of default decreases; therefore, it has better access to external financing, which might result in high leverage. Direct bankruptcy costs also influence a firm's leverage: large-scale firms can have higher leverage since bankruptcy costs account for a smaller portion of their capital (Titman and Wessels 1988). Large firms are likely to obtain long-term loans more easily, since they have lower default risks and more assets to put up as collateral, compared to smaller firms. On the other hand, large firms can easily finance their investments directly from capital markets because asymmetric information is less likely to occur, as outside investors can obtain more information about large firms than about small-sized firms. This allows larger firms to have lower leverage.

Industry classification (INDDUMMY)

Unique features of a certain industry also affect the debt structures of the firms in that industry. Each industry might have industry-specific patterns of financing because of disparities in product market structure and types of competitive actions between firms. To control for these industry effects, many empirical studies include dummies for industry. We classify the firms in the sample into 48 industry categories, as per the standard industrial classification (SIC) code used in India. The industry dummy is chosen as $INDDUMMY = 1$, if $SIC \geq 40$, and $= 0$ otherwise. As we shall discuss, other categorization does not offer any meaningful result.

Long-term borrowing (LONG_TER)

We include long-term borrowing as one of the explanatory variables, since a firm's borrowing pattern and time preference might strongly influence its credit-worthiness. Consequently, the structure may be used to observe whether firms that use long-term borrowing would also have a high leverage, and whether the component of debt in total borrowing would also be high for these firms.

The model

The empirical result is based on the following formulation that uses the explanatory factors as described. Thus, the hypothesized equation may be written as:

$$Y_{it} = \alpha_1 + \sum_{K=2}^{K} \alpha_K X_{Kit} + e_{it}, \text{ where } i = 1, 2, K, T \tag{9.1}$$

where, Y_{it} is the dependent variable pooling Ncross-sectional observations and T time-series observations, and X_{Kit} the independent variables pooling N cross-sectional observations and T time-series observations; α_1 is a constant term and e_{it} is random error with mean 0 and variance σ^2. Evidently, we use a panel regression for carrying out this analysis.

Use of the panel data as described enables us to consider both the cross-sectional and time-series characteristics of our sample, and helps to identify the sources of the effects, which, as far as some of the earlier studies are concerned, appear mixed. With the panel dataset, Equation (9.1) can be estimated by means of ordinary least squares (OLS) techniques. However, assumptions concerning the constant term α_1 in the estimation equation dictate the choice of estimation methods. If α_1 varies over time (year by year), it can be rewritten as $\bar{\alpha}_1 = \alpha_1 + \mu_t$, where $\bar{\alpha}_1$ is a constant term and μ_t denotes the time-specific fixed effect. In that case, the equation becomes a *fixed-effect* model, which can now be estimated using the OLS method by incorporating year dummies. Our empirical investigation includes two different cases; one with fixed α_1 and the other with the *time-specific fixed effect*. The year dummy variable is used when the time-specific effect is assumed. However, as we shall see shortly, all the equations that we estimate indicate the existence of a fixed-effect model.

Therefore, the empirical model for this study is as follows, where we propose two different sets of equations to be estimated based on the two models discussed above:

$$\begin{aligned} DEBTINTO = {} & \alpha_1 + \alpha_2 Age + \alpha_3 Shareprice + \alpha_4 Longterm \\ & + \alpha_5 NFATOTAA + \alpha_6 Logsales + \alpha_7 Netsales + \alpha_8 SalesGrowth + \varepsilon_{it} \end{aligned} \tag{9.2}$$

$$\begin{aligned} LEVERAGE = {} & \alpha_1 + \alpha_2 Age + \alpha_3 Shareprice + \alpha_4 Longterm \\ & + \alpha_5 NFATOTAA + \alpha_6 Logsales + \alpha_7 Netsales + \alpha_8 SalesGrowth \\ & + \alpha_9 IndustryDummy + \varepsilon_{it} \end{aligned} \tag{9.3}$$

Panel estimation results

For the first model, we attempt to identify and explain the factors behind corporate debt holdings by a company in its total borrowing (henceforth, *DEBTINTO*). The results are reported in Table 9.6. In fact, we regress five sets of equations with *DEBTINTO* as a function of: age, share price, long-term borrowing, *NFATOTAA*, logsales, netsales and sales growth – variables and expected signs as discussed above. Notably, all the results obtained under this specification recommend a one-way fixed-effect model on the basis of the Hausman test statistic. For example, Equation (1) in Table 9.6 uses most of these explanatory variables except *NFATOTAA* and *SALES_GR*, which were dropped. The reported R^2 is 0.84

Table 9.6 Panel regressions

Eqn No.	1 Eqn	2 AGE	3 SHARE_PRI	4 LONG_TER	5 NFATOTAA	6 LOGSALES	7 NETSALES	8 SALES_GR	9 INDUMMY	10 R^2	11 AIC	12 LA
1	**DEBT INTO**	**–0.178**	**0.0072**	**0.4999**		**–14.389**	**13.327**			**0.844**	**12.552**	**9.715**
		(–0.284)	**–0.999**	**(76.662*)**		**(–1.436)**	**(2.035**)**					
	LEVERAGE	–0.0022	–0.00023	0.0000135		–0.0145	–0.011			0.596	–3.1	–5.91
		(–8.08*)	(–0.769)	(5.134*)		(–3.591*)	(–4.271*)					
2	**DEBT INTO**	**–0.453**	**0.662**	**0.499**	**–28.542**	**–9.36**				**0.844**	**12552**	**9.715**
		(–0.753)	**–0.913**	**(76.691*)**	**(–1.871)**	**(–1.005)**						
	LEVERAGE	–0.0028	–0.000003	0.00001	0.0094	–0.01				0.595	–3.1	–5.91
		(–13.991*)	(–1.269)	(4.619*)	–1.551	(–5.981*)						
3	**DEBT INTO**	**–0.755**	**0.006**	**0.499**	**–22.617**		**8.15**			**0.844**	**12.552**	**9.715**
		(–1.532)	**–0.821**	**(77.263*)**	**(–1.493)**		**–1.348**					
	LEVERAGE	(–) 0.002	(–) 0.00003	0.001	0.009		(–) 0.01			0.56	–3.1	–5.91
		(–14.7*)	(–1.7)	(3.5*)	–1.7		(–6.9*)					
4	**DEBT INTO**	**–0.214**	**0.0071**	**0.499**		**–14.367**	**14.921**	**–0.002**		**0.844**	**12.553**	**9.715**
		(–0.34)	**–0.988**	**(76.648*)**		**(–1.433)**	**(2.032**)**	**(–0.229)**				
	LEVERAGE	–0.0022	–5	0.00001		–0.01	–0.011	–0.000003		0.596	–3.1	–5.91
		(–8.843*)	(–0.791)	(5.073*)		(3.405*)	(–4.176*)	(–0.103)				
5	**DEBT INTO**	**0.652**	**0.003**			**95.232**	**–19.68**			**0.685**	**12.552**	**9.715**
		–0.702	**–0.359**			**(6.487*)**	**(–2.305**)**					
	LEVERAGE	–0.0022	–0.000002				–0.012	–0.011		0.593	–3.1	–5.91
		(–8.699*)	(–799)				(–4.056*)	(–2.882**)				
6	LEVERAGE	–0.002	–0.000002	0.000001			–0.01	–0.00004		0.56	–3.1	–5.91
		(–13.1*)	(–1.2)	(3.5*)			(–6.9*)	(–2.3*)				
7	LEVERAGE	–0.002	–0.000005	0.000001	0.009		–0.01	–0.00004	–0.002	0.56	–3.1	–5.91
		(–13.9*)	(–1.28)	(4.6*)	–1.53		(–5.9*)	(–2.5**)	(–3.6*)			
8	LEVERAGE	–0.001	–0.00001	0.00001	0.008	–0.01		–0.00005		0.57	–3.1	–5.91
		(–7.9*)	(–0.45)	(3.9*)	–1.7	(–4.9*)		(–1.2)				

Notes: Significance at 1 per cent and 5 per cent denoted by ** and * respectively; AIC: Akaike Information Criterion; LA: Log Ameniya prediction criterion.

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(Table 9.6, column 10) and *LONG_TER* borrowing (at 1 per cent) and *NETSALES* (at 5 per cent) turn out to be positive and significant factors in explaining the debt component in total borrowing for the group of 450 firms. Although non-significant, *AGE* as an explanatory variable affects *DEBTINTO* negatively, and this pattern continues for all the other equations specified subsequently. In other words, it turns out that, *AGE* either does not affect the choice of the debt structure of a firm significantly or, even if it does, the effect is negative – the greater the age of a firm, the lower the tendency that it will use corporate debt as a means of finance.

Subsequently, Equation (2) in Table 9.6, estimates *DEBTINTO* by dropping *NETSALES* as a variable and including *NFATOTAA*, and the model loses significant explanatory variables, since *LONG_TER* alone now offers a positive and significant coefficient. Similarly, Equations (3), (4) and (5) add and drop variables to see whether the model offers a better insight into the factors that affect the choice of a firm's debt structure significantly. All of these equations, however, return a high goodness of fit ($R^2 = 0.84$) – except for Equation (5), where R^2 drops to 0.68. For Equation (5), we dropped *LONG_TER* and included *NETSALES* along with *AGE*, *SHARE_PRI* and *LOGSALES* and observe that while LOGSALES becomes positive and highly significant (Table 9.6, column 6), *NETSALES* becomes negative, though significant. This denotes a reversal of sign for both *LOGSALES* (negative up to that point) and *NETSALES* (positive up to that point) compared to all the previous equations where these variables have been picked for estimating *DEBTINTO*. At the same time, however, *AGE* reports a positive coefficient, unlike in all the previous cases. We believe that the system becomes unstable if *LONG_TER* is dropped from the analysis, despite the fact that *LONG_TER* and *LOGSALES* display some degree of correlation (0.37), which is however, not surprising because long-term firm borrowing is often associated with buy-back options offered by the financer. This furthermore, explains the negative (albeit, non-significant) coefficient reported by *LOGSALES*, since sales growth in this case reduces the likelihood that the firm will choose corporate debt as a mode of financing.

The second model used in this analysis is based on Equation (3) and the results are also reported in Table 9.6. As already mentioned, the dependent variable for this panel regression is *LEVERAGE*, defined as the *proportion of firm's total domestic debt to total assets*. Once again, we offer a number of cases where we drop and insert variables in favour of obtaining the most appropriate combination to best explain a firm's *LEVERAGE*. The Hausman test for these equations recommends the one-way fixed-effect model, as in the previous case. Therefore, we begin with Equation (1), where *LEVERAGE* is a function of *AGE*, *SHARE_PRI*, *LONG_TER*, *LOGSALES* and *NETSALES*. Of these, *AGE* reports a small negative (−0.0022) but highly significant ($t = -8.08$) coefficient. While *SHARE_PRI* continues to display little impact on the choice and volume of the financing pattern of a firm, the variable *LONG_TER* reports a positive (though very small) and highly significant coefficient. In this respect, there is not much difference with the previous case, although the coefficient values are substantially greater for *DEBTINTO*. Finally, both *LOGSALES* and *NETSALES* offer negative and significant relationship with *LEVERAGE*, which implies that the firms do not choose corporate debt as a mode of financing in the presence of high sales. In other words, stated more simply, a bad sales performance may be thought of as an indicator that the firm goes into high indebtedness.

The pattern observed here, continues for the remaining seven equations reported in Table 9.6. Additionally, we have included *SALES_GR* as an explanatory variable in Equation (4) in the presence of *LONG_TER* and *LOGSALES* and it reports a low negative and non-significant coefficient. However, when both *LONG_TER* and *LOGSALES* are dropped from Equation (5), the coefficient of *SALES_GR* increases and becomes significant at the 5 per cent level. Finally, Equation (7) uses the industry dummy variable (*INDDUMMY*) discussed above. In fact, we have specified the dummy variable for the industrial categories around several possible options – such as, $INDDUMMY = 1$, if $SIC \geq 25$ or, $SIC \geq 30$ and $= 0$, otherwise – none of which retrieved any meaningful result. The choice of $SIC \geq 40$, however, shows that, the higher the industrial classification type, the lower is the possibility that the firm enters into high *LEVERAGE*.

Conclusion

Historically, the corporate debt market in India has not been popular with Indian firms as a source of finance. Despite a substantial increase (from Rs 197,287 million in 2001–2 to Rs 360,388 million in 2002–3) in the secondary market turnover through issue of corporate debt, it remains a rather small fraction of the total turnover, with the transaction through the government securities continuing to dominate. It is often claimed that transactions in the corporate debt market in India may be riddled with unscrupulous practices, since private placements (93 per cent) lack sufficient control and supervision by the regulatory authority. In spite of that, there is little doubt that it is a cheaper option for the firms to raise capital through this market.

We examined the factors that strongly influence leverage. These include: the age of the firm, the level of long-term borrowing, share prices, the ratio of net fixed assets and total assets, the size of the firm as captured through its sales figures and through the growth of sales, and so on. In addition to leverage, we define another dependent variable, *DEBTINTO* (proportion of debt – which includes fixed deposits, commercial papers and debentures – in the total borrowing of a firm). Our sample comprises a panel of 450 firms with an average of 5,300 observations per variable.

Age displays a negative but insignificant impact on both the dependent variables, while long-term borrowing continues to be positive and significant all through. For some equations (notably 1–4, in Table 9.6), share price (though non-significant) and netsales (significant) estimates alternate in signs for *DEBTINTO* (positive) and *LEVERAGE* (negative). However, *NFATOTAA* and *INDDUMMY* turn out to be of little or no impact on *DEBTINTO* and *LEVERAGE*, except in Equation (7), where, *INDDUMMY* has a negative and significant impact on *LEVERAGE*. Finally, it is observed that sales growth negatively and significantly explains the *LEVERAGE* of a firm when long-term borrowing and *LOGSALES* are dropped from the analysis.

LEVERAGE, as the more conventional measure of a firm's debt market participation, depends significantly on the level of the firm's long-term borrowing and sales performances. *DEBTINTO*, as the other measure, is also strongly influenced by the level of long-term borrowing and sales performance of the firm. However, since the explanatory variables return different signs for the two dependent variables, future policy propositions and reforms aimed at positively or negatively affecting the level of activity in the corporate debt market must take cognizance of such possibilities.

There are several well-known studies that discuss the link between financial development and growth, both at the firm level and for the economy. Levine (1997, 2004), among others, provides very conclusive evidence that both financial intermediaries and markets contribute towards growth and that the reverse causality alone – that is, economic growth to development of financial markets – does not drive the relationship. In fact, Levine (2004: ii) comments that 'better developed financial systems ease external financing constraints facing firms, which illuminates one mechanism through which financial development influences economic growth'. Studies dealing with growth at the firm level subject to their choice of financial structures provide a more targeted analysis. Anderson (2002), for example, predicts that a long-term reliance on high levels of debt finance tends to be associated with high levels of liquid asset holding. He constructs a theoretical model, which is applied on panels of firms from Belgium and UK, and establishes that high leverage leads to high liquidity and slow growth at the firm level, especially when the access to external financing is costly. Besides, high leverage at the firm level might often be influenced by strategic motives of a specific group of investors to retain control over the firm. The implications of such developments for the entire economy are neither direct nor monotonic. However, if high leverage leads to slower growth and stagnation at the firm level, and if this practice is endemic, then the impact on the economy is clearly predictable.

We have argued that, despite several advantages of debt financing, Indian firms have traditionally relied on bank loans to finance their activities. The chain of reasoning builds around the perception that, for a developing economy, the growth of an efficiently functioning corporate bond market would enrich the financial system in the country and therefore influence the finance–growth nexus positively. However, as noted earlier, one cannot deny the other side of the issue altogether, whereby high leverage can cause production slow-down at the firm level, with possible spillover to the greater economy. Any strong conclusion on the efficacy of bond financing at the firm level would also require evidence on the role played by the alternative financing arrangements. Evidently, these are countervailing issues that should be weighed up and considered in favour of rigorous impact assessment of short-term and long-term debt financing on growth of the firm and the economy.

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Notes

1 For earlier work on the corporate debt market in India, see Mohan (2000), Thorat (2000, 2002), Leonardo (2000) and Patil (2004). For relations between financial liberalization and aggregate debt intensity, see Bhaduri (2000). Babu and Jain (2000) examine the significance of industry class in designing capital structure between debt-equity ratios. A cross-country analysis for the Asian countries is available in Harwood (2000).

2 For recent survey papers on the theory of determination of optimal financial structure of firms, see Harris and Raviv (1991); see also Rajan and Zingales (1995), also providing an empirical estimate.

3 Important empirical studies regarding the determinants of the firm's capital structure include, Bradley *et al*. (1984), Titman and Wessels (1988) and Demirgüç-Kunt and Maksimovic (1994).

References

Anderson, R.W. (2002) 'Capital Structure, Firm Liquidity and Growth', National Bank of Belgium Working Paper 27.

Babu, S. and P. Jain (2000) 'The Influence of Nature of Business on Corporate Debt Ratios: Empirical Evidence from Indian Corporate Sector', *Finance India*, 14: 1165–73.

Bhaduri, S. (2000) 'Decomposition of Aggregate Debt Intensity: Some Insights into the Financial Liberalization Process in India', *Indian Journal of Applied Economics*, 8: 263–84.

Bradley, M., G. Jarrell and E. Kim (1984) 'On the Existence of an Optimal Capital Structure: Theory and Evidence', *Journal of Finance*, 39: 857–78.

Chirinko, R.S. and H. Schaller (2001) 'Business Fixed Investments and "Bubbles": The Japanese Case', *American Economic Review*, 91: 663–80.

Demirgüç-Kunt, A. and V. Maksimovic (1994) 'Capital Structures in Developing Countries: Evidence from Ten Country Cases', Policy Research Working Paper 1320 (Washington DC: Policy Research Department, World Bank).

Grossman, S. and O. Hart (1982) 'Corporate Financial Structure and Managerial Incentives', in J. McCall (ed.), *Economics of Information and Uncertainty* (Chicago: University of Chicago Press).

Harris, M. and A. Raviv (1991) 'The Theory of Capital Structure', *Journal of Finance*, 46: 297–355.

Harwood, A. (ed.) (2000) *Building Local Bond Markets: An Asian Perspective (*Washington, DC: International Finance Corporation, World Bank).

ISMR (2004) *Indian Securities Market: A Review*, National Stock Exchange of India Ltd (NSE), Mumbai, available at www.nse-india.com/archives/us/ismr/us_ismr2004.htm

Leonardo, J. (2000) 'India Survey: Issues in Local Bond Market Development', in A. Harwood (ed.), *Building Local Bond Markets: An Asian Perspective* (Washington, DC: International Finance Corporation, World Bank).

Levine, R. (1997) 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35 (2), 688–726.

Levine, R. (2004), 'Finance and Growth: Theory And Evidence', NBER Working Paper 10766 (Cambridge, MA: National Bureau of Economic Research).

Modigliani, F. and M.H. Miller (1958) 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review*, 48: 261–97.

Mohan, R. (2000) 'The Importance of Local Bond Markets in Financing India's Infrastructure Needs', in A. Harwood (ed.), *Building Local Bond Markets: An Asian Perspective* (Washington DC: International Finance Corporation, World Bank).

Myers, S.C. and N.S. Majluf (1984) 'Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have', *Journal of Financial Economics*, 13: 187–221.

Patil, R. (2004) 'Corporate Debt Market: New Beginning', *Economic and Political Weekly* (March): 20.

Rajan, R.G. and L. Zingales (1995) 'Is there an Optimal Capital Structure? Evidence from International Data', *Journal of Finance*, 50: 1421–60.
Reddy, Y.V. (1997) 'The Future of India's Debt Market', *BIS Review*, 99.
Thorat, U. (2000) 'India's Debt Market: A Review of Reforms', in A. Harwood (ed.), *Building Local Bond Markets: An Asian Perspective* (Washington, DC: International Finance Corporation, World Bank).
Thorat, U. (2002) 'Developing Bond Markets to Diversify Long-term Development Finance: Country Study of India', *Asia-Pacific Development Journal*, 9: 45–63.
Titman, S. and R. Wessels (1988) 'The Determinants of Capital Structure Choice', *Journal of Finance*, 43 (1): 1–19.

10

Financial Markets and R&D Investments: A Discrete Time Model to Interpret Public Policies

Marco Mazzoli

Introduction

The importance of financial deepening for economic development has been emphasized for some considerable time, since the seminal work by Schumpeter (1911), Goldsmith (1969), McKinnon (1973) and Shaw (1973). Kiyotaki and Moore (2005) provide a theoretical model explaining the long-run effects of financial deepening on output, investments and the interest rate, as well as circulation and use of different monetary instruments. Rajan and Zingales (1998) provide precise information on the nature of the causal nexus finance–growth, by performing empirical tests showing the importance of financial markets in allowing firms to raise external finance in a context of financial market imperfections. Finally, in the model by Aoki *et al*. (2006), the degree of development of the domestic financial system (together with international collateral constraints) determines whether capital liberalization causes capital outflow and transitional loss of wage and employment, or capital inflow and increase in wages and employment. Most of the related literature, however, focuses on the importance and role of financial markets for efficient resource allocation and the spreading of information.

The informational role of financial markets and their impact on firms' ability to raise external finance (namely, debt) are the main focus of this chapter. In particular, the purpose of the present analysis is to provide an interpretational tool that could ideally be complementary to the results by Rajan and Zingales (1998) and Aoki *et al*. (2006). Instead of looking at the domestic market as a whole, the model presented here looks inside the firm and describes the interaction between the firm's investment and financial decisions, in the context of a developing country. The engine of development (a very powerful one) for many countries has been, of course, R&D investments: however, since the emphasis of this analysis is on what happens inside the firm rather than outside in the markets, and since another important ingredient of the model is the simultaneity between real investments and finance, the analytical background is provided by a modified investment model rather than the usual literature on R&D and technological innovation.

The first basic element characterizing the expenditure in R&D is the fact that the link between expenditure in R&D and technological innovation is wrought with significant uncertainty. Positive externalities for firms that have not borne the initial costs of R&D are determined by the nature of public goods characterizing technological knowledge. Technological spillovers and the appropriability of knowledge limit the effectiveness of patents, which do not always constitute a totally satisfactory instrument for the firm undertaking potential investments in R&D. For these reasons, a consolidated literature in the field promotes the role of public investments in R&D for product innovation. Another basic element is the fact that technical innovation – by affecting both the technology of the production process and consumer demand – can deeply affect market characteristics and the context in which competition takes place.

The analysis of the (non-)success of the Schumpeterian approach in explaining the process of technical innovation is beyond the scope of this study; however, it might be interesting to note that Rosenberg (1982, 2000) provides wide historical and empirical evidence for the USA that suggests technological innovation in many industries has been successfully introduced by new entrants rather than incumbent dominant firms. From the point of view of the policy-maker (and, clearly, in the case of developing countries), the question appears rather complex. According to the literature, large-scale investments in R&D and innovation need to be covered by public investments, due to strong externalities and spillovers. However, the particular portion of R&D expenditure analysed by Rosenberg and performed by marginal 'new entrant' firms, raises difficulties. In highly concentrated markets, oligopolistic dominant firms tend to create barriers to entry against new entrants who (in Rosenberg's analysis) might be potential carriers of new technology and who face highly uncertain pay-offs. Under these circumstances, the expected profits of potential entrants must be significantly high in order to trigger entry and generate new technology. In this specific situation, the role of public investments and public incentives for innovation is not trivial. It is somewhat difficult to assess the projects that deserve funding since the decision is, to a large extent, subjective, arbitrary and characterized by information asymmetries, as well as by the obvious problems of monitoring and moral hazard for receiving public incentives. Furthermore, even with the best of intentions, there is an intrinsic problem of inconsistency over time – what could appear at first to be a good research project might not always turn into a good invention. This constitutes the free-rider problem, an important argument in favour of public investment in R&D. But what about innovations by new entrants and those associated with market dynamics and configuration? Barriers to entry could generate a distortion in the process of invention and reduce the R&D incentives.

The main policy proposal of this chapter consists of reducing one kind of distortion (barriers to entry) by moderating another kind of distortion (tax distortion) through the use of tax incentives for firms that conduct successful innovation.

Financial markets play a very relevant role for the entry of potential carriers of new technology. In particular, in transition economies and developing countries the size and efficiency of financial markets constitute a key factor for the efficient allocation of resources (see Table 10.1).

To understand the relevance of the link between efficient financial markets and technological innovation, one might consider the case of Italy. Italy suffers from an unsatisfactory level of R&D expenditure and is witnessing a lively debate on the causes of its industrial decline.

Table 10.1 R&D expenditure (GDP %), 2001

Country	All sectors	Private firms
Belgium	2.2	1.6
Denmark	2.4	1.7
France	2.2	1.4
Germany	2.5	1.8
Italy	1.1	0.6
Japan*	3.0	2.1
Netherlands*	1.9	1.1
Spain	1.0	0.5
UK	3.0	1.3
USA	2.7	2.1

Note: * Year 2000.
Source: Baussola (2003).

The country has always been characterized by: (i) a relatively imperfect system of juridical protection for small shareholders; (ii) rather undeveloped financial markets (at least compared to bank intermediation); (iii) a relatively small number of public companies; and (iv) significant concentration and rigidities in the market for entrepreneurial control not necessarily associated with the market for shares.[1]

In addition, many companies (small as well as large) have been in the control of the same family of entrepreneurs for several generations. Burkart *et al.* (2002) point out that, on the one hand, this ownership feature reduces the agency problems, since it is characterized by the relationship between owners and managers. On the other hand, it raises very relevant problems concerning the selection process of executive managers, because these tend to be appointed on the basis of family links rather than on the basis of their professional abilities. A similar situation is also apparent in the less efficient financial markets with a relatively small number of public companies, where strong bias and disincentives of external shareholders and investors create problems in investment financing. Furthermore, Lotti *et al.* (2001) and Santarelli and Vivarelli (2002) note that the birth of new firms is, statistically speaking, very significant in Italy; however, in general, these new entrants are very small, have a high probability of exit, and have historically been supported by very unselective and distortionary policy incentives. Incentives are strongly orientated towards the production of traditional commodities in the industrial sector but are rather weak in all hi-tech sectors, where size and scale economies play a relevant and strategic role. According to many analysts, this is possibly one of the main causes of the decline of Italian industry.

The model

In a world of financial market imperfections due to information asymmetries, the internally generated cash flow constitutes a cheaper source of finance than borrowing or issuing new shares. The behaviour of the share price and capital gains might affect the dividend policy of the management, which in turn impacts on the firm's financial structure by determining the rate of retention of profits, subsequently affecting the volume of investments funded by internal finance. All of these are factors that might have relevant implications for the standard intertemporal investment decision. If the firm's financial structure is affected by profits retention, and if the cost of financial capital is affected by the firm's financial structure, then, to the extent that the (firm-specific) discount factor is assimilated to the cost of financial capital, a causal link for the firm's intertemporal investment decision is established between its profits, financial structure and discount rate for the future profits. Timing, in the coordination process between financial and investment decisions, is essential for the definition of flow variables. For this reason, introduced here is a discrete time-optimal control model with a recursive structure, with financial market imperfections and diverging incentives between the management and external shareholders.

In this model, financial and real investment decisions take place simultaneously. The goods market is assumed to be imperfectly competitive, although perfect competition can be a particular case. On the basis of the assumptions summarized in the previous section, management is assumed to be able to decide how to allocate the firm's cash flow once the creditors are repaid and shareholders have been remunerated consistently with a yield that depends on the average market yield of the shares. The average market yield of the shares will, of course, influence the remuneration owners expect to receive from their financial investments. Furthermore, given that managers are assumed to have full control of the firm and its cash flow allocation, the actual amount of dividends paid to the shareholders is the result of an implicit negotiation between management and external shareholders. It can be affected by a number of factors related, in general, to the existing relationship between management and external shareholders. In particular, management may or may not have the incentive to reveal information on the firm's profitability. If this is the case, the stock price might not react (at least, in the short run) to changes in the profitability of the firm. On the other hand, if we allow for the possibility of speculative bubbles (at least, in the short run), and if we admit that in the short run the share price might overshoot its theoretical level as implied by the net present value of future profits, we must include this fact in the rational financial choice of management.

The model is formalized with the optimal control approach in order to refer explicitly to the standard results of the investment model and to emphasize how different the results can be by simply introducing some common assumptions of financial market imperfections, risk premium on the remuneration of finance raised by the firm. The risk premium may be affected by the process of information spreading on the outcomes of the R&D expenditures performed by the firms. In order to take into account the relevance of timing in real and financial decisions (which cannot be accounted for over a continual time period in an optimal control model), we introduce a recursive structure for the intertemporal problem of the firm's investments.

The capital is installed at time $t-1$, and is funded with financial sources raised by the firm at time $t-1$, reflecting remuneration or expected remuneration at time t. Investment decisions, the production process (generating the profits π_t), as well as payment of interest on borrowed capital and dividends on own capital, take place at time t; $\Phi^*{}_t$ is the weighted average of the cost of own capital and borrowed capital, established at time $t-1$ and paid at time t.[2]

We assume that the time horizon of the decision-makers (the management) corresponds to their expected residual time m of being in control in the company. This assumption is actually as arbitrary as assuming that the time horizon is infinite. Expectational equivalence is assumed to hold.

The problem of the firm may be represented in the following way:

$$V_t = \sum_{t=1}^{m} \{[E(\pi_t(k_{t-1}|\nu^*, \omega l^*)) - I_t] \cdot [1/(1+\Phi^*{}_{t-1})^{t-1}]\} \tag{10.1}$$

where $\pi_t(k_{t-1}|\nu^*, \omega l^*)$ is defined as the (strictly concave) maximum value function, conditional on the parameter ν^* (describing possible shocks on profits) and on the labour costs ωl^*). In what follows, we assume ν^* and ωl^* to be given and will omit them in the rest of the chapter;[3] k_{t-1} is the capital installed at time $t-1$, I_{t-1} is the amount of investments decided at time t that will contribute to determining the stock of capital at time $t+1$; $\Phi^*{}_{t-1}$ represents the minimized cost of financial capital at time $t-1$: we return to this variable below when defining one of the constraints.

The maximand (1) is subject to the following constraints:

Law of motion of investments:

$$I_t = k_t - (1-\delta)k_{t-1} \tag{10.2}$$

with $0 < \delta < 1$ being the rate of capital depreciation.

Flow of funds constraint:

$$I_t = \pi_t(k_{t-1}) - \Phi^*{}_{t-1}\, k_{t-1} + \Delta B_t + \Delta E_t \tag{10.3}$$

Balance sheet constraint:

$$k_t = E_t + R_t + B_t \tag{10.4}$$

Where B_t is the outstanding debt at time t; ΔB_t its variation between time $t-1$ and time t; E_t the outstanding shares valued at their issuing price; R_t the accumulated reserves (that is, the past non-distributed profits); $\Phi^*{}_{t-1}$ the (optimized) cost of financial capital, defined as the weighted average of debt and internal finance as follows:

$$\Phi^*{}_t = \min\,[\mu[r_t^f + \phi(\mu_t)] + (1-\mu)i_t] \tag{10.5}$$

where i_t represents the cost of internally generated own capital, defined below; r_t^f is the risk-free interest rate; $\phi(\mu_t)$ is the risk premium on the interest rate on the firm's borrowing, which is assumed to be a monotonically increasing function of the gearing ratio $\mu_t = B_t/k_t$; and $\Phi^*{}_t$ represents the minimum value function of the firm's financial cost minimization problem.

The rate of discount of future profits is the (optimized) cost of finance, which contains a risk premium function of the gearing ratio and therefore (given the assumptions of the model) of the firm's profits. We can define it then as $\phi(\pi_t)$ and $\Phi^*{}_t = \Phi^*{}_t[\phi(\pi_t)]$. Intuitively speaking, one can easily see that by allowing unexpected random shocks on the profits, the higher the profits, the less likely is the firm to go bankrupt.

At every time t, the firm optimizes its financial structure by choosing the optimal gearing ratio $\mu_t = B_t/k_t$, which minimizes the cost of financial capital, defined as the weighted average between the borrowed and internally generated finance. The rate at which the firm can raise external finance for its investments, and can transfer resources from time t to time $t+1$, is represented by $\Phi^*{}_t$.

The optimized financial structure determines the rate of discount appearing in the intertemporal problem, which is conditional on the flow of non-distributed profits of the previous period. In this way the firm-specific rate of discount is recursively determined as a function of the lagged stock of physical capital and lagged cost of financial capital.

We define i_t as follows:

$$i_t = D^*/(E_0 + R_t) \tag{10.6}$$

where the issuing price (at time 0) of the N firm's shares is

$$E_0 = p_{s,0} \cdot N_t$$

R_t, the non-distributed profits of all the previous years, from the starting year $t = 0$, are defined as follows:

$$R_t = \sum_{i=0}^{t} W_i$$

and

$$D^* = r^*_{s,t} \cdot p_{s,t} \cdot N_t - \Delta p_{s,t} N_t$$

Where, again,

r^*_s = the yield on the firm's share at time t;
$p_{s,t}$ = the share price;
$\Delta p_{s,t}$ = its variation with respect to time $t - 1$;
N_t = the number of existing shares.

In other words, given the share price, the short-run capital gain and the (exogenous) yield $r^*_{s,t}$ that the management allows for its shareholders, we can determine the amount of paid dividends. In this regard, we could have two possible situations: the first (and extreme) situation is the standard neo-classical investment model; the second corresponds to a situation in which the management pays dividends strictly in an amount consistent with the market yield of the shares and the share price might not always reflect (in the short run) the net present value of future profits.

In order to have the standard neo-classical investment model with efficient financial markets:

(i) Share prices must adjust perfectly and instantaneously to the value implied by the profits;
(ii) Cash flows (net of adjustment costs of investments) are to be entirely exhausted as interest and dividend payments (that is, no agency problem and no incentive for the managers to keep the cash flow – as far as possible, given the yield on shares – within the firm).

In all the other cases, the stock price in the short run may diverge from the value implied by the net present worth of future profits. This is our assumption in the remainder of the chapter.

If stock prices were to be affected by the endogenous propagation of expectations (as, for instance, in Kurz's (1994a, 1994b) 'rational beliefs' theory), then the share price would be subjected to a number of shocks and would follow a path apparently uncorrelated (or only very weakly correlated) in the short run to actual profits.

In order to explain the 'irrational exuberance' of some years ago, many mainstream authors (for instance, Miller *et al*. 2002) had to invoke a theory of some sort of long-lasting bubble in order to justify the puzzle of the Nasdaq index in 1996–2001. In this context, again stock prices in the 'short run' would be exogenous with respect to 'real' profits even though the 'short run' in this case would be as short as a decade.

On the other hand, even without being as sceptical as Kurz on the efficiency of financial markets, if one admitted that stock prices may diverge for a sufficiently long period from the value implied by the profits of firms, managers might lack the incentive to reveal all information regarding the firm's profitability, and they may prefer not to exhaust profits into dividends and interest payments.

Under these assumptions, we can consider the share price to be exogenously determined in the short run.

Note that for the shareholder the yield on shares is given by:

$$r^*{}_{s,t} = [D^*/(p_{s,t} \cdot N_t)] + (\Delta p_{s,t}/p_{s,t})$$

while, for management, the cost of capital is affected by the (exogenous) book value $p_{0,t} \cdot N_t$ of the shares. However, for a given (and exogenous) value of $(\Delta p_{s,t}/p_{s,t})$, it is easy to verify that if $(\Delta p_{s,t}/p_{s,t})$ were subject to shocks, these would have an impact on the dividend policy and, consequently, on the firm's financial structure and investment decisions. Note that due to the assumptions made here regarding the control of the cash flow by insiders, once the shares have been issued, their market value is relevant to the managers only to the extent that it contributes to determining their dividend policy. For this reason, the notation ΔE_t or E_t is different from the notation employed to indicate the value of newly issued shares.

The above assumptions generate not only a recursive structure in the problem, but also a certain persistence of the influence of past profits on the discount rate. The extent of this persistence is implicitly limited by the rate of capital depreciation Δ.

Since the internally generated finance is predetermined (by the non-distributed profits at time $t-1$), by choosing the value X_t of the newly borrowed finance, the firm also determines the maximum amount of feasible new investments at time t and the gearing ratio at time t, which will be incorporated in the new debt contracts issued by the firm in order to finance a part of its investments.

Let us now analyse the minimum value function $\Phi^*{}_t$. Assuming that the second-order conditions are satisfied, the first-order conditions are the following:

$$d\Phi^*{}_t/dt = r^f{}_t + \phi(\mu_t) + \mu_t\phi'(\mu_t) - i_t = 0$$

The above equation (stating that in equilibrium the marginal cost of borrowing equals the marginal cost of the internally generated finance) can be simplified by assuming that $\xi = \phi(\mu_t)+\mu_t\phi'(\mu_t)$ can be rearranged into a monotonically increasing and invertible function of μ_t. One can easily verify that this is always true if $\phi(\mu_t)$ is convex in μ_t, as we are assuming henceforth in the model.[4] In this case we get:

$$\mu_t = \xi^{-1}(i_t - r^f_t) \tag{10.7}$$

In other words, this means that the gearing ratio is an increasing function of the difference between the cost of own capital, i_t, and the interest rate on risk-free assets, $r^f{}_t$, because, for a given $r^f{}_t$, the higher the cost of own capital, the higher the incentive for the firm to borrow by increasing the gearing ratio. At each time, by choosing the level of debt, the managers simultaneously affect the investments (that is, the control variable), the financial structure and the cost of finance.

By looking at the constraints (10.2), (10.3′), and (10.4), one immediately sees that they both are dynamic equations putting into relation two flow variables I_t and $X_t = \Delta B_t$ with the state variable k at two different moments in time $t-1$ and t.

In particular, while I_t relates the state variables k_{t-1} and k_t to a given rate of discount $\Phi^*{}_t$, X_t does the same job and, in addition, determines (together with k_t) the optimal rate of discount. In other words, in contrast to the conventional neo-classical intertemporal investment models, it is not I_t but X_t that acts as a control variable in this context.

Since we know from (10.3′) that $\pi_t(k_{t-1}) - I_t = \Phi^*{}_{t-1} \cdot k_{t-1} - X_t$, we may express (10.1) in terms of the control variable X_t and the state variable k_{t-1}, while by putting together the two constraints (10.3′) we can eliminate I_t and express the intertemporal constraints also in terms of X_t. Therefore the firm's problem can be redefined as follows:

$$V_t = (\Phi^*{}_{t-1} \cdot k_{t-1} - X_t) + \sum_{t=1}^{m}\{[\Phi^*{}_t \cdot k_t - X_{t+1}] \cdot [1/(1+\Phi^*{}_t)^t]\} \tag{10.8}$$

subject to

$$k_t = (1 - \delta)k_{t-1} + \pi_t(k_{t-1}) - \Phi^*{}_{t-1} \cdot k_{t-1} + X_t$$

if one allowed for shocks in the profit function $\pi_t(k_{t-1}|\nu^*, \omega l^*)$; for instance, by letting ν^* be subjected to shocks, these would be transferred to the rate of discount of future profits from the next period on. In addition, as we can see again from (10.5), (10.7) and (10.4), the firm's discount rate is affected by the share price and its variations. In other words, a financial shock modifying the optimal dividend policy of the firm's managers would also modify the cost of own capital, the optimal gearing ratio, and, as a consequence, the discount rate. Of course, the specific nature of these causal links would depend on the nature of the relationship between π and p; that is, how efficient the financial market is, and how fast and efficiently information spreads from the profits of the firm to its stock price.

A slightly unusual result: what is the role of financial markets?

We are now able to write the discrete Hamiltonian as follows:

$$H_t = (\Phi^*{}_{t-1} \cdot k_{t-1} - X_t) + \sum_{t=1}^{m} \{[\Phi^*{}_t \cdot k_t - X_{t+1}] \cdot [1/(1 + \Phi^*{}_t)^t]\}$$
$$+ \lambda_t(X_t - k_t + (1 - \delta)k_{t-1} + \pi_t(k_{t-1}) - \Phi^*{}_{t-1} \cdot k_{t-1})$$

where

$$\Phi^*{}_i = \Phi^*{}_i(\mu_i(i_t - r^f{}_t))$$

and

$$i_t = (r^*_{s,t} \cdot p_{s,t} \cdot N_t - \Delta p_{s,t} N_t) \,/\, [E_0 + \sum_{I=0}^{t} (\pi_i(k_{i-1}) - \Phi^*{}_{i-1} \cdot k_{i-1})]$$

The definition for i_t allows us to clarify the link between profits, the spreading of information, share prices and dividend policy. For instance, if managers lack incentives to reveal information on the profitability of the firm, the share price might not react (at least, in the short run) to increases in profits. Therefore, the numerator of i_t would not change and the denominator would increase. This means that an increase in $\pi_i(k_{i-1})$

would be associated with a reduction in the cost of own capital and, hence, on the average cost of capital.

On the other hand, if an increase in the firm's profitability determines an increasing and persistent capital gain, the numerator of i_t would be small again: in other words, own capital would become relatively cheap (as long as $\Delta p_{s,t}$ increases) since the management, due to capital gains, would only need to pay a lower level of dividend to external shareholders to keep them happy.

Given the assumptions we made on the cost of own capital and determination of dividends, any shock to the exogenous share price would be transferred to the dividends and, hence, to i_t and the optimal financial structure μ, which determines (through (10.7)) the rate of discount of future profits. In other words, by substituting (10.5), (10.6) and (10.7) into (10.4), Φ^*_i could be defined as the following generic function:

$$\Phi^*_t = \Phi^*_t(\mu_t(r^f_t, r^*_{s,t}, \pi_t) | p_{s,t}, \Delta p_{s,t})$$

Assuming now that the regularity conditions for H_t are satisfied, an easy and straightforward application of the Tu definition of the 'discrete maximum principle' (Tu 1991: 261–4) yields the following results:

$$\begin{aligned} &\partial H_t/\partial X_t = 0 \Rightarrow \quad \lambda_t = 1 \\ &\partial H_t/\partial k_{t-1} = \lambda_t \end{aligned} \tag{10.9}$$

which imply

$$\begin{aligned} (\partial\pi_t/\partial k_{t-1}) - \delta = {} & (\partial\Phi^*_t/\partial W_t)\cdot((\partial\pi_t/\partial k_{t-1}) - \Phi^*_{t-1})\cdot \\ & [\Phi^*_t \cdot k_t - X_{t+1}]\cdot[1/(1+\Phi^*_t)^2] - [1/(1+\Phi^*_t)]\cdot \\ & (\partial\Phi^*_t/\partial W_t)\cdot((\partial\pi_t/\partial k_{t-1}) - \Phi^*_{t-1})\cdot k_t + \\ & + \sum_{i=t+1}^{m} \{[1/(1+\Phi^*_i)^i](\partial\Phi^*_i/\partial W_i)\cdot((\partial\pi_i/\partial k_{i-1}) - \Phi^*_{i-1})\cdot \\ & [(\Phi^*_i \cdot k_i - X_{i+1})\cdot(1/(1+\Phi^*_i)) - k_i]\} \end{aligned} \tag{10.10}$$

The left-hand side of (10.10) is, of course, the marginal profitability of capital, net of the rate of depreciation of k. The right-hand side of (10.10) is composed of three addends. The first one can be considered as the effect of how modifications in the discount rate generated by a change in the state variable affect the way in which the future values of the net financial flows $\Phi^{*}{}_{t} \cdot k_t - X_{t+1}$ are discounted.

The second addend describes how the same modifications in the discount rate again modify the flow of dividends and interest rates that have to be paid on the future capital k_t (which, given the balance sheet constraint of the firm, is equal to the financial capital $B_t + R_t$). The third addend represents the total of the two above-mentioned effects for the remaining future periods.

Intuitively, we can assume that any shock to the profit function on the left-hand side of the above equation (that is, any shock affecting the functional link between profits and capital – such as technology shocks, but also shocks in the market structure or in the degree of competition among firms) determines both the shock on the cost of financial capital, and a second shock on the rate of discount of future profits. This happens because, in imperfect financial markets, the cost at which management is able to raise funds is bound to be affected by the risk premium and by the cash flow. In addition, the converse is also true: any (exogenous, in this framework) shock to the discount rate (caused, for instance, by a speculative bubble increasing share prices) affects the cost of external finance (since managers only need to pay a lower level of dividend to shareholders in order to keep them happy) and, hence, the rate of discount, by increasing the right-hand side of the above equation. All of this brings about a modification in the marginal profitability of capital, in the left-hand side of the above equation.

Equation (10.10) can be rearranged as follows:

$$
\begin{aligned}
&(\partial \pi_t/\partial k_{t-1}) - \delta \\
&\quad = (\partial \Phi^{*}{}_{t}/\partial W_t) \cdot ((\partial \pi_t/\partial k_{t-1}) - \Phi^{*}{}_{t-1}) \cdot \\
&\quad (1/(1+\Phi^{*}{}_{t})) \cdot [(\pi_t - I_t - (1+\Phi^{*}{}_{t})k_t) \cdot \\
&\quad (1/(1+\Phi^{*}{}_{t}))] + \sum_{i=t+1}^{m} \{[1/(1+\Phi^{*}{}_{i})^{i}](\partial \Phi^{*}{}_{i}/\partial W_i) \cdot \qquad (10.11) \\
&\quad ((\partial \pi_i/\partial k_{i-1}) - \Phi^{*}{}_{i-1}) \cdot [(\pi_i - I_i - (1+\Phi^{*}{}_{t})\, k_i) \cdot \\
&\quad (1/(1\Phi^{*}{}_{i}))]\}
\end{aligned}
$$

The expression $(I_t + (1 + \Phi^{*}{}_{t})k_t)$ might be interpreted as the total capital absorption (that is, capital stock plus investments) plus capital remuneration at time t. Since the marginal profitability of capital associates a change in profits to a change in the stock of capital, the first line of

(10.11) contains the difference between profits and capital absorption and remuneration $\pi_t - I_t - (1 + \Phi^*{}_t)k_t$.

The term $((\partial\pi_t/\partial k_{t-1}) - \Phi^*{}_{t-1}) \cdot (1/(1 + \Phi^*{}_t))$ is the present value of the spread between $(\partial\pi_t/\partial k_{t-1})$ and $(\partial\pi_t/\partial k_{t-1})$ that would be obtained if nothing changes at time $t+1$. The term $[(\pi_t - I_t - (1+\Phi^*{}_t)k_t) \cdot (1/(1+\Phi^*{}_t))]$ is the present value of the difference between profits at time $t + 1$ and capital absorption and remuneration at time $t + 1$.

The term $(\partial\Phi^*{}_t/\partial W_t)$ is the impact of the firm's wealth on the risk premium and, hence, on the capital cost. Therefore, the marginal profitability of capital (net of depreciation) may be decomposed into $(\partial\Phi^*{}_t/\partial W_t) \cdot ((\partial\pi_t/\partial k_{t-1}) - \Phi^*{}_{t-1}) \cdot (1/(1+\Phi^*{}_t))$ and $[(\pi_t - I_t - (1+\Phi^*{}_t)k_t) \cdot (1/(1+\Phi^*{}_t))]$ as well as their future net present discounted values. Generally speaking, (10.11) could be interpreted as a link between the marginal profitability of the capital and the financial value of the firm.

In other words, the portion of marginal profitability of capital not paid out by the management as remuneration for shares and debt, has an impact on the firm's financial reserves and, hence, on the discount rate of future profits and on the value of the firm.

The results presented here diverge slightly from the conventional neoclassical investment model because: (i) the assumptions are made with regard to managers' cash flow control; (ii) the fact that the market for shares is not necessarily associated with the market for the firm's control; and, (iii) financial market imperfections (and imperfect adjustment of the share price to the value implied by the discounted future profits) introduce a causal link between the flow of profits, the firm's financial structure and the rate of discount of the future flow of profits. This can be interpreted as an internal channel of transmission of financial shocks to real investments. This framework could also help explain some recent empirical results that claim the inclusion of appropriate measures for stock market yields and capital gains would make the internal cash flow statistically non-significant in investment regressions based on firms' panel data (for instance, Gomes 2001). In fact, to the extent that both current profits and stock prices simultaneously contribute to determining the (endogenous) rate of discount of future profits, they could turn out to be statistically co-determined and simultaneously correlated with investments through the firm-specific rate of discount of future profits. If the firm enjoys a long period of high profits, and its stock price overshoots the value implied by the profits (such as in the case of excess volatility; Shiller 1989, 2000) so that the firm experiences increasing capital gains for an extended period (as in the case of irrational exuberance), the results become even stronger. In other words, an increasingly overvalued share price makes the internally generated finance cheaper because it allows the managers to pay out less in dividends (and still keep the shareholders satisfied, since they are remunerated by the capital gain). This could contribute to the explanation as to why some recent empirical analyses (for example, Gomes 2001) find that introducing appropriate measures for stock market prices in an investment regression seems to reduce the statistical significance of the internally generated cash flow.

Interpretation of the results and policy considerations

The ability of a developing country to attract foreign investments can, in many cases, be a key factor for economic development. It is often associated with financial deepening and efficiency in financial markets; that is, the effectiveness of financial markets in conveying information about the profitability of firms. As we know it, R&D investments are also a very important factor of success for developing countries, and a main policy issue. Ever since the well-known statement by Alan Greenspan on 'irrational exuberance' in the stock markets, in recent years a special focus has been put on the very crucial role (at times, even potentially dangerous, due to market volatility and capital outflows) that financial and stock markets play, not only in financing R&D investments, but also in attracting new investors. Besides, in recent years financial markets have been investigated also for their specific impact on R&D investments (see, for instance, Rajan and Zingales 1998). For all these reasons this chapter, by taking a look 'inside' the firm's behaviour, attempts to provide a precise theoretical framework for undertaking a formal analysis of the interactions beteween finance and investment decisions, with the help of a discrete time model. Furthermore, in this regard, the question asked is: Can public policy totally ignore the potential role of financial markets as a vehicle for the spreading of information and as a means by which to attract foreign investments? Even though public investments are, in various circumstances, more frequently identified as a primary form of policy to promote R&D, the present analysis puts the focus on a secondary form of policy (which, of course, needs further research); focusing on financial markets as a monitoring tool. The model introduced here suggests a feedback mechanism between profits, the cost of capital and the firm's investments. With imperfect financial markets, the stock price (due to imperfect information and the incentive of management not to give full disclosure of privileged information on the profitability of the firm) might, in the short run, deviate from the value implied by discounted future dividends. Obviously, the nature and characteristics of this feedback depend on the assumption made regarding the relationship between future profits, the price of the firm's shares, the yield on shares and how the cost of finance is affected by the behaviour of stock prices (that is, whether and how the risk premium on firm's finance reacts to the information revealed by the behaviour of stock prices).

The efficiency and the level of development of financial markets play a crucial role in the process of economic growth, to the extent that they finance technological innovation. In this regard, a very relevant piece of information in developing countries could be provided through further empirical research on the link between financial market efficiency, credit market efficiency, intensity in R&D expenditure and growth. In particular, the model shows a 'double channel of transmission' of shocks to investments. By simplifying the feedback mechanism between profits and the cost of financial capital, it has been shown that the interaction between financial and investment decisions introduces an additional 'financial' channel of causation between profits and real investments. This financial channel can potentially amplify the effects of an exogenous shock in a firm's profits on its investments.

The model can also be used to analyse the effects of public policy for encouraging innovation and investments in R&D. Of course, the main bulk of innovation policies should be based on public investment. However, potentially effective innovation policies could be conducted in concentrated markets where innovation is performed by potential entrants, and is bound to affect the market structure (and make it more competitive). This would consist of tax incentives and/or preferential allocation of public funds to firms that have: (i) documented a certain level of expenditure in R&D (for instance, beyond a certain threshold defined as a percentage of its sales); (ii) registered patents (thus providing evidence of product innovation); (iii) issued shares on the local stock market beyond a certain threshold of their own capital (thereby contributing to the increased size of the market for control by firms and to the size of the stock market in general); and (iv) have attained positive profits for a specific period after issuing shares. These, in terms of our model, would have a double impact on the level of investments in R&D.

First, there is an impact on the flow of profits. Technological innovation in itself would increase the profit flow of the firm that has made R&D investments, thereby increasing the firm's pay-off if the R&D investment were fruitful.

Furthermore, a second impact could be achieved through a reduction in the cost of finance that is carried over by the process of spreading information in financial markets, and which would convey knowledge of successful investment in R&D. The subsequent reduction in risk premium (both on debt and stock issued by the firm) would reduce the discount factor of the future flow of profits. This would also increase the incentive for investing in the capital that was the object of successful expenditure in R&D.

Policy promoting tax incentives and preferential allocation of public funds to 'more virtuous' firms (according to the performance of their securities and shares in stock and financial markets) should be preferred to old fashion direct public investments. This is so because they would reduce the problem of discretionality in the allocation of public funds by using financial and stock markets and monitoring devices. Firms interested in benefiting from this fiscal advantage and public funds allocation would need to face 'stock market valuation'. Examination of the stock price pattern would enable policy-makers to assess and monitor the effectiveness of innovation policies. Thus, the tax advantages for firms complying with the above-mentioned requirements would help to reduce the degree of discretionality of public investment. In addition, given the existence of asymmetric information in financial markets, this would generate a 'virtuous circle' based on self-selection. Firms confident of the quality of their R&D investments would have an incentive to take advantage of the capital gains in the stock markets that would, in addition, trigger a tax reduction. Tax distortion on capital allocation would be reduced in innovative sectors. Furthermore, in institutional contexts where financial markets are not fully developed and very few public companies exist, the incumbent companies would act to increase the size of financial markets. Finally, in some 'bank orientated' financial systems where financial markets are not yet widely extended (see Allen and Gale 2000 in this regard) and the market for control by firms is not always linked to the market for shares, policies consisting of tax incentives for R&D expenditures for the issuance of stock market shares could create a positive externality, through the increase in the size and competition of the financial markets, thereby creating an actual and effective market for control by firms. As argued by the Rosenberg studies (1982, 2000), a wide historical and empirical evidence for the USA seems to suggest that, in many US industries, technological innovation has been successfully introduced by new entrants rather than incumbent dominant firms. If this is the case, the above-mentioned mechanism of fiscal incentives would motivate new firms to enter the market as well as motivating incumbent dominant firms (usually already well present in the stock markets) to increase their expenditure in R&D in association with issuing new shares.

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Notes

1 Hostile takeovers have historically been extremely rare and, therefore, the controlling groups of shareholders have complete control of their companies.
2 For the discrete time extension and applicability of the Pontryagin maximum principle with finite time horizon, see Seierstad and Sydsaeter (1987: 207–10 and 370–7) and Tu (1991).
3 To support this sort of ceteris paribus assumption, we can think of a labour market characterized by a simplified efficiency wage mechanism in which wages and employment are fixed in the short run and are affected mainly by macroeconomic factors
4 This would be true also if $\phi(\mu_t)$ were concave but, with a second derivative sufficiently small in absolute value – that is, if its curvature is 'relatively flat'. However, the assumption of convexity for $\phi(\mu_t)$ is somewhat general, since it could capture the situation in which highly indebted firms would have to pay an extremely high risk premium on borrowed capital. Furthermore, if the analytical form of $\phi(\mu_t)$ were such that it tended asymptotically to infinite when μ_t approaches 1, one could reproduce the case of credit rationing by introducing appropriate analytical form and parameters for the function $\phi(\mu_t)$.

References

Allen, F. and D. Gale (2000) *Comparing Financial Systems* (Cambridge, MA: MIT Press).

Aoki, K., G. Benigno and N. Kiyotaki (2006) 'Adjusting to Capital Account Liberalization', mimeo, London School of Economics, also available at http://www.princeton.edu/~kiyotaki/papers/capital%20account %20liberalization.pdf

Baussola, M. (2003) 'Tra Crescita e Declino: l'Industria Italiana al Bivio', *Vita e Pensiero*, 6.

Burkart, M., F. Panunzi and A. Shleifer (2002) 'Family Firms', CEPR Discussion Paper 3234 (London: Centre for Economic Policy Research).

Goldsmith, R. (1969) *Financial Structure and Development* (New Haven, Conn.: Yale University Press).

Gomes, J.F. (2001) 'Financing Investments', *American Economic Review*, 91 (5): 1263–85.

Kiyotaki, N. and J. Moore (2005) 'Financial Deepening', *Journal of the European Economic Association*, 3 (2–3): 701–13.

Kurz, M. (1994a) 'On the Structure and Diversity of Rational Beliefs', *Economic Theory*, 4: 877–900.

Kurz, M. (1994b) 'On Rational Beliefs Equilibria', *Economic Theory*, 4: 859–76.

Lotti, F., E. Santarelli and M. Vivarelli (2001) 'Le Politiche per la Formazione di Nuove Imprese', *Rivista di Politica Economica*, 91 (4–5): 151–70.

McKinnon, R. (1973) *Money and Capital in Economic Development* (Washington, DC: Brookings Institution).

Miller, M., P. Weller and L. Zhang (2002) 'Moral Hazard and the US Stock Market: Analysing the Greenspan Put', *Economic Journal*, 112: C171–86.

Rajan, R.G. and L. Zingales (1998) 'Financial Dependence and Growth', *American Economic Review*, 88 (3), 559–86.

Rosenberg, N. (1982) *Inside the Black Box: Technology and Economics* (Cambridge: Cambridge University Press).

Rosenberg, N. (2000) *Schumpeter and the Endogeneity of Technology: Some American Perspectives* (London and New York: Routledge).

Santarelli, E. and M. Vivarelli (2002) 'Is Subsidizing Entry an Optimal Policy?', *Industrial and Corporate Change*, 11 (1): 39–53.

Schumpeter, J.A. (1911) *A Theory of Economic Development* (Cambridge, MA: Harvard University Press).

Seierstad, A. and K. Sydsaeter (1987) *Optimal Control Theory with Economic Applications* (Amsterdam: North Holland).

Shaw, E.S. (1973) *Financial Deepening in Economic Development* (New York: Oxford University Press).

Shiller, R. (1989) *Market Volatility* (Cambridge, MA: MIT Press).

Shiller, R. (2000) *Irrational Exuberance* (Princeton, NJ: Princeton University Press).

Tu, P.N.V. (1991) *Introductory Optimization Dynamics* (Berlin, Heidelberg: Springer-Verlag).

11

Financial Sector Development and Total Factor Productivity Growth

Subal C. Kumbhakar and George Mavrotas

Introduction

Recent years have witnessed important structural changes around the world as a result of the globalization process, the creation of new economic blocks and the liberalization of the financial sector in many countries. In view of this, many sectors of the industrialized countries have gone through major deregulatory changes to acclimatize themselves to new environments. At the same time, many countries have undertaken institutional reforms to build a market-orientated financial system in the hope that transition towards a market economy will improve productivity. These changes often tend to distort the markets (in the short run), thereby affecting the allocation of resources. Furthermore, in the face of uncertainty resulting from changes in regulatory structure and the development of financial institutions to foster market economy, many countries might not be able to achieve their maximum growth potential. In other words, productivity growth is likely to depend on the development of financial institutions and the stage of economic development. That is, a less developed country is likely to benefit more (in terms of output growth rate) from development of financial institutions than a developed economy that has well-functioning and sound financial institutions.

Of particular relevance to the present chapter is the empirical literature discussing the channels and mechanisms through which the impact of financial sector development (FSD) operates in an economy. There exists a vast and still-growing literature, both theoretical and empirical, regarding the impact of FSD on growth.[1] On the relationship between financial sectors and productivity growth, King and Levine (1993) have argued that financial services can accelerate growth by improving the allocation of capital and by enhancing the productivity of firms. Within this context, the quality of financial institutions in an economy might crucially affect innovation by mobilizing resources to finance promising investment projects, evaluating prospective entrepreneurs and allowing investors to diversify the risks related to uncertain innovative activities. The above desirable effects on growth and productivity take place in a Schumpeterian environment in which well-structured and functioning financial systems can have a crucial impact on technological innovation and productivity growth. Similarly, Bencivenga and Smith (1991) and Bencivenga *et al*. (1995) argue that sound financial institutions result in efficient allocation of resources in an economy and, by doing so, they enhance long-run growth. Neusser and Kugler (1998), Benhabib and Spiegel (2000) and Beck *et al*. (2000b) extend the argument further to consider the impact of FSD on total factor productivity (TFP) growth. The study by Beck et al. reports an overall positive effect of FSD on TFP growth.[2]

The impact of foreign direct investment (FDI) on economic growth has also been the subject of a vast empirical literature. It is notable, however, that although there exists a voluminous literature on the relationship between FDI and growth, only a fraction of it focuses on the impact of FDI on productivity growth. In neo-classical models of growth, FDI increases the volume of investment and its efficiency, and leads to long-term level effects and medium-term, transitional increases in growth. Endogenous growth models, on the other hand, consider long-run growth as a function of technological progress, and provide a framework in which FDI can permanently increase the rate of growth in the host economy through technology transfer, diffusion and spillover effects. It is mainly through the spillover effects that FDI inflows are expected to affect productivity growth. A large number of empirical studies on the role of FDI in host countries suggest that FDI is an important source of capital, complements domestic private investment, is usually associated with new job opportunities and enhancement of technology transfer, and boosts overall economic growth in host countries.[3] A number of firm-level studies, on the other hand, do not lend support for the view that FDI promotes economic growth – see Carkovic and Levine (2003) and the references therein. Hanson (2001) has also reported weak evidence that FDI generates positive spillovers for host countries. For a very recent, comprehensive discussion at the firm level see also Gorg and Greenaway (2004).

It is important to emphasize that the present chapter is a first attempt (to the best of our knowledge) in the voluminous finance growth literature to examine directly the link between FSD and TFP by using two different modelling approaches. Instead of using the standard production function, our modelling approach uses the rate of change in output (GDP) so that country-specific effects are controlled for. The first approach assumes that covariates related to FSD directly affect rates of change in output and, hence, TFP. The second approach assumes that the covariates related to FSD affect output (GDP) growth and, hence, TFP indirectly through input factor (capital and labour) productivities. Since the covariates related to FSD are not standard inputs such as capital and labour, the second approach might be useful to examine the robustness of our results. Furthermore, the impact of factors related to FSD on productivity (growth rate of GDP) and TFP might differ depending on whether one is willing to adopt the assumption that markets are competitive. We argue that, if markets are non-competitive, it is better to focus on rates of output growth instead of TFP growth.

Production function approach

The production function approach is widely used to measure productivity growth as well as the impact of regulation and other policy variables (henceforth labelled as control variables) on growth rates. Here, we consider two alternative methods; first, the standard production function approach, in which the control variables appear as arguments of the production function – just as the input variables such as capital and labour. Second, we consider a factor-augmenting approach, in which the arguments are capital and labour, but we append augmenting functions to the input variables. We use the control variables as well as capital and labour as the arguments in the factor-augmenting functions. If the augmenting functions are exponential in the control variables and the production function is Cobb–Douglas, then the standard and factor augmenting are identical. For other functional forms, such as the translog, the two specifications will be different. However, one form is not necessarily nested in the other and, thus, one cannot test which specification fits the data better.

The standard production function approach

We consider the case where the producers are fully efficient technically.[4] We write the production technology as $Y = f(X, L, t)A(v)$ where Y is output, X is a vector of inputs except for labour (L), t is time trend (introduced to measure technical change, hereafter TC), and v is all other unmeasured factors.[5] We start with a partial factor (labour) productivity measure and define productivity as the average product of labour; that is, Y/L. By differentiating the production function totally, we obtain:

$$\dot{Y} = \sum_j \lambda_j \dot{X}_j + \lambda_L \dot{L} + TC + \varepsilon \tag{11.1}$$

where $\dot{Y} = (1/Y)(dY/dt)$, $\dot{X}_j = (1/X_j)(dX_j/dt)$, $j=1,\ldots,J$; $\dot{L} = (1/L)(dL/dt)$, are rates of change in Y, X_j and L; $\lambda_j = \partial \ln f(.)/\partial \ln X_j$, $\lambda_L = \partial \ln f(.)/\partial \ln L$, $TC = \partial \ln f(.)/\partial t$ and, finally, the residual component is $\varepsilon = (\partial \ln A(v)/\partial \ln v)\dot{v}$. The above equation decomposes sources of output growth rate into rates of change in inputs and TC. The ε term is the residual component associated with unmeasured inputs. For example, if production is technically inefficient and inefficiency is time varying, the effect of technical efficiency on output growth will be captured by the ε term. It is likely to capture effects of other unmeasured inputs that are time varying. Since the λ_j terms are expected to be positive for a well-behaved production function, an input contributes positively (negatively) to output growth when its usage increases (decreases).

Using (11.1) we can express labour productivity growth as:

$$\dot{Y} - \dot{L} = \sum_j \lambda_j \dot{X}_j + (\lambda_L - 1)\dot{L} + TC + \varepsilon$$

which decomposes labour productivity growth into: (i) growth rates of other inputs; (ii) growth rates of labour employment; (iii) TC; and (iv) a miscellaneous component due to unmeasured inputs. Since λ_j are all positive, growth in input–usage increases labour productivity. However, growth in employment will reduce labour productivity since $\lambda_L \leq 1$.

To give familiar productivity decomposition, we rewrite (11.1) as:

$$\dot{Y} - \dot{L} = (RTS - 1)\sum_{j=1}^{J+1} M_j \dot{X}_j + \sum_{j=1}^{J+1} M_j \dot{X}_j - \dot{L} + TC + \varepsilon \tag{11.2}$$

where $RTS = \sum_{j=1}^{J+1} \lambda_j$, and $M_j = f_j X_j / \sum_{j=1}^{J+1} f_j X_j = \lambda_j / \sum_{j=1}^{J+1} \lambda_j$. In the above expressions the $(J+1)^{\text{th}}$ input is labour. In (11.2), productivity growth is decomposed into scale, growth of input quantities, employment growth, TC and a residual component that takes in the effect of unobserved/unmeasured inputs. It is clear from (11.2) that productivity growth can be computed from the observed data (without estimating anything econometrically) but to make a meaningful use of it, one needs to know the sources of productivity growth. For example, if some firms in an industry are champions (performing better than others in terms of their labour productivity), it is essential to identify the sources so that one can examine why some firms (and which ones) are lagging behind. In sum, information about the sources of productivity growth always helps in making correct policy prescriptions.

To estimate the components of productivity growth in (11.2), we rewrite (11.1) in the form of a familiar regression equation; that is:

$$\dot{Y} = \beta(X,t) + \sum_{j=1}^{J+1} \beta_j(X,t)\dot{X}_j + \varepsilon \tag{11.3}$$

Note that the coefficients of the above regression are functions of inputs and time. By assuming a functional form on the underlying production technology, we can derive a parametric form for each of these coefficients. For example, if the production function is translog, that is:

$$\ln Y = \beta_0 + \sum_j \beta_j \ln X_j + \beta_{it} t + \frac{1}{2}\sum_j \sum_k \beta_{jk} \ln X_j \ln X_k + \sum_j \beta_{jt} \ln X_j t + \frac{1}{2}\beta_{tt} t^2 \tag{11.4}$$

then

$$\beta(X,t) = \beta_t + \beta_{tt} t + \sum_{j=1}^{J+1} \beta_{jt} \ln X_j = TC \tag{11.5}$$

and

$$\beta_j(X,t) = \beta_j + \beta_{jt} t + \sum_{k=1}^{J+1} \beta_{jk} \ln X_k = \lambda_j \tag{11.6}$$

On the other hand, if the production function is Cobb–Douglas with neutral *TC*, then $\beta(X,t) = \beta_t + \beta_{tt} t$ and $\beta_j(X,t) = \beta_j$. Thus, data on rates of change (as well as the level) in output and inputs can be used to estimate all the parameters of the translog production function in (11.4), except the intercept, simply by estimating the relationship in (11.3). In fact, it is not necessary to specify $\beta_j(X,t)$ and $\beta(X,t)$ in such a way that they are consistent with a specific form of production function. One can assume any functional form on $\beta_j(X,t)$ and $\beta(X,t)$. For example, it might be desired to assume a functional form that guarantees positive marginal product of capital and labour. This is not possible if one estimates the translog production function directly. Once the parameters are estimated, one can compute the components of productivity growth.

It is worth mentioning another advantage of estimating the growth equation in (11.3) instead of the production function in (11.4). In (11.3) producer-/country-specific effects are automatically controlled, whereas these effects are to be added in (11.4). If these effects are not added, parameter estimates are likely to be biased and to contaminate the contribution of covariates of financial factor development. The main disadvantage of estimating (11.3) is that, unless there are enough variations in input growth rates, parameter estimates will be imprecise.

After estimating the production technology represented by either (11.3) or (11.4), one can compute labour productivity from (11.2). Although such a measure is widely used in practice, it does not give the total picture. For example, labour productivity for a country can be high simply because the production process is capital-intensive. Thus, unless one takes into account the other factors that are used in the production process, the estimated productivity is likely to be biased and a cross-country productivity comparison based on labour productivity might be misleading. One can avoid such problems by using what is called the Divisia or *TFP*, which takes into account growth rates of all the inputs (weighted by their cost shares). *TFP* growth is defined as:

$$\begin{aligned} T\dot{F}P &= \dot{Y} - \sum_j S_j^a \dot{X}_j = \sum_j \{\lambda_j - S_j^a\}\dot{X}_j + TC + \varepsilon \\ &= (RTS - 1)\sum_j M_j\dot{X}_j + TC + \sum_j \{M_j - S_j^a\}\dot{X}_j + \varepsilon \end{aligned} \tag{11.7}$$

where w_j is the price of input X_j, $S_j^a = w_j X_j / C^a$ and $C^a = \sum_j w_j X_j$. The last component in (11.7) (that is, $(\sum_j \{M_j - S_j^a\}\dot{X}_j)$ – often labelled as the price component) captures either deviations of input prices from the value of their marginal products, $w_j \neq pf_j$, or the departure of the marginal rate of technical substitution from the ratio of input prices, $(f_j/f_k \neq w_j/w_k)$. Thus, computation of the last component requires price information. It can, however, be dropped from the analysis if one assumes that firms are allocatively efficient (that is, $f_j/f_k = w_j/w_k$ or $w_j = pf_j$).

If there are other covariates (Z) that affect output, as is the case in country studies, then the *TFP* growth equation in (11.7) can be expressed as:

$$T\dot{F}P = \dot{Y} - S_L\dot{L} - S_K\dot{K} = (\lambda_L - S_L)\dot{L} + (\lambda_K - S_K)\dot{K} + \sum_{q=1}^{Q} \gamma_q \dot{Z}_q + TC + \varepsilon \tag{11.8}$$

where $\gamma_q = \partial \ln Y / \partial \ln Z_q, q = 1, \ldots, Q$. If prices are not available and one makes the assumption that input markets are competitive and input allocation is efficient, the above formula reduces to

$$T\dot{F}P = (RTS - 1)\sum_j M_j \dot{X}_j + \sum_{q=1}^{Q} \gamma_q \dot{Z}_q + TC + \varepsilon \tag{11.9}$$

To estimate the components of *TFP* growth in (11.9), one can estimate either the translog production function in (11.4) after appending the country-specific effects or adding the necessary terms to accommodate the Z variables, or the growth equation in (11.10):

$$\dot{Y} = \beta(X, Z, t) + \sum_{j=1}^{2} \beta_j(X, Z, t)\dot{X}_j + \sum_{q=1}^{Q} \gamma_q(X, Z, t)\dot{Z}_q + \varepsilon \tag{11.10}$$

where $\beta(X, Z, t) = \beta_t + \beta_{tt}t + \sum_{j=1}^{2} \beta_{jt} \ln X_j + \sum_{q=1}^{Q} \delta_{qt} Z_q$

$$\beta_j(X, Z, t) = \beta_j + \beta_{jt}t + \sum_{k=1}^{2} \beta_{jk} \ln X_k + \sum_{q=1}^{Q} \delta_{jq} \ln Z_q \equiv \lambda_j$$

and $$\gamma_q(X, Z, t) = \gamma_q + \delta_{qt}t + \sum_{k=1}^{2} \delta_{qk} \ln X_k + \sum_{q=1}^{Q} \gamma_{qq} \ln Z_q$$

which are counterparts of (11.5) and (11.6). The only difference is that, here, we separated capital and labour (included in X) from the other control variables (Z). Once the parameters are estimated, *TFP* growth and its components in (11.9) can be obtained. In the standard approach, one estimates the production function in (11.4) and computes the scale, *TC* and price components. The sum of these components differs from the Divisia index, which can be computed from the data. In our analysis, we capture this deviation in the ε term, which is a part of the *TFP* growth equation and is in the regression we run. We also give an interpretation of the ε term (a miscellaneous component that arises from the non-traditional inputs). Note that the ε term cannot be computed from the residuals of the estimated production function (the mean of which is zero by construction), while the mean of it can be non-zero and obtained from the residuals of (11.3).

It should be noted here that, algebraically, the equations in (11.9) and (11.10) are the same. However, they differ in terms of interpretation of results, especially for the variable inputs. In equation (11.10), $\beta_j(X, Z, t)$ measures the marginal contribution of rates of change in input j to the output growth rate, while the contribution of rates of change in input j to *TFP* growth from (11.9) is $(RTS - 1)M_j$. The contributions of Z_q on output growth rate and *TFP* growth are the same. It is worth noting here that the crucial assumption behind the computation of the *TFP* growth components is that markets are competitive. Under this assumption, one can compute the *TFP* growth components without knowing the relevant prices. If the markets are not competitive, however, the *TFP* growth decomposition result in (11.9) will not hold. On the contrary, the decomposition result in (11.10) will hold, irrespective of whether input markets are competitive or not. Based on this, one can argue that output growth decomposition might be preferred to *TFP* growth decomposition.

The factor-augmenting representation

The production function in factor-augmenting (FA) form (Sato and Beckmann (1968), Beckmann and Sato (1969) and Kumbhakar (2002, 2004)) can be written as:

$$Y = f(AX) = f(A_1(t, Z, X)X_1, \ldots, A_J(t, Z, X)X_J) \equiv f(\tilde{X}_1, \ldots, \tilde{X}_J) = f(\tilde{X}) \tag{11.11}$$

where $\tilde{X}_j = A_j(t, Z, X)X_j$ is the jth variable input measured in efficiency units, and $f(\cdot)$ is the production technology. $A_j(t, Z, X) > 0$ is the efficiency factor associated with input $j (j = 1, \ldots, J)$. It can also be viewed as an input-specific productivity/efficiency index. If $A_j(t, Z, X)$ increases with Z_q, then the productivity of input j will also increase – meaning that, given everything else, output growth rate will go up with an increase in Z_q.

Using the same definition of technical change as before, *TC* in the FA model can be expressed as:

$$TC_p = \sum_j \frac{\partial \ln f(\tilde{x})}{\partial \ln \tilde{x}_j} \frac{\partial \ln \tilde{x}_j}{\partial t} = \sum_j \frac{\partial \ln f(\tilde{x})}{\partial \ln \tilde{x}_j} \dot{A}_j \equiv \sum_j \tilde{\lambda}_j \dot{A}_j = \sum_j TC_p^j \tag{11.12}$$

where TC_p^j represents the contribution of the jth input to the aggregate (overall) technical change TC_p. It is clear from (11.12) that TC_p^j depends on the rate of change of input productivity ($\dot{A}_j$) and $\dfrac{\partial \ln f(\tilde{x})}{\partial \ln \tilde{x}_j} = \tilde{\lambda}_j$, which, under competitive market conditions, is the cost share of input j in total revenue.

TFP growth in this set-up (counterpart of (11.8)) is

$$T\dot{F}P = \dot{Y} - S_L\dot{L} - S_K\dot{K} = (\tilde{\lambda}_L - S_L)\dot{L} + (\tilde{\lambda}_K - S_K)\dot{K} + TC_p + \varepsilon \qquad (11.13)$$

To examine these components in detail, we assume a translog functional form to represent the underlying production technology, that is:

$$\ln Y = \alpha_0 + \sum_j \alpha_j \ln \tilde{X}_j + \frac{1}{2}\sum_j \sum_k \alpha_{jk} \ln \tilde{X}_j \ln \tilde{X}_k \qquad (11.14)$$

where $\tilde{X}_j = A_j(t, Z, X)X_j$. It is necessary to specify $A_j(.)$ in order to estimate the above model. We specify the A_js as functions of Z as well as other X variables, that is:

$$\ln A_j = t\left(a_j + \sum_{k=1} b_{jk} \ln X_k + \sum_{q=1} \gamma_{jq} Z_q\right) \qquad (11.15)$$

where a_j, b_{jk} and γ_{jq} are parameters to be estimated.

From the above specifications one can easily test whether the rate of change in efficiency factors is constant or not by restricting $b_{jk} = 0$ and $\gamma_{jq} = 0$ in (11.15).

Data issues

In this section, we discuss data issues of crucial importance for the chapter in view of its empirical nature. Having already discussed issues related to the measurement of *TFP* in the previous section, here we focus inter alia on the other crucial variable; namely, the one measuring *FSD*, as well as the rest of the (control) variables employed in the chapter. It has been widely recognized that measuring *FSD* is not an easy procedure, since an ideal index of *FSD* should attempt to measure both the various aspects of the deregulatory and the institution-building process in *FSD*. However, measuring the above aspects is a difficult, if not an impossible, task (see Bandiera *et al*. 2000 and Mavrotas and Son 2006 for a detailed discussion). Various measures of *FSD* have been used in the empirics of finance and growth. Common measures of financial development used in the literature have been financial depth or selected financial indicators. Financial depth, in particular, has been used extensively in much of the early, as well as recent, literature as a measure of *FSD*.

A comprehensive assessment of the development, structure and performance of the financial sector has been provided by Beck *et al.* (2000a), which also provides data sources regarding the size, activity and efficiency of various financial intermediaries and markets across a broad spectrum of countries and through time. In the present chapter, we employ some measures of *FSD* suggested by Beck *et al.* (2000a) but in the context of a database consisting of 65 countries (of which 24 are OECD countries and 41 are developing countries) spanning the period 1960–99. The database and the methodology for constructing the *FSD* indicators draw on Mavrotas and Son (2006).

We use a financial sector development index (hereafter *FSDI*), following Mavrotas and Son (2006), who used principal component analysis to derive the above index as the linear combination of three financial indicators; namely, *PCR*, *CMB* and *LQ*:

$$Z1_{it} = a_{1i\cdot}PCR_{it} + a_{2i\cdot}CMB_{it} + a_{3i\cdot}LQ_{it} = FSDI_{it}$$

where $Z1_{it}$ is the first principal component and coefficient vector $(a_{1i\cdot}, a_{2i\cdot}, a_{3i\cdot})$ calculated from the time-series data for each country. Thus, *FSDI* is the financial sector development index employed in this chapter to encompass the three financial indicators below:

- Private Credit or *PCR* is the ratio of private credit by deposit money banks and other financial institutions to GDP and measures the activity of financial intermediaries, that is, this measure of FSD isolates credit issued to the private sector as opposed to credit issued to governments and public enterprises; by doing so, it measures the mobilized savings that are channelled to private firms (see Beck *et al*. 2000a and Mavrotas and Son 2006).
- *CMB* stands for the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets; that is, this indicator provides information regarding the relative importance of deposit money banks relative to central banks. By doing so, it captures the relative size of financial intermediaries in the economy.
- The third indicator we employed (*LQ*, the ratio of liquid liabilities to GDP), is another measure of the size of financial intermediaries and,

indeed, a standard indicator of financial depth used extensively in the empirical literature.

All raw data for the variables used in the empirical analysis have been obtained from the 2001 electronic version of the IMF *International Financial Statistics* (IFS) and the 2001 electronic version of World Bank's *World Development Indicators*, except Ethiopia's GDP data, which was obtained from the UN *Yearbook of National Accounts*. The raw dataset covers 65 countries over the period 1960–99 (40 years), but the time span of data employed after adjustment is 1961–99 (39 years) for 65 countries. The raw data can be distinguished into two main groups: stock variables and flow variables. Whereas stock variables are measured at the end of a period, flow variables are defined relative to a period. This presents problems in measuring, both in terms of correct timing and in terms of deflating correctly. To address the above problems, a data adjustment process is required. In line with Beck *et al*. (2000a, 2000b) and Mavrotas and Son (2006), we used the following data adjustment process to deal with the above problem. More precisely, we deflated the end-of-year financial balance sheet items (f) by the end-of-year consumer price indices (CPI) and also deflated the GDP series by the annual CPI. Then, we computed the average of the real financial balance sheet item in year t and $t-1$ and divided the average by real GDP measured in year t.

In view of this, *PCR* is calculated using IFS data and the following formula:

$$PCR_{it} = \{(0.5)^{*}[f_{it}/CPI(e)_{it} + f_{i,t-1}/CPI(e)_{i,t-1}]\}/[GDP_{it}/CPI(a)_{it}]$$

where, f stands for credit by deposit money banks and other financial institutions to the private sector (IFS lines 22d + 42d), *GDP* is from IFS (line 99b), *CPI*(*e*) is end-of-period CPI (IFS line 64) and *CPI*(*a*) is the average annual CPI. The f and end-of-period CPI are either the value for December or, where not available, the value for the last quarter. In the case that end-of-period CPI in 1960 and 1961 is not available, the average annual CPI is used. In addition, some data on CPI were estimated using the average annual increase rate of the following three years,[6] where CPI data in the early 1960s are missing or not available. It is useful to note that the data from 1999 in eurozone countries are reported in euro currency, so the data were converted to the equivalent values in national currency.

CMB is calculated using IFS data and the following formula:

$$CMB_{it} = DB_{it}/[DB_{it} + CB_{it}]$$

where *DB* is assets of deposit money banks (IFS lines 22a–d) and *CB* is central bank assets (IFS lines 12a–d).

The data on *LQ* is obtained from 'liquid liabilities (M3) as per cent of GDP' in the *World Development Indicators* 2001 of the World Bank. If the data from the World Bank were not fully available for the period of 1961–99, we used money and quasi-money (M2), which is calculated using IFS data and the following formula:

$$LQ_{it} = \{(0.5)^{*}[m_{it}/CPI(e)_{it} + m_{i,t-1}/CPI(e)_{i,t-1}]\}/[GDP_{it}/CPI(a)_{it}]$$

where *m* is money (IFS line 34) plus quasi-money (IFS line 35), *GDP* (IFS line 99b), *CPI*(*e*) is end-of-period CPI (IFS line 64) and *CPI*(*a*) is the average annual CPI.

The financial sector development index (*FSDI*) is calculated as the linear combination of the financial indicators *PCR*, *CMB* and *LQ* by using principal component analysis. Under the assumption of heterogeneity across countries, we estimated coefficients of the principal components for each country in our sample.

Input variables used

The basic input variable is related to scale effects – that an expansion of the aggregate labour force, *L*, raises the per capita growth rate for the economy in the endogenous growth model. In particular, under the assumptions of learning-by-doing and knowledge spillovers, the per capita growth rate would increase over time as the labour force grows over time. Data on this variable are obtained from 'Labour force, total' in the *World Development Indicators* 2001. The other input variable used is real gross fixed capital formation (also from the *World Development Indicators*). If they are not available from WDI, the data on capital were calculated using the raw data obtained from IFS (IFS line 93e, Gross Fixed Capital Formation).

Control variables

We also employed a number of control variables in the empirical analysis. These include two policy variables: the inflation rate and the ratio of government expenditure to GDP as indicators of macroeconomic stability in the growth equation (although the latter could also be viewed as a measure of private sector activity). Government expenditure plays an important role in the overall growth process and could affect economic growth positively or negatively. The relationship between inflation and economic growth is more complex because inflation affects economic

Table 11.1 Summary statistics

Variable	Mean	Std dev.	Minimum	Maximum
log(GDP)	18.6442470	3.0696180	9.7618317	27.4602475
log(labour)	8.3530134	1.6286445	4.2660825	12.9965772
log(capital)	11.1108635	2.6082834	4.7186024	18.6405343
FSDI	0.6746334	0.5268480	−0.4754284	3.7601369
Govt expenditure to GDP	0.1430420	0.0585798	0	1.1213348
FDI	0.9112698	1.7429134	−15.5767889	24.8807983
Openness to trade	0.5977038	0.3605824	0	2.3870007
Inflation	11.4777150	26.5897779	−10.6861153	1133.83
PCR	0.3691556	0.3164437	0	1.8433036
CMB	0.7963952	0.1994530	0	1.0318389
LQ	0.4523717	0.3612355	0	5.2536891
TCR	0.9384277	2.4948443	0	29.9149165

growth indirectly through real money balances in saving or investment functions, rather than directly. The data source for both variables is the *World Development Indicators*. Furthermore, under the assumption of an open economy, our set of control variables includes two open economy variables: openness to trade (the share of the sum of exports and imports in GDP) and foreign direct investment (FDI). Data on trade openness are obtained from IFS (IFS lines 90c + 98c) and data on FDI are obtained from 'foreign direct investment, net inflows (per cent of GDP)' in the *World Development Indicators* 2001.

The summary statistics of these variables (see Table 11.1) give an idea of what the mean values of some of these variables are, how much their spread is and whether there are extreme values. It is clear that some of these variables vary substantially. Most of these variations are across countries instead of within countries; also, there are some extreme values, as can be seen from the maximum and minimum values.

Estimation and results

Results from the standard production function model

Equation (11.4), as previously specified, is estimated with country dummies.[7] Since input markets are likely to be non-competitive, especially in developing countries, we report growth decomposition results computed from (11.10). We focus on the contributions of the Z variables and TC. Table 11.2 reports empirical results from the estimation of the

Table 11.2 Empirical results from the standard production function model

Label	Mean	Std dev.	Minimum	Maximum
ALL COUNTRIES				
TC	1.7230622	1.4314054	−7.6674800	6.4562461
comp_labour	1.2471069	0.9992102	−7.7245371	7.4071055
comp_capital	1.3799202	5.4276002	−77.7626978	132.6835034
comp_fsdi	0.0902512	1.7432779	−42.8150243	11.6801622
comp_govt exp	−0.2339086	3.2465422	−82.0192171	17.8920584
comp_fdi	−0.0598560	2.0159033	−62.9049405	22.5246565
comp_otr	0.0435468	2.5378577	−24.5974077	91.7873270
comp_inflation	0.0868625	1.7895685	−13.5347138	54.4816035
GDP growth	4.0257724	4.8609316	−69.5255878	51.9542030
Residual	−0.0773472	7.2141947	−132.2822122	68.6798174
DEVELOPED				
TC	2.3881324	1.2838849	−1.1683285	6.2905564
comp_labour	0.7058739	0.7247746	−1.0849679	3.7952328
comp_capital	0.9712136	2.2700766	−7.6846901	13.9803674
comp_fsdi	−0.0547910	2.1938593	−42.8150243	11.6801622
comp_govt exp	−0.1740417	1.1540813	−8.9086841	12.8731527
comp_fdi	−0.1475717	1.7294026	−21.7231758	22.5246565
comp_otr	0.0517770	1.3055272	−12.0136092	6.4281266
comp_inflation	0.0675916	0.5829531	−3.5379224	3.8293532
GDP growth	3.9117751	3.2473256	−19.9539186	19.5661705
Residual	0.1853308	3.1473222	−11.7215605	44.3650666
AFRICA				
TC	1.2175579	1.1990945	−1.3191238	5.4345994
comp_labour	1.3926018	0.8439520	−7.7245371	7.4071055
comp_capital	1.4205390	8.0192270	−77.7626978	132.683503
comp_fsdi	0.0967689	1.1717961	−8.4610956	7.2850918
comp_govt exp	−0.3065358	4.3502871	−82.0192171	9.5611441
comp_fdi	−0.0997332	2.9379957	−62.9049405	13.4881448
comp_otr	−0.0849831	2.2912614	−18.0911978	21.2639893
comp_inflation	0.0453059	1.8370266	−12.9717198	14.3482457
GDP growth	3.0114134	7.1579383	−69.5255878	51.9542030
Residual	−0.8802261	10.5974667	−132.2822122	68.6798174
ASIA AND THE PACIFIC				
TC	0.7857571	1.2483917	−7.6674800	6.4562461
comp_labour	2.1836784	1.1202688	0.1718262	4.5145275
comp_capital	2.4558795	8.3330036	−19.8415344	118.3342270
comp_fsdi	0.5255424	2.0966871	−20.1453961	9.5870345
comp_govt exp	−0.6267892	5.5839206	−78.7873641	17.8920584
comp_fdi	−0.0343305	0.7309984	−9.4650780	3.0150248
comp_otr	0.3665246	4.9901111	−12.0482898	91.7873270
comp_inflation	0.2420452	3.4989525	−13.5347138	54.4816035
GDP growth	5.4839856	4.3660673	−13.6961946	24.6997236
Residual	0.0886522	9.8333263	−107.7265874	42.5609285

SOUTH AMERICA				
TC	1.6923593	1.3643653	−2.4199129	4.1935882
comp_labour	1.1353568	0.8297097	0.000383527	3.3495599
comp_capital	1.3402734	3.3996177	−17.6397619	16.185629
comp_fsdi	0.0065360	0.9548353	−7.3730052	5.0616020
comp_govt exp	0.0263287	1.9671719	−18.2374833	15.4657473
comp_fdi	0.1214476	1.9361492	−10.1739143	22.0577787
comp_otr	−0.0379961	1.7248753	−24.5974077	7.8368469
comp_inflation	0.0653324	1.3716542	−9.0898208	16.7428978
GDP growth	4.1345796	4.2474055	−14.3638340	21.5358304
Residual	0.2675233	4.3447900	−24.0127644	15.9521559
MIDDLE EAST				
TC	2.4349466	1.7813039	−1.0178532	5.2569918
comp_labour	1.5658028	0.2980453	0.9776340	2.1427032
comp_capital	1.7882103	3.6224623	−4.6461089	17.7008221
comp_fsdi	0.1914242	1.1040531	−2.6932691	3.4537585
comp_govt exp	−0.2648654	0.9556841	−2.1254078	3.0500614
comp_fdi	−0.1049428	1.5433747	−6.1569592	7.5642152
comp_otr	−0.1353309	1.9656297	−5.1543150	7.4036646
comp_inflation	0.0045854	0.6009572	−2.8258210	1.5458643
GDP growth	4.9487144	4.1595314	−5.9477259	13.6515301
Residual	0.4769381	6.1422191	−15.0565261	15.8470215

standard production function model. Here, we report empirical findings related to the full sample of countries used in the empirical analysis under the assumption that the production function is the same for all countries, except for differences in the intercept (country-specific effects).

Since prices of capital and labour are not available, we focus on the contribution of variable inputs (X) as well as the other covariates (Z) on the *GDP* growth rate;[8] that is, the estimates of $\beta_j(X, Z, t)$ and $\gamma_q(X, Z, t)$. Once the values of $\beta_j(.)$ are obtained, the contribution of variable inputs (X) on the *TFP* growth can be derived from $(RTS - 1)M_j\dot{X}_j$ where $RTS = \sum \beta_j(X, Z, t)$ and $M_j = \beta_j(X, Z, t)/RTS$. Thus, no additional information is required to compute the impact of capital and labour (the variables inputs in this study) on the *TFP* growth. It can be seen from Table 11.2 that the most important factor behind *GDP* / *TFP* growth is *TC*. Its contribution, on average, for all the countries is 1.72 per cent per year. There is, however, substantial variation from country to country. Average *TC* for the developed countries, Africa, Asia and the Pacific, South America and the Middle East as a group are 2.39 per cent, 1.22 per cent, 0.78 per cent, 1.69 per cent and 2.43 per cent, respectively. Contributions of capital and labour to GDP growth ($\beta_j(X, Z, t)$ for $j =$ capital and labour) are, in general, positive. The mean values of $\beta_j(X, Z, t)$ for $j =$ labour for the developed countries, Africa, Asia and the Pacific, South America and the Middle East as a group are 0.71 per cent, 1.39 per cent, 2.18 per cent, 1.13 per cent and 1.56 per cent, respectively. The mean values of $\beta_j(X, Z, t)$ for capital for these countries are 0.97 per cent, 1.42 per cent, 2.45 per cent, 1.34 per cent and 1.79 per cent, respectively. Since *RTS* is found to be less than unity, the contributions of labour and capital to *TFP* growth (computed from $(RTS - 1)M_j\dot{X}_j$) will be negative.

However, the focus of the present chapter is the financial sector development index (*FSDI*), and, thus, we now turn to the impact of *FSDI* on *GDP* growth. Since the *GDP* variable in (11.10) is measured in percentage change and the *FSDI* variable is an index, we interpret the contribution of *FSDI* to *GDP* growth as follows. Since the mean value of $\gamma_q(X, Z, t)$ for *FSDI* for all the countries combined is 0.09, a 10-percentage point change in *FSDI* increases *GDP* growth by 0.9 per cent. A substantial variation is found across countries. The mean values for the developed countries, Africa, Asia and the Pacific, South America and the Middle East as a group are –0.05, 0.10, 5.25, 0.01 and 1.91, respectively. Thus, a 10-percentage point change in *FSDI* decreases *GDP* growth by 0.5 per cent in the developed countries. On the other hand, a 10-percentage point change in *FSDI* increases *GDP* growth by 1 per cent in the African countries and 5.25 per cent in the countries in Asia and the Pacific region. The effect of FDI is found to be negative for all countries taken together. It is the highest (-0.15) for the developed countries. This finding is in line with the empirical findings of recent studies on FDI (though at the firm level), which seem to suggest that FDI may not generate spillover effects in host countries.

Turning to the impact of the other measure of openness used – terms of trade (*TOT*) – our findings clearly suggest that a 10-percentage point change in *TOT* increases *GDP* growth by 0.4 per cent for all the countries together. Government expenditure has a clear negative effect (and one of a large magnitude) on *GDP* growth and finally inflation affects *TFP* positively with a 10-percentage point change increasing *GDP* growth by 0.8 per cent.

The assumption that the production technology is the same for all countries, except for the intercepts, might not be appropriate. To avoid this misspecification problem, we estimate the production technology separately for the developed countries, Africa, Asia and the Pacific, and South America.[9] In each case, we control for fixed country-specific effects. The results are reported in Table 11.3. Some results are different while others are somewhat similar. For example, the estimates of *TC* for the developed countries are quite similar while, for Africa and South America, the countries estimates of *TC* are negative. Similarly, the sign, as well as the magnitude, of the *FSDI* coefficients, except for

Table 11.3 Empirical results based on estimating each group of countries separately

Label	Mean	Std dev.	Minimum	Maximum
DEVELOPED				
TC	1.9809876	0.5479028	0.3598739	3.4921902
comp_labour	0.2212992	0.1818998	−0.4839714	1.1226895
comp_capital	1.9646769	3.9974210	−23.5074462	23.8256259
comp_fsdi	−0.0408594	1.6777959	−35.6701242	11.2585105
comp_govt exp	−0.0654075	0.7084500	−6.6975272	2.8546823
comp_fdi	−0.0540792	1.6765257	−11.0958431	26.7785847
comp_otr	0.0461478	0.8409297	−4.9861583	6.7681701
comp_inflation	−0.0421874	0.5884847	−5.6740054	5.2950729
GDP growth	3.9117751	3.2473256	−19.9539186	19.5661705
Residual	−0.0988028	3.6844229	−29.6455068	33.5423939
AFRICA				
TC	−1.1722390	4.0436037	−9.5360098	10.1390588
comp_labour	3.9709897	3.2091045	−9.9873808	12.1747823
comp_capital	2.1889083	10.0213834	−27.6269641	169.5666667
comp_fsdi	0.0582476	1.6974238	−17.1698460	8.2158972
comp_govt exp	1.0803697	17.1946118	−14.1682947	310.7426356
comp_fdi	0.1364250	3.1368934	−45.2522756	20.7396568
comp_otr	−0.0530656	5.4687620	−62.0489580	25.5333159
comp_inflation	0.2062665	3.1662286	−21.8519901	33.9103051
GDP growth	3.0114134	7.1579383	−69.5255878	51.9542030
Residual	−0.6772901	8.1182803	−46.5368372	49.0423586
ASIA AND THE PACIFIC				
TC	1.5986334	1.4564068	−3.0160198	9.9193774
comp_labour	2.4620472	0.9687233	0.5591036	5.1216537
comp_capital	1.8080414	5.2339565	−35.1056142	57.3091902
comp_fsdi	0.5447061	4.6938673	−41.4487948	28.9300024
comp_govt exp	−0.1909776	7.2985576	−77.5472896	87.0432632
comp_fdi	0.5816589	3.3578802	−11.5626321	42.0396312
comp_otr	−0.6957350	6.8468471	−88.8336610	52.5783421
comp_inflation	0.2416159	4.9757680	−41.1445383	57.9311190
GDP growth	5.4839856	4.3660673	−13.6961946	24.6997236
Residual	−0.0710412	10.4610140	−53.0463028	98.4485386

Table 11.3 (continued)

Label	Mean	Std dev.	Minimum	Maximum
SOUTH AMERICA				
TC	−1.3033771	1.3398756	−5.2991595	1.4829007
comp_labour	3.6343187	1.8387057	0.1020631	10.4915530
comp_capital	1.6793002	3.9652608	−14.9436633	25.4136791
comp_fsdi	0.0503387	1.6872040	−18.8509454	10.2210130
comp_govt exp	0.1878347	2.5494866	−11.1936354	19.3511968
comp_fdi	−0.5823213	4.6728767	−40.6697289	17.6892701
comp_otr	−0.0019206	3.0297017	−22.7143802	16.9620601
comp_inflation	0.0929794	2.8226921	−13.3331589	22.3684064
GDP growth	4.1345796	4.2474055	−14.3638340	21.5358304
Residual	0.6270859	6.7057967	−18.9479671	48.0750678

South America, are remarkably similar. For the developed country group, a 10-percentage point increase in *FSDI* will decrease *GDP* growth by 0.5 per cent. This is an interesting finding, suggesting that a developing country is likely to benefit more (in terms of productivity growth) from *FSD* than a developed economy with well-functioning financial institutions. The signs of the other variables remain remarkably similar to the same technology case for both the developed and developing country groups, except for the terms of trade coefficient, which has now a negative sign for the developing country group (suggesting that openness may be harmful for *GDP* growth in the case of developing countries). Grouping countries in terms of geographic location reveals a similar positive effect of *FSD* on *GDP* growth, as in the case of the African country group above. However, now the magnitude of the impact varies substantially among regions with the largest magnitude documented in the Asia and the Pacific group and the smallest in South America. It is also interesting that the coefficients for government expenditure and *FDI* are now positive in the case of South America as compared to the negative sign reported for the other regions.

Results from the factor-augmenting model

We now turn to empirical findings based on the factor-augmenting model (Table 11.4). As mentioned before, the idea behind this approach is that the *Z* variables are not standard inputs such as capital and labour, but they can enhance productivity of labour and capital. Thus, the results from the factor-augmenting model should complement those from the standard production function models. Results

Table 11.4 Empirical results from the factor-augmenting model

Label	Mean	Std dev.	Minimum	Maximum
ALL COUNTRIES				
TC	1.3729829	0.9564126	−2.3678750	3.5020288
comp_labour	0.5746097	0.3424443	−0.5299020	1.6528625
comp_capital	0.1630520	0.1354050	−0.2085164	0.5645891
comp_fsdi	0.1265543	0.0786396	0.0044670	0.3712103
comp_govt exp	0.3307761	0.1790461	0.0233712	0.8771256
comp_fdi	0.0015499	0.0010764	0.000014972	0.0055520
comp_otr	0.1235086	0.0730826	0.0059534	0.3219373
comp_inflation	−0.000537977	0.000458434	−0.0025311	0.000107057
GDP growth	4.0257724	4.8609316	−69.5255878	51.9542030
Residual	0.2005874	6.5360839	−144.1980283	50.5334971
DEVELOPED				
TC	1.7831016	0.8386366	−0.5180358	3.5020288
comp_labour	0.5960832	0.3838861	−0.5299020	1.4522731
comp_capital	0.1494119	0.1355740	−0.0973902	0.5645891
comp_fsdi	0.1261115	0.0790462	0.0044670	0.3426420
comp_govt exp	0.3206583	0.1697221	0.0265866	0.8663410
comp_fdi	0.0015589	0.0011081	0.000014972	0.0050566
comp_otr	0.1224990	0.0724603	0.0059534	0.2998951
comp_inflation	−0.000549737	0.000485386	−0.0022717	0.000107057
GDP growth	3.9117751	3.2473256	−19.9539186	19.5661705
Residual	0.7575121	2.8071810	−16.1196064	13.6669246
AFRICA				
TC	0.9046253	0.8988802	−1.2121245	2.7764094
comp_labour	0.5428044	0.2352651	0.0354143	1.1537544
comp_capital	0.1776860	0.1093026	−0.0997917	0.3995127
comp_fsdi	0.1252270	0.0759487	0.0076934	0.3069630
comp_govt exp	0.3370894	0.1744320	0.0278939	0.7808150
comp_fdi	0.0015180	0.0010075	0.000078869	0.0041710
comp_otr	0.1228436	0.0715258	0.0080099	0.2830699
comp_inflation	−0.000517441	0.000406772	−0.0016949	−3.715901E-7
GDP growth	3.0114134	7.1579383	−69.5255878	51.9542030
Residual	−0.8944332	9.9703385	−144.1980283	49.0760426
ASIA AND THE PACIFIC				
TC	1.5342596	0.7762007	−2.3678750	3.3382055
comp_labour	0.7840386	0.4007073	0.0420187	1.6528625
comp_capital	0.1148263	0.1782410	−0.1625110	0.4597357
comp_fsdi	0.1466456	0.0880729	0.0089338	0.3712103
comp_govt exp	0.3430735	0.2000242	0.0272616	0.8771256
comp_fdi	0.0018606	0.0012253	0.000073176	0.0055520
comp_otr	0.1405250	0.0812560	0.0101723	0.3219373
comp_inflation	−0.000684613	0.000535022	−0.0025311	−3.633013E-6
GDP growth	5.4839856	4.3660673	−13.6961946	24.6997236
Residual	0.3654147	8.5455046	−99.5143980	50.5334971

Table 11.4 (continued)

Label	Mean	Std dev.	Minimum	Maximum
SOUTH AMERICA				
TC	1.0434303	1.0015173	−1.2842143	2.7766549
comp_labour	0.4488870	0.2471884	−0.0779682	1.3961169
comp_capital	0.1963589	0.1190849	−0.2085164	0.4011789
comp_fsdi	0.1161277	0.0714537	0.0065595	0.2916162
comp_govt exp	0.3299166	0.1820087	0.0233712	0.8139512
comp_fdi	0.0013799	0.000943723	0.000050061	0.0041474
comp_otr	0.1150335	0.0678299	0.0076159	0.2879327
comp_inflation	−0.000453471	0.000386691	−0.0019927	8.0793037E-7
GDP growth	4.1345796	4.2474055	−14.3638340	21.5358304
Residual	0.1927939	4.5291128	−22.2082334	23.2262210
MIDDLE EAST				
TC	1.4647263	0.8190107	−0.3177249	2.9440735
comp_labour	0.3883824	0.1540386	0.1708701	0.6184459
comp_capital	0.2249576	0.0360777	0.1338321	0.2827457
comp_fsdi	0.1143514	0.0748139	0.0066290	0.2896537
comp_govt exp	0.3493699	0.1876498	0.0262874	0.6919269
comp_fdi	0.0013194	0.000935812	0.000066792	0.0036521
comp_otr	0.1148526	0.0723308	0.0070469	0.2784851
comp_inflation	−0.000409234	0.000339121	−0.0013305	−0.000014536
GDP growth	4.9487144	4.1595314	−5.9477259	13.6515301
Residual	0.9605645	5.3480605	−13.3749071	16.6354788

from the factor-augmenting model in (11.14) and (11.15) are reported in Table 11.4. Here, we assume that a single relationship holds for all countries, except for country-specific effects in the intercepts. A standard F test shows that the factor augmentations are not constant – they vary with X, Z and t. Estimates of *TC* are found to be lower for all groups of countries (except for the Asia and the Pacific group), as compared to those from the standard production function model (reported in Table 11.2). Similarly, the contribution of labour is found to be much lower as compared to the standard production function model. The same applies to capital. This type of result is expected because the impact of the Z variables on productivity growth is now transmitted through the variable inputs labour and capital.

We now return to the central variable in the chapter, the financial sector development index – *FSDI*. It shows a clear positive effect on *GDP* growth (a 10-percentage point change increases productivity growth by

1.26 per cent), a finding that remains stable when we group countries either in terms of level of development or geographic location.

Another interesting finding is the positive (though of negligible magnitude) impact of *FDI* on *GDP* growth in all country groups, and the positive impact of the openness indicator, *OTR*, in all country classifications. Turning to the impact of inflation on *GDP* growth, Table 11.4 clearly shows that it is now negative in all country groups, although of a very small magnitude. Finally, the government expenditure coefficient is now positive (around 0.32).

Some of these results differ substantially from those based on the standard production function. Since the factor-augmenting model is not a special case of the standard production model, one cannot perform a nested test (F or likelihood ratio) to determine the appropriate functional form. Given that the *Z* variables are not direct inputs in the production process, but that they affect productivity of the traditional inputs (labour and capital), we argue that the factor-augmenting approach is perhaps better suited for analysing the present problem. The results from the factor-augmenting model are more intuitive. For example, *FDI* and *FSDI* are expected to complement capital, thereby contributing positively to output growth. This is true in the factor-augmenting model for all groups of countries. Similarly, inflation is supposed to affect output growth adversely. This is documented in the factor-augmenting model for all country groups. Results from the standard production function models (Tables 11.2 and 11.3) do not support these conventional wisdoms.

It is often argued that results depend on how one defines *FSDI*. Note that we used the first principal component of the three financial indicators – namely, *PCR*, *CMB* and *LQ*. To examine robustness of the results, we used an alternative definition, that is:

$$FSDI = \alpha_1 PCR + \alpha_2 CMB + (1 - \alpha_1 - \alpha_2) LQ$$

where α_1 and α_2 are the unknown parameters to be estimated along with the parameters of the production function. Magnitudes of these parameters are weights attached to the respective financial indicators. Note that this specification makes the model non-linear in the parameters, and all the parameters are estimated simultaneously. Results using this alternative definition of *FSDI* from the standard production model are reported in Table 11.5. A comparison between Tables 11.2 and 11.5 shows that the results are quite similar so far as *TC*, contributions of labour and capital are concerned. Looking at the country group means

Table 11.5 Empirical results from the standard production function model with an alternative definition of FSDI

Label	Mean	Std dev.	Minimum	Maximum
ALL COUNTRIES				
TC	1.7209370	1.3674783	−2.8278559	5.8301351
comp_labour	1.1589663	0.9524816	−7.1460261	6.0776133
comp_capital	1.4210378	5.4282495	−80.0974100	134.4266403
comp_fsdi	0.4893206	3.3880755	−112.2816611	35.2404879
comp_govt exp	−0.2628218	3.5755706	−126.0861497	21.7193804
comp_fdi	−0.0186875	1.5562879	−60.1936608	10.7667326
comp_otr	0.1560437	1.7773556	−16.2744448	33.7098243
comp_inflation	0.0703105	3.5244188	−30.4182087	149.6781008
GDP growth	4.0257724	4.8609316	−69.5255878	51.9542030
Residual	−0.4055988	7.6751515	−94.4355304	113.0085068
DEVELOPED				
TC	2.3824701	1.1445920	−0.6123761	5.8301351
comp_labour	0.6544532	0.6777996	−1.0206034	3.5988262
comp_capital	0.9578644	2.2995890	−10.4622580	14.9224202
comp_fsdi	0.6137233	4.7420118	−112.2816611	35.2404879
comp_govt exp	−0.1949228	1.5078523	−14.1597966	21.7193804
comp_fdi	−0.0496972	1.0686735	−13.4041869	10.7667326
comp_otr	0.0654008	0.6643739	−4.4339985	3.8880299
comp_inflation	−0.0066081	0.4827331	−8.9410560	6.6484389
GDP growth	3.9117751	3.2473256	−19.9539186	19.5661705
Residual	−0.3159821	5.4677322	−26.2682582	113.0085068
AFRICA				
TC	1.2233565	1.3469081	−2.8278559	4.7218419
comp_labour	1.3120113	0.8069781	−7.1460261	6.0776133
comp_capital	1.5891896	8.3238423	−80.0974100	134.4266403
comp_fsdi	0.2906822	1.8374135	−6.9226440	9.3825295
comp_govt exp	−0.4293935	5.9598580	−126.0861497	9.8325361
comp_fdi	−0.0720776	2.6849982	−60.1936608	8.0607232
comp_otr	0.1530027	2.3123760	−16.2744448	17.7327638
comp_inflation	−0.0336219	1.6386159	−30.4182087	8.0077529
GDP growth	3.0114134	7.1579383	−69.5255878	51.9542030
Residual	−0.8439618	10.2572473	−71.4668817	110.7089232
ASIA AND THE PACIFIC				
TC	0.8055303	1.1452454	−2.0104040	4.5362776
comp_labour	2.0520895	1.0993747	0.2666651	4.3248811
comp_capital	2.4189103	7.8141986	−15.5497001	106.6971435
comp_fsdi	0.9887743	3.2139108	−27.0990890	16.1867319
comp_govt exp	−0.5399732	4.5846576	−58.7812213	18.5068242
comp_fdi	−0.0186789	0.6243619	−7.4026008	3.4786240
comp_otr	0.3586440	2.3639961	−10.3741017	33.7098243
comp_inflation	0.5433436	8.6536554	−25.1302567	149.6781008

GDP growth	5.4839856	4.3660673	−13.6961946	24.6997236
Residual	−0.6468466	10.5201815	−94.4355304	51.9385101
SOUTH AMERICA				
TC	1.6893948	1.2262897	−1.5736549	4.2638582
comp_labour	1.0235305	0.7704192	0.0013600	3.0850989
comp_capital	1.4325703	3.6421794	−18.6127166	17.1085160
comp_fsdi	0.1345641	1.7040130	−9.3435555	10.7357449
comp_govt exp	−0.0057871	1.5207472	−12.4170913	9.3970358
comp_fdi	0.0889882	1.0885899	−5.1114846	7.8730854
comp_otr	0.1798486	1.9609630	−6.4625228	30.9777813
comp_inflation	−0.0075668	1.0532888	−12.4589511	6.6935760
GDP growth	4.1345796	4.2474055	−14.3638340	21.5358304
Residual	0.0875452	4.5291096	−34.0907659	16.9158371
MIDDLE EAST				
TC	2.2499001	1.7002497	−0.8661844	5.2219263
comp_labour	1.3796027	0.2654769	0.8447201	1.8682760
comp_capital	1.8100612	3.7139633	−4.7028461	17.2983544
comp_fsdi	0.4815641	1.8092486	−5.1708587	5.2050623
comp_govt exp	−0.2615143	1.2686455	−2.9914625	3.8817725
comp_fdi	−0.0027282	0.9303341	−2.9793235	4.6658010
comp_otr	0.0947665	1.5811712	−4.8275414	6.8863371
comp_inflation	−0.0339958	0.2918205	−0.8466381	0.8229576
GDP growth	4.9487144	4.1595314	−5.9477259	13.6515301
Residual	−0.0000180	5.9579787	−14.9828805	14.1209441

for *FSDI*, we observe some differences. The contribution of *FSDI* is found to be much larger and positive (at the mean) when the alternative definition is used. Similarly, the negative contribution of *FDI* is found to be much weaker when the alternative definition of *FSDI* is used. One could also see some minor differences in the contributions of government expenses, *OTR*, and inflation in these two alternative specifications of *FSDI*.

Now, we examine the robustness issue with respect to the alternative definition of *FSDI* in light of the factor-augmenting model, for which the results are reported in Table 11.6. A comparison of results reported in Tables 11.4 and 11.6 shows close similarity as far as *TC* and contributions of capital and labour are concerned. With the new definition of *FSDI*, its contribution is much larger for all country groups. This is what we found for the standard production function model as well. Contributions of other components are found to be quite robust to the alternative definition.

Table 11.6 Empirical results from the factor-augmenting model with an alternative definition of FSDI

Label	Mean	Std dev.	Minimum	Maximum
ALL COUNTRIES				
TC	1.3718503	1.0230565	−1.9751614	3.7680630
comp_labour	0.6196674	0.4102627	−0.6498069	1.8910839
comp_capital	0.1606408	0.1246716	−0.1480301	0.5143946
comp_fsdi	0.2750725	0.1868528	0.0028586	0.9801129
comp_govt exp	0.2836088	0.2298126	−0.4211287	1.3698552
comp_fdi	0.000825008	0.0026941	−0.0091883	0.0149671
comp_otr	0.0962500	0.0606859	0.0026871	0.2967878
comp_inflation	0.000423022	0.000252303	0.000018315	0.0011264
GDP growth	4.0257724	4.8609316	−69.5255878	51.9542030
Residual	0.2012001	7.8296657	−141.3237538	131.0178294
DEVELOPED				
TC	1.9401752	0.8264115	−0.0570462	3.7680630
comp_labour	0.6381244	0.4734914	−0.6498069	1.6535771
comp_capital	0.1497338	0.1301420	−0.0826034	0.5143946
comp_fsdi	0.2742243	0.1923711	0.0028586	0.8940862
comp_govt exp	0.2680674	0.2426079	−0.2834672	1.3698552
comp_fdi	0.000945681	0.0030665	−0.0091883	0.0128074
comp_otr	0.0954802	0.0612324	0.0026871	0.2739849
comp_inflation	0.000417816	0.000250007	0.000018315	0.0010543
GDP growth	3.9117751	3.2473256	−19.9539186	19.5661705
Residual	0.5752754	2.8227846	−15.7047738	13.7849511
AFRICA				
TC	0.8303226	1.0590964	−1.9751614	2.7574842
comp_labour	0.5798151	0.2730857	−0.1674330	1.2357791
comp_capital	0.1753346	0.0979508	−0.0750912	0.3756619
comp_fsdi	0.2691480	0.1703882	0.0135962	0.7343763
comp_govt exp	0.3038392	0.1896309	0.0098291	0.9423317
comp_fdi	0.000585964	0.0018977	−0.0044362	0.0069333
comp_otr	0.0950262	0.0570022	0.0051744	0.2388073
comp_inflation	0.000420919	0.000242477	0.000024350	0.000986159
GDP growth	3.0114134	7.1579383	−69.5255878	51.9542030
Residual	−0.8225226	11.1090839	−141.3237538	58.3463560
ASIA AND THE PACIFIC				
TC	1.1839684	0.7606490	−1.1601436	3.1897655
comp_labour	0.9183452	0.4385497	0.1707660	1.8910839
comp_capital	0.1029320	0.1595796	−0.1480301	0.3839855
comp_fsdi	0.3449151	0.2154096	0.0176560	0.9801129
comp_govt exp	0.2255092	0.2608936	−0.4211287	0.9460416
comp_fdi	0.0021275	0.0032688	−0.0026131	0.0149671
comp_otr	0.1164933	0.0690533	0.0074215	0.2967878
comp_inflation	0.000495815	0.000283497	0.000036179	0.0011264

GDP growth	5.4839856	4.3660673	−13.6961946	24.6997236
Residual	0.6401060	11.7425890	−93.1877652	131.0178294
SOUTH AMERICA				
TC	1.0785330	0.9980314	−1.5599564	3.1494236
comp_labour	0.4520933	0.2595080	−0.0673770	1.3017448
comp_capital	0.1958720	0.1002867	−0.1129473	0.3609338
comp_fsdi	0.2396711	0.1593541	0.0098619	0.6893678
comp_govt exp	0.3185843	0.2177197	−0.3782089	0.8960680
comp_fdi	0.000118359	0.0019643	−0.0035229	0.0105943
comp_otr	0.0861673	0.0538709	0.0046261	0.2400189
comp_inflation	0.000387596	0.000232350	0.000024864	0.0010503
GDP growth	4.1345796	4.2474055	−14.3638340	21.5358304
Residual	0.2242864	5.9581441	−36.4112822	46.5642045
MIDDLE EAST				
TC	1.5701206	0.8313597	0.1964770	2.8760007
comp_labour	0.3863969	0.2834589	0.0342288	0.7341378
comp_capital	0.2217420	0.0306954	0.1537877	0.2717925
comp_fsdi	0.2307282	0.1726412	0.0100381	0.6692097
comp_govt exp	0.3628182	0.1816592	0.0278835	0.6985736
comp_fdi	−0.000357538	0.0013875	−0.0020609	0.0036094
comp_otr	0.0847617	0.0590554	0.0040778	0.2280121
comp_inflation	0.000388065	0.000255373	0.000020102	0.000978408
GDP growth	4.9487144	4.1595314	−5.9477259	13.6515301
Residual	0.9975294	5.6626023	−15.6348250	18.0919811

Conclusion

The chapter focused on an important economic relationship – the impact of *FSD* (broadly defined to include different measures of the activity and the size of financial intermediaries) on productivity growth – by a employing a large dataset of 65 countries, varying substantially in terms of level of development and geographic location, spanning the period 1961–99. Empirical results obtained from the estimation of two different empirical models regarding the measurement of productivity growth seem to confirm a priori expectations about the overall positive influence of financial systems on productivity in line with previous work on this front.

We also found that productivity growth depends crucially on the stage of economic development. That is, a less developed country is likely to benefit more (in terms of output growth rate) from development of financial institutions than a developed economy that has well-functioning and sound financial institutions. This seems to confirm recent findings by Mavrotas and Son (2006) who, by using a similar dataset (within the context of the finance–growth nexus), seem to suggest that the effect of *FSD* in developing countries is more persistent and larger than those in industrial countries. The results seem to be robust with respect to alternative definitions of *FSDI*. The positive effect of *FSDI* on productivity growth is confirmed in terms of both the standard production function and factor-augmenting modelling approaches.

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Notes

1 Reviews of the literature can be found in Fry (1988), Wachtel and Rousseau (1995), Hermes and Lensink (1996), Arestis and Demetriades (1997), Levine (1997), Rousseau (1998), Demirgüç-Kunt and Levine (2001), World Bank (2001), Green and Kirkpatrick (2002) and Wachtel (2004), among others.
2 Another strand of the finance growth literature focuses on the important relationship between stock market development and economic growth. Major studies in this area include Atje and Jovanovic (1993), Singh (1997), Levine and Zervos (1998), Rousseau and Wachtel (2000), Arestis et al. (2001) and, more recently, Beck and Levine (2004).
3 See de Mello (1997, 1999), for a comprehensive survey of the nexus between FDI and growth, as well as for further evidence on the FDI–growth relationship; Mody and Murshid (2002), for a recent assessment of the relationship between domestic investment and FDI; Blomstrom and Kokko (1998), for a critical review of the role of FDI in technology transfer and spillover effects; Tsai (1994), Chakrabarti (2001) and Asiedu (2002), on the determinants of FDI.
4 See Kumbhakar (2000, 2005) for models with technical inefficiency.
5 Here, we assume, for simplicity, that the unmeasured/unobserved inputs are separable from the measurable/observed inputs.
6 The employed method of estimation is $\text{CPI}(t) = \text{CPI}(t+1)/[\text{CPI}(t+4)/\text{CPI}(t+1)]1/3$.
7 In a linear model, results from the growth (log differenced) model and the production function model are identical.
8 Note that the contribution of the *Z* variables on GDP growth rate, as well as the TFP growth rates, is the same. Similar, is the case with technical change and the residual components. Since the meaning of GDP growth rate is more transparent than the TFP growth, we interpret our results in terms of the former. Also note that, in order to give a total factor productivity growth interpretation,

we need to make the assumption that input markets are competitive and allocation of inputs is efficient (that is, no distortions and allocative errors).

9 Since there are only two countries in the Middle East group, we decided not to estimate a separate production function for these two countries.

References

Arestis, P. and P. Demetriades (1997) 'Financial Development and Economic Growth: Assessing the Evidence', *Economic Journal*, 107 (442): 783–99.

Arestis, P., P. Demetriades and K. Luintel (2001) 'Financial Development and Economic Growth: The Role of Stock Markets', *Journal of Money, Credit and Banking*, 33: 16–41.

Asiedu, E. (2002) 'On the Determinants of Foreign Direct Investment to African Countries: Is Africa Different?', *World Development*, 30: 107–19.

Atje, R. and B. Jovanovic (1993) 'Stock Markets and Development', *European Economic Review*, 37: 632–40.

Bandiera, O., G. Caprio, P. Honohan and F. Schiantarelli (2000) 'Does Financial Reform Raise or Reduce Saving?', *Review of Economics and Statistics*, 82 (2): 239–63.

Beck, T. and R. Levine (2004) 'Stock Markets, Banks and Growth: Panel Evidence', *Journal of Banking and Finance*, 28: 423–42.

Beck, T., A. Demirgüç-Kunt and R. Levine (2000a) 'A New Database on the Financial Development and Structure', *World Bank Economic Review*, 14: 597–605.

Beck, T., R. Levine and N. Loayza (2000b) 'Finance and the Sources of Growth', *Journal of Financial Economics*, 58: 261–300.

Beckmann, M.J. and R. Sato (1969) 'Aggregate Production Functions and Types of Technical Progress: A Statistical Analysis', *American Economic Review*, 59: 88–101.

Bencivenga, V.R. and B.D. Smith (1991) 'Financial Intermediation and Endogenous Growth', *Review of Economic Studies*, 58: 195–209.

Bencivenga, V.R., B.D. Smith and R. Starr (1995) 'Transaction Costs, Technological Choice and Endogenous Growth', *Journal of Economic Theory*, 67: 53–117.

Benhabib, J. and M.M. Spiegel (2000) 'The Role of Financial Development in Growth and Investment', *Journal of Economic Growth*, 5: 341–60.

Blomstrom, M. and A. Kokko (1998) 'Multinational Corporations and Spillovers', *Journal of Economic Surveys*, 12: 247–77.

Carkovic, M. and R. Levine (2003) 'Does Foreign Direct Investment Accelerate Economic Growth?', Working Paper, University of Minnesota.

Chakrabarti, A. (2001) 'The Determinants of Foreign Direct Investment: Sensitivity Analysis of Cross-Country Regressions', *KYKLOS*, 54: 89–114.

Demirgüç-Kunt, A. and R. Levine (eds) (2001) *Financial Structure and Economic Growth: A Cross Country Comparison of Banks, Markets, and Development* (Cambridge, MA: MIT Press).

de Mello, L. (1997) 'Foreign Direct Investment in African Countries and Growth: A Selective Survey', *Journal of Development Studies*, 34: 1–34.

de Mello, L. (1999) 'Foreign Direct Investment Led Growth: Evidence from Time-Series and Panel Data', *Oxford Economic Papers*, 51: 133–51.

Fry, M.J. (1988) *Money, Interest, and Banking in Economic Development* (Baltimore and London: Johns Hopkins University Press).
Gorg, H. and D. Greenaway (2004) 'Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?', World Bank Research Observer, 19: 171–97.
Green, C.J. and C. Kirkpatrick (2002) 'Finance and Development: An Overview of the Issues', *Journal of International Development*, 14 (2): 207–10.
Hanson, G. (2001) 'Should Countries Promote Foreign Direct Investment?', UNCTAD: G-24 Discussion Paper Series 9, February.
Hermes, N. and R. Lensink (eds) (1996) *Financial Development and Economic Growth: Theory and Experience from African Countries* (London: Routledge).
King, R.G. and R. Levine (1993) 'Finance and Growth: Schumpeter Might be Right', *Quarterly Journal of Economics*, 108 (3): 717–38.
Kumbhakar, S.C. (2000) 'Estimation and Decomposition of Productivity Change When Production is not Efficient: A Panel Data Approach', *Econometric Reviews*, 19: 425–60.
Kumbhakar, S.C. (2002) 'Decomposition of Technical Change into Input-Specific Components: A Factor-Augmenting Approach', *Japan and the World Economy*, 14: 243–64.
Kumbhakar, S.C. (2004) 'Estimation of Factor-augmenting Technical Change: The Case of US Agriculture', *Indian Economic Review*, 39: 31–54.
Kumbhakar, S.C. (2005) 'Productivity and Efficiency Measurement using Parametric Econometric Methods', in M. Bagella, L. Becchetti and I. Hasan (eds), *Transparency, Governance and Markets* (Amsterdam: Elsevier).
Levine, R. (1997) 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, 35 (2): 688–726.
Levine, R. and S. Zervos (1998) 'Stock Markets, Banks and Economic Growth', *American Economic Review*, 88: 537–58.
Mavrotas, G. and S.I. Son (2006) 'Financial Sector Development and Growth: Re-examining the Nexus', in M. Bagella, L. Becchetti and I. Hasan (eds), *Transparency, Governance and Markets* (Amsterdam: Elsevier).
Mody, A. and A. Murshid (2002) 'Growing Up with Capital Flows', IMF Working Paper WP/02/75, (Washington, DC: IMF).
Neusser, K. and M. Kugler (1998) 'Manufacturing Growth and Financial Development: Evidence from OECD Countries', *Review of Economics and Statistics*, 80 (4): 638–46.
Rousseau, P. (1998) 'The Permanent Effects of Innovation on Financial Depth: Theory and US Historical Evidence from Unobservable Components Models', *Journal of Monetary Economics*, 42: 387–425.
Rousseau, P. and P. Wachtel (2000) 'Equity Markets and Growth: Cross-country Evidence on Timing and Outcomes, 1980–1995', *Journal of Banking and Finance*, 24: 1933–57.
Sato, R. and M.J. Beckmann (1968) 'Neutral Inventions and Production Functions', *Review of Economic Studies*, 35: 57–66.
Singh, A. (1997), 'Financial Liberalization, Stock Markets and Economic Development',*Economic Journal*, 107 (442): 771–82.
Tsai, P. (1994) 'Determinants of Foreign Direct Investment and Its Impact on Economic Growth', *Journal of Economic Development*, 19: 137–63.

Wachtel, P. (2004) 'How Much Do We Really Know About Growth and Finance?', *Research in Banking and Finance*, 4: 91–113.

Wachtel, P. and P. Rousseau (1995) 'Financial Intermediation and Economic Growth: A Historical Comparison of the United States, United Kingdom and Canada', in M. Bordo and R. Sylla (eds), *Anglo-American Financial Systems: Institutions and Markets in the Twentieth Century* (New York: Irwin).

World Bank (2001) *Finance for Growth: Policy Choices in a Volatile World* (New York: Oxford University Press).

12

The Effects of Regional Integration: Impact on Real Effective Exchange Rate Volatility, Institutional Quality and Growth for MENA Countries

Leonardo Becchetti and Iftekhar Hasan

Introduction

Two of the main (anticipated and concurring) effects expected from regional integration among virtuous countries (or around a core of economically more advanced countries) are reduced exchange rate volatility, and higher and less heterogeneous quality of institutional rules and macroeconomic policies.

In both factors, the role of financial institutions is of paramount importance. The exchange rate volatility index is a financial indicator that is highly affected by the shape and rules of domestic financial institutions since, as the survey of the literature provided below shows, exchange rate agreements and monetary policies are crucial in determining its pattern. The index of institutional quality that we select in the chapter documents the fact that financial institutions and rules are a crucial part of a well-functioning domestic governance. In the chapter, we use both the aggregate index and two specific indices related to 'credit, labour and business' rules and the 'legal structure, property right' index. By inspecting the index structure and starting from the aggregate index, we find that, out of its five components, one is entirely related to domestic monetary policy (*MONEYACCESS*), part of a second one (*FREEDOMEXC*) is about capital market controls, a third (*CREDLABUS*) is for a large part about banking regulation, while only the two remaining are not to do with financial issues.

In this chapter, we aim to evaluate the impact of past and future potential achievement in terms of regional integration of Middle East and North Africa (MENA) countries among themselves and with the EU on these two expected effects, and on levels and growth of real per capita GDP. We measure the magnitude of these two effects by looking at real effective exchange rates (REERs) and at different indicators of quality of institutional rules (including the quality of financial institutions) and macroeconomic policies (QIRMPs), without neglecting the potential costs generated by the reduction of exchange rate flexibility implied by exchange rate agreements within the process of regional integration. To do so, we overcome the traditional limits of bilateral exchange rate measures and we build a measure of real effective exchange rate volatility, which we call *trade portfolio risk* (also TPR). We define the TPR as the risk of a portfolio whose assets are the country's exchange rates with the main trading partners weighted by bilateral country trade shares. We then measure the effects of TPR and institutional quality for MENA countries on levels and rates of growth of real per capita GDP in order to evaluate the effects of past and future perspective benefits of an increased economic integration within the region and with the EU.

Cost of volatility and advantage of flexibility: theoretical rationales and empirical findings

In the past, the evaluation of the effects of exchange rate regimes and volatility on growth has led to the development of two different arguments.

The first can be defined as the cost of volatility argument (CVA). It establishes that exchange rate volatility may be harmful for growth and, thus, provides indirect support to the creation of monetary unions, which eliminate part of this volatility (Buiter *et al*. 1998). According to this perspective, the elimination of exchange rate volatility among union members (Buiter *et al*. 1998, Devereux *et al*. 1999) is generally considered a beneficial effect, given the perception that:

> unpredictable volatility can inflict damage [and that] . . . although the associated costs have not been quantified rigorously, many economists believe that exchange rate uncertainty reduces international trade, discourages investment and compounds the problems people face in insuring their human capital in incomplete asset markets. (Obstfeld and Rogoff 1995: 73–96)

Along the same line, de Grauwe and Schnabl (2004) emphasize that while the Mundell (1961) theory of optimal currency areas (OCAs) (which they term as Mundell I, following a classification proposed by McKinnon 2004) suggests the well-known caveats to be considered before opting for entering a monetary union (MU – minimum level of trade integration, limited occurrence of asymmetric shocks, sufficient mobility of workers), Mundell (1973a, 1973b) (Mundell II) provide very different prescriptions. When exchange rate movements are an independent source of volatility and are also driven by speculative dynamics,[1] anticipated entry into MUs may help small open economies to avoid negative macroeconomic effects of exchange rate volatility. The empirical findings of de Grauwe and Schnabl (2004) support this hypothesis, finding a positive association between exchange rate stability and growth in Central and Eastern Europe in the last decade.

The second view, which we will term the advantage of flexibility argument (AFA), finds that terms of trade shocks are amplified in countries with more rigid exchange rate regimes and that, after controlling for other factors, countries with flexible exchange rate regimes grow faster (Edwards and Levy-Yeyati 2003). This second approach traces back to Meade's (1951) argument that, in countries with fixed exchange rates and inflexible money wages, adjustment in the equilibrium real exchange rates arising from external shocks occur through domestic nominal prices and domestic wages. In such cases, shock absorption would be easier under flexible exchange rate regimes. The same author recognizes that flexible exchange rates may not be of help in case of inflexible real wages, due to some indexation mechanisms. The advantage of flexibility also seems to be supported by empirical evidence. Edwards and Levy-Yeyati (2003) find that terms of trade shocks are amplified in countries with more rigid exchange rate regimes and that, after controlling for other factors, countries with fixed exchange rate regimes grow faster. Their results are consistent with those of Levy-Yeyati and Sturzenegger (2003a) also using de facto exchange rate classifications. The same finding disappears in empirical works in which de jure classifications are adopted (Ghosh *et al*. 1996).[2]

Our methodological point is that these two apparently conflicting views of the literature (advantage of flexibility and cost of volatility) can be tested to be not mutually exclusive when exchange rate volatility is properly measured with a multilateral trade weighted exchange rate. The rationale is that, while it is almost impossible to observe that AFA and CVA hold together when volatility is measured with the bilateral volatility with the dollar (given the strong negative relationship between the latter and fixed exchange rate regimes, especially if pegged to the dollar itself), multilateral trade weighted exchange rate volatility is unrelated with exchange rate regimes and allows the two arguments to be measured separately (Bagella *et al.* 2004).

The literature on exchange rate volatility, institutional quality and growth

Exchange rate volatility and growth: theoretical underpinnings and empirical measures

The main effects of exchange rate volatility on growth are expected to occur via the investment channel. In principle, the impact of exchange rate volatility on investment is ambiguous, as it depends on assumptions on market competitiveness, symmetry/asymmetry of investment adjustment costs and entrepreneurial attitudes towards risk (Caballero and Corbo 1989, Baum *et al.* 2001, Froot and Klemperer 1989, Serven 2000).

The effect is definitely positive under perfect competition, risk neutrality and symmetric costs of capital adjustment (Caballero and Corbo 1989), due to the wellknown property of convexity of the profit function. This property implies that potential losses for insufficient investment in good states are higher than potential costs for excess capacity in bad states. Hence, firms will over-invest when exchange rate volatility is higher.

The positive relationship no longer holds when we remove the assumptions of risk neutrality and symmetric costs of capital adjustment. In doing so, we realize we are getting closer to the real world if we simply consider that the existence of sunk costs implies per se that costs of downward adjustments are higher than those of upward adjustments. More specifically, it has been shown that irreversibility must be accompanied by imperfect competition and decreasing returns to scale to invert the sign (from positive to negative) of the relationship between uncertainty, investment and growth (Serven 2000). By introducing the reasonable assumption of risk aversion in this framework, the direction of the link between investment and volatility becomes definitely and unequivocally negative.

On the empirical side, evidence on the exchange rate volatility–growth nexus is scant and controversial, also because of methodological problems arising in the definition of exchange rate volatility. Nonetheless, several empirical findings seem consistent with the above-mentioned theoretical approach, which considers the role of asymmetric sunk costs and finds a negative relationship among exchange rate volatility, investment and growth (Cottani *et al.* 1990, Dollar 1992, Ghura and Grennes 1993, Darby *et al.* 1999).

Institutional quality and growth: theoretical underpinnings and empirical measures

The huge amount of empirical literature on growth and conditional convergence is, in most cases, an empirical test of the Solow or Solow-augmented growth model in the version proposed by Mankiw *et al.* (1992). Their model has proven to be particularly successful, as the empirical specification to be tested can be easily accommodated to test hypotheses on the inclusion of additional factors affecting conditional convergence, and different from human and physical capital investment. A survey summarizing results of this research field outlines something like 87 different factors potentially affecting conditional convergence (Durlauf and Quah 1998). Among them, quality of economic policies and institutions plays a dominant role. Among those surveyed by Durlauf and Quah (1998) in their empirical studies, institutions (Barro and Sala-i-Martin 1995, Rodrik 2000) or, more specifically, financial institutions (Pagano 1993, King and Levine 1993) play a crucial role together with human capital (Mankiw *et al.* 1992). Other factors such as the government sector (Hall and Jones 1999), social and political stability (Alesina and Perotti 1994) and corruption (Mauro 1995) all appear as different facets of the quality of institutions and economic policies.

In a direct evaluation of the relative significance of different factors that confirms our previous considerations, Sala-i-Martin (2002) finds that institutional quality is one of the most robust. The impact of institutions on growth – with specific reference to transition countries – is tested by de Melo *et al.* (1996) and Fischer *et al.* (1996).

With regard to the innumerable theoretical rationales provided to explain the role of institutional quality on growth, we briefly recall some we consider the most important and representative: Rodrik (1999, 2002) argue that market-based economies, to be successful, crucially need good institutions and, more specifically, institutions to protect property rights, to fight corruption, to support macroeconomic stabilization and to promote social cohesion. Klein and Luu (2003) find that that technical efficiency is positively related to policies supporting laissez-faire and political structures that promote policy stability. Esfahani and Ramirez (2003) find that good institutions support the creation of the infrastructure needed to promote growth.

Methodology

The methodology for the construction of the multilateral exchange rate volatility model is based on the idea that a country may be conceived as having a portfolio of assets represented by its relationships with trade partners. We measure potential benefits of economic integration by proposing a measure of exchange rate risk called *trade portfolio risk* (TPR): this is the risk of a portfolio whose assets are a country's exchange rates with its main trade partners weighted by bilateral country trade (export plus import) shares.

More formally, if the i-th country has trade relationships with j ($j = 1, \ldots, N$) partners, the variance of its portfolio $\sigma_{p,i}{}^2$ may be written as:

$$\sigma_{p,i}{}^2 = \sum_j x^2{}_j \sigma^2{}_j + 2 \sum_{h<k} x_h x_k \sigma_{hk}$$

where $\sigma_j{}^2$ is the variance of the return of the j-th asset; that is, the rate of return of the bilateral exchange rate with the j-th partner, x_j is the share of trade to the j-th partner out of the i-th country total export, σ_{hk} is the covariance between bilateral exchange rate returns of the ith country with partners h and k. Our measure of effective exchange rate variance is therefore a 'portfolio variance'. It includes the volatility of each bilateral exchange rate and their covariances weighted for their relative trade shares. To analyse the behaviour of the export portfolio risk variable, we calculate moving windows of average two-year variances of mean monthly exchange rate returns weighted for the trade shares in our sample period.

With respect to a simple bilateral exchange rate with a leading currency (that is, the dollar), the TPR variable has three advantages. First, it includes neighbours' (or trade partners') externalities in the evaluation of the effects of exchange rate volatility on growth. This inclusion is fundamental because a country might have good governance and good macroeconomic policies (and might, therefore, be likely to have a low bilateral exchange rate volatility with a leading currency – say, the dollar) but might import instability via variability of governance and economic policies of its trade partners. Individual country stability is therefore insufficient if it is not framed into regional stability, and this is why the export portfolio risk variable is more likely to measure the costs of missing regional integration.[3]

A second important advantage of this measure is that favourable and unfavourable exchange rate movements with different trade partners may compensate each other, thereby dampening the negative effects of individual bilateral exchange rate volatility on growth (Qian and Varangis 1994). This effect is incorporated in our export portfolio risk measure, which conveniently takes into account the potential impact of trade diversification on export risk.

A third and final advantage is that this measure is much less correlated with exchange rate regimes than bilateral exchange rate volatility with the dollar and therefore gives the opportunity of jointly testing the advantage of flexibility and the cost of volatility arguments, as explained above. When building the TPR index, we consider that, as far as trade shares of a given trading partner fall, their contribution to the TPR becomes negligible. For this reason, and in order to avoid including trade partners with a very small shares in the analysis, we consider the following three constraints: (i) no more than seven partners; (ii) a cumulative trade share not higher than 60 per cent; and (iii) an individual partner share not smaller than 2 per cent. When one of these constraints is hit, we do not include additional trade partners in our TPR measure.[4]

Specification for conditional convergence growth model

We test the effect of trade portfolio volatility and quality of institutions and economic policies in a standard specification of a model from Mankiw *et al.* (1992) – hereafter MRW – augmented for the role of institutions and exchange rate volatility.

It is trivial to see that, when we assume that part of the A-factor augmenting labour productivity is proxied by quality of institutions and multilateral exchange rate volatility, the model leads to the following specification in levels:

$$\ln\left(\frac{Y_t}{L_t}\right) = c + \gamma_1[\ln\left(A_{QIMP}\right) + g_{PIMP}t] + \gamma_2[\ln\left(A_{REERV}\right) + g_{REERV}t] + \frac{\alpha}{1-\alpha-\beta}\ln\left(s_k\right) + \frac{\beta}{1-\alpha-\beta}\ln\left(s_h\right) + -\frac{\alpha+\beta}{1-\alpha-\beta}\ln\left(n+g+\delta\right) \tag{12.1}$$

where $c = \ln(A_{KP(0)}) + g_{KP}t$ is the quasi-public good component of knowledge products and is therefore assumed constant across countries and $[\ln\left(A_{QIMP}\right) + g_{PIMP}t]$,$_2$ $[\ln\left(A_{REERV}\right) + g_{REERV}t]$ are two specific components (quality of institutional rules and macroeconomic policies, and real effective exchange rate volatility) of the country-specific factors augmenting the effects of labour input on levels and growth of real per capita GDP when we interpret $A_{V(QI,\ REERV,\ldots)}$ as $A_V = \gamma_1 A_{QIMP}{}^{*}\gamma_2 A_{REERV*}\gamma_3 Ar$ where *Ar* captures all additional factors affecting the labour augmenting component.In this augmented MRW model, the possibility that all countries have the same steady state level of per capita income depends not only on the levelling of their rate of population growth and of their physical and human capital investment rates, but also on REER and quality of rules and macroeconomic policies.

Our augmented version of the model will be estimated also in growth rates under the following specification:

$$\ln(y_t) - \ln(y_0) = (1 - e^{-\lambda t})\frac{\alpha}{1-\alpha-\beta}\ln(s_k) + (1 - e^{-\lambda t})\frac{\beta}{1-\alpha-\beta}\ln(s_h) + -(1 - e^{-\lambda t})\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) - (1 - e^{-\lambda t})\ln\left(y_0\right) \tag{12.2}$$

The difference with respect to the traditional MRW approach is in the interpretation of the common intercept, and in the fact that convergence may be prevented by differences in the quality of policies and institutions, and by REER volatility.

Variables for our empirical analysis are taken from various sources. The dependent variable Y/L is the real gross domestic product per person of working age, L is the working age population (population aged between 15 and 64), s_k is gross domestic investment over GDP and is calculated using values taken from World Bank *World Development Indicators*, s_h is secondary school gross enrolment ratio. Indicators of institutional quality are taken from the economic freedom indicators of the Frazer Institute.

To interpret our model, and especially findings from the growth estimate in (12.2), remember that while the MRW estimation framework was adopted by the authors originally to test the (human capital augmented) Solow exogenous growth model, Bernanke and Gurkaynak (2001) show that such estimation framework is consistent with any growth model that admits a balanced growth path and, therefore, is also compatible with suitable endogenous growth models.

The exogenous/endogenous growth issue has special interest when we interpret the results of our growth equation, given that the interpretation under the two perspectives is quite different.

The validity of the MRW framework in the augmented Solow model perspective implies that growth is determined by transitional dynamics, leading to the steady state equilibrium level of per capita GDP (the latter being affected by country fundamentals, which include human capital investment). Growth from this perspective is uniquely determined by exogenous changes in the labour-augmenting A-factor.

The same empirical finding would imply, in the endogenous growth perspective, that human capital investment directly affects growth and not only equilibrium levels of per capita GDP.

However, since we introduce REER volatility and quality of institutions and economic policies as determinants of the A-factor, the traditional distinction between exogenous/endogenous growth models in terms of the role of economic policy as a growth stimulus fades away. By arguing that REER volatility and quality of institutions and economic policies proxy important components of the A-factor, which augments labour productivity and is uniquely responsible of further growth from the equilibrium point, we implicitly introduce the importance of institutions and policies also in the exogenous growth framework.

Empirical findings

Descriptive evidence on exchange rate volatility

The first descriptive evidence on the dynamics of trade portfolio volatility in different macroareas is provided in Table 12.1. We can see here that MENA countries are quite an exception, since they exhibit an average TPR much lower than that of other developing countries and are in line with that of OECD or EU countries at the end of the sample period. In addition, MENA countries seem to have successfully reduced their trade-weighted exchange rate volatility from the very high levels of 1990, but also of 1994 when their TPR was about 40 times higher.

Along the same line, Figure 12.1 shows that historical shocks on trade portfolio volatility for MENA countries have been much milder than those affecting heavily indebted poor countries (HIPCs) or Latin American countries. An important distinction needs to be made between Mediterranean and non-Mediterranean MENA countries, since we expect that the low TPR of the former has been helped by the process of integration with the EU. This impression is confirmed when we observe trade share dynamics. Mediterranean MENA countries have maintained around 50 per cent of their trade share with EU countries throughout all the sample period, and have lower and slightly declining trade shares with the USA (above 40 per cent). Trade shares versus the EU and the USA are much smaller for non-Mediterranean MENA countries (around 10 per cent) (Figure 12.2).

Table 12.1 Relative dynamics of trade portfolio volatility across macroareas

	Eurozone	OECD non-EU	Transition candidates	Transition non-candidates	MENA	Latin American countries
1980	0.0001940	0.0005533	0.0025394	0.0001057	0.0021633	0.0005528
1981	0.0003466	0.0001342	0.0038470	0.0008962	0.0142089	0.0007017
1982	0.0002000	0.0029110	0.0809345	0.0004692	0.0005651	0.0111006
1983	0.0001124	0.0016421	0.0002005	0.0001291	0.0003816	0.0631913
1984	0.0001616	0.0002593	0.0002616	0.0066659	0.0004469	0.0340898
1985	0.0002898	0.0008257	0.0004359	0.0039779	0.0006245	0.0355935
1986	0.0000605	0.0003518	0.0005168	0.0002226	0.0029055	0.0031403
1987	0.0001126	0.0005415	0.0010800	0.0059923	0.0004104	0.0020527
1988	0.0001461	0.0001425	0.0011811	0.0000959	0.0085016	0.0020502
1989	0.0001619	0.0001073	0.0327992	0.0002888	0.0018232	0.0171249
1990	0.0000938	0.0001154	0.0127287	0.0365089	0.0323007	0.0891855
1991	0.0002720	0.0001120	0.0026689	0.0824572	0.0005244	0.0010962
1992	0.0003050	0.0001409	0.0006854	0.0203340	0.0003669	0.0008258
1993	0.0002000	0.0001746	0.0007326	0.0004743	0.0004751	0.0070089
1994	0.0000563	0.0007834	0.0002169	0.0007963	0.0021457	0.0057376
1995	0.0001180	0.0005524	0.0042368	0.0002876	0.0009053	0.0009547
1996	0.0000335	0.0000493	0.0000905	0.0032572	0.0000878	0.0007101
1997	0.0000489	0.0006753	0.0000663	0.0197763	0.0001135	0.0000907
1998	0.0000861	0.0003534	0.0003362	0.0045173	0.0002012	0.0002611
1999	0.0000478	0.0000886	0.0001051	0.0030805	0.0000757	0.0011156
2000	0.0000362	0.0000832	0.0000648	0.0015527	0.0000576	0.0007141

Notes: Eurozone countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.
OECD high-income countries: Australia, Canada, Iceland, Japan, New Zealand, Norway, Switzerland and USA;
Transition non-candidates: Albania, Armenia, Azerbaijan, Bosnia, Bulgaria, Croatia, Macedonia, Moldova, Romania, Russian Federation, Tajikistan, Ukraine, Uzbekistan and Yugoslavia;
Transition candidates (first phase enlargement): Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia;
MENA countries: Algeria, Egypt, Israel, Jordan, Mauritania, Morocco, Pakistan, Somalia, Syria, Tunisia and Turkey (data for other MENA countries such as Libya and Lebanon not available).
Source: Authors' elaboration from Datastream and IMF's DOTS database.

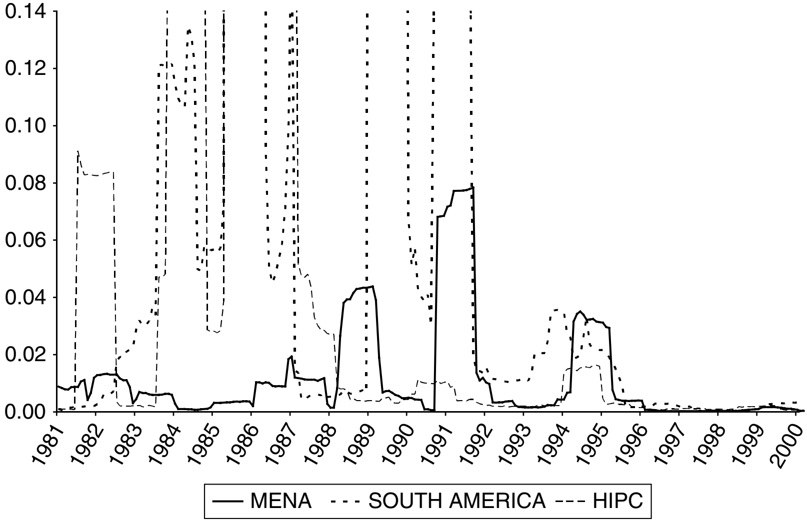

Figure 12.1 Trade portfolio risk ups and downs for MENA, South America and HIPC countries

Note: See text for the definition of trade portfolio risk.

Source: Authors' elaboration from Datastream and IMF DOTS database.

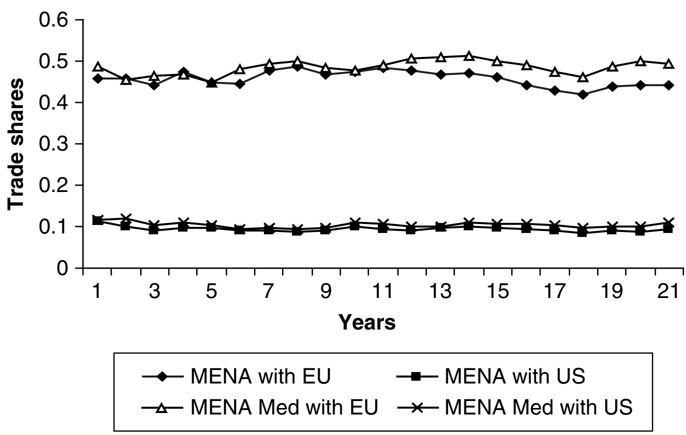

Figure 12.2 Trade shares of MENA and MENA Mediterranean countries with the USA and EU

Source: Authors' elaboration from IMF DOTS database.

Descriptive evidence on quality of institutions and macroeconomic policies

If MENA countries have a TPR almost in line with that of most developed countries, the gap is much more pronounced when considering another important factor, that of conditional convergence, represented by the quality of institutions and macroeconomic policies.

We are well aware of the problems arising when building composite indicators such as those generally used in comparing institutions at international level. For this reason, as an indicator for the quality of institutions and economic policies we employ a benchmark commonly used in the literature and represented by individual and aggregate components of the index published in the *Economic Freedom of the World: 2000 Annual Report* issued by the Frazer Institute.[5] The index is a weighted average of the different composed indicators, designed to identify the quality of institutional arrangements and policies in major areas (see the Appendix for details).

We focus on three measures:

(i) regulation of money credit and business;
(ii) legal structure and property rights; and
(iii) a composite index which includes indicators (i) and (ii), plus the access to sound money and freedom to exchange with foreigners indicators.

We compare the dynamics of the indicator for MENA countries vis-à-vis the eurozone, OECD non-EU, the transition countries that entered the EU in 2004 and transition non-candidates (Figures 12.3–12.5). All of the three pictures show similar patterns. Eurozone and OECD non-EU countries have the highest scores. The transition countries that entered the EU start from low values but rapidly converge to those of the first two groups. MENA countries, together with transition non-candidates, share the lowest scores. In the next section, we try to evaluate the costs in terms of reduced growth of the lower quality of institutions and economic policies.

Econometric evidence

We perform our estimates on World Bank data on a dataset recording values for 120 countries for a sample period ranging from 1980–2000. Table 12.1 clearly shows that the *TPR* variable in different macroareas is highly variable across time. In a cross-sectional estimate, the effect of such variability on growth is not accounted for. We therefore believe

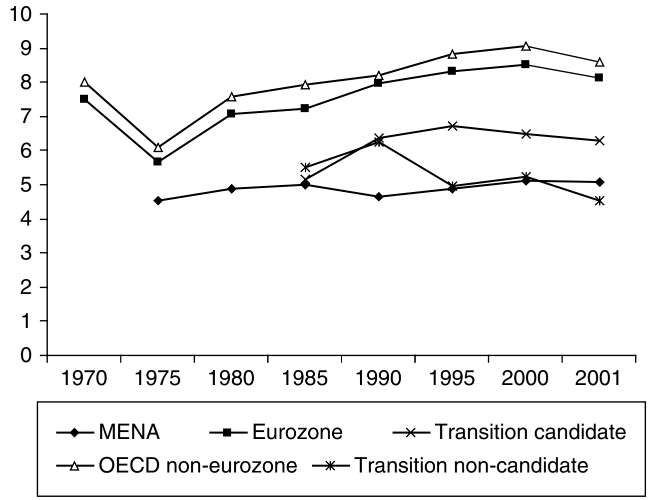

Figure 12.3 Legal structure and property rights, MENA countries compared with representative groups of countries
Source: Authors' elaboration from Datastream and IMF's DOTS database.

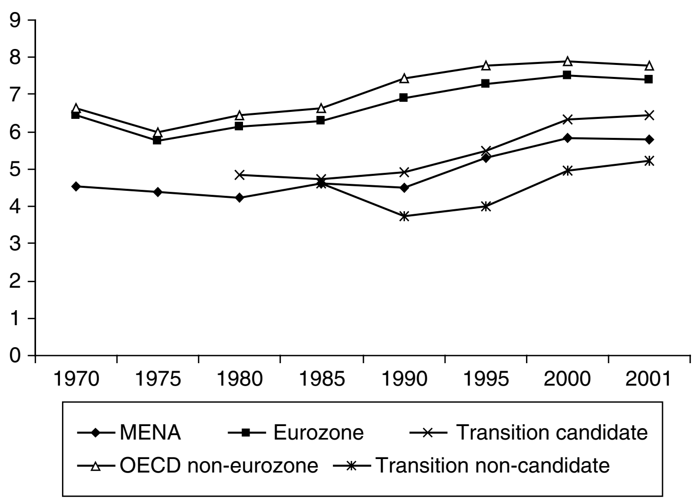

Figure 12.4 Quality of institutions and economic policies, MENA countries compared with representative groups of countries
Source: Authors' elaboration from Datastream and IMF DOTS database.

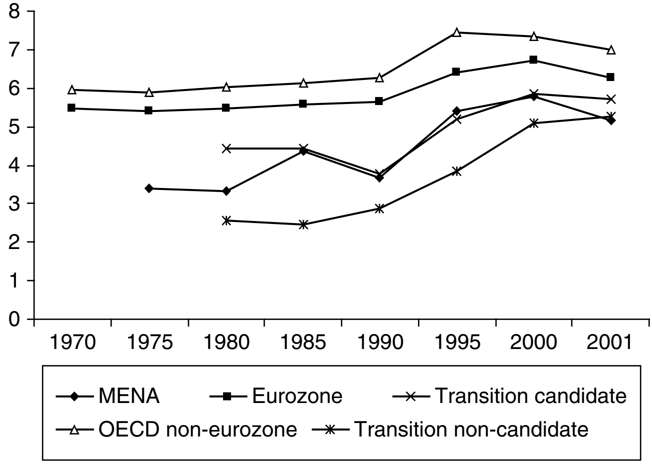

Figure 12.5 Credit, labour and business, MENA countries compared with representative groups of countries
Source: Authors' elaboration from Datastream and IMF's DOTS database.

that a panel estimate may better enhance the impact of the *TPR* variable in the estimates. Data are grouped into five five-year periods in order to provide acceptable time lags to test conditional convergence effects in growth estimates.

We perform growth fixed-effect panel estimates using the basic MRW approach, in which the two main factors of growth are physical and human capital.[6]

In the choice of these two crucial inputs, we fully take into account the debate of the recent literature. Our basic specification framework considers World Bank investment to GDP ratio and secondary school enrolment rates. In a further step, sensitivity analysis on the effects of *TPR* on growth is run by taking into account the refinements recently proposed in the literature and replacing: (i) enrolment ratios with average schooling years corrected for quality; and (ii) World Bank with Heston and Summers' (1996) investment to GDP ratios, given that in the latter measures, changes in physical capital stock are corrected for quality according to the results of cross-country surveys on comparability of physical capital.[7]

Results from different specifications of growth estimates under these two general frameworks for estimating human and physical capital are presented in Table 12.2.[8] Results of the baseline MRW specification show

Table 12.2 Impact of trade portfolio volatility in conditional convergence growth equations

	Fixed effects									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(4)′**	**(5)′**	**(6)′**	**IV-2SLS (7)**
Ln(Y/L)$_{t0}$	−0.210**	−0.273**	−0.271	−0.229	−0.223	−0.216**	−0.255	−0.272**	−0.238**	−0.165**
	[−9.81]	[−7.46]	[−7.46]	[−9.85]	[−8.63]	[−9.58]	[−7.60]	[−7.32]	[−7.29]	[−3.97]
ln(s_k) *(1)*	0.079**	0.080**	0.068	0.077	0.081	0.088**	0.037	0.055**	0.044**	0.066*
	[3.88]	[3.00]	[2.54]	[3.41]	[3.32]	[3.91]	[1.83]	[1.96]	[1.70]	[1.99]
ln(s_h) *(2)*	−0.019	0.061*	0.061	0.05	0.016	0.031	0.05	0.050	0.022	0.0184
	[−1.33]	[2.13]	[2.14]	[1.54]	[1.34]	[1.24]	[1.34]	[1.93]	[1.08]	[0.5]
ln(n+g+d) (3)	−0.242**	−0.287**	−0.261	−0.261	−0.222	−0.252**	−0.325	−0.286**	−0.214**	−0.169*
	[−5.56]	[−3.82]	[−3.48]	[−5.31]	[−4.31]	[−5.20]	[−4.68]	[−3.95]	[−3.15]	[−1.92]
Ln(TPR)		−0.007*	−0.004				0.005	−0.005	0.007	−0.018**
		[−2.02]	[−1.22]				[1.46]	[−1.64]	[1.85]	[−1.94]
*Ln(TPR*smopec)*			−0.008				−0.007	−0.007	−0.008	
			[−2.56]				[−2.94]	[−2.65]	[−3.32]	
Ln(Indexfree)				0.245			0.260			
				[7.64]			[6.18]			
Ln(legstrupro)					0.063			0.045		
					[3.29]			[1.67]		

Ln(credlabus)						0.323**			0.342**	
						[8.30]			[7.44]	
Dflex										0.045**
										[2.45]
Constant	1.734**	1.706**		1.734	1.40	0.815**	0.996	1.61	1.07**	0.973**
	[4.9]	[4.78]		[4.9]	[5.27]	[3.40]	[3.01]	[4.49]	[3.31]	[2.47]
F test (overall regression significance)	11.98	12.84 (0.00)	11.98	39.09 (0.00)	25.48 (0.00)	15.59 (0.00)	39.09 (0.00)	10.80 (0.00)	18.16 (0.00)	TPR instrumented by TWTOTINST and TWDIFINT
R-sq Within	0.1825	0.166	0.1825	0.30	0.23	0.27	0.30	0.20	0.30	0.045
F test u_i=0 (joint significance of fixed effects)	2.24	2.14 (0.04)	2.24	3.24 (0.00)	2.84 (0.01)	2.53 (0.00)	3.24 (0.00)	2.35 (0.00)	2.85 (0.00)	1.81
F test Ho: (1)+(2)=–(3)	0.1131	(0.0826)	0.1131	(0.00)	(0.00)	(0.01)	(0.00)	(0.04)	(0.03)	
Observations	434	434	434	570	541	403	570	390	397	320
Groups	106	106	106	111	110	95	111	93	95	88

Notes: Estimates are run on eight five-year spells.
Variable key:
$(Y/L)_{t0}$: real per capita GDP of the first year in each five-year spell; s_k: World Bank (WB) investment to GDP ratio; s_h: net secondary school enrolment ratio; TPR: trade portfolio volatility (see text for the definition); *Smopec*: dummy taking unit value for small open economies (which conventionally defined as countries with less than 10 million inhabitants and a ratio of import plus exports over GDP higher than 50 per cent) and zero otherwise; *Dflex*: dummy for de facto flexible exchange rate regimes; *Indexfree*: index of economic freedom; *Lesgstrupro*: index of legal structure and property rights; *credlabus*: index of quality of credit, labour and business regulation (for definitions of the institutional indicators see the Appendix). In column 7 the TPR variable is instrumented by the following two variables:
(i) $\text{TWDIFINT}_{ij} = \sum_j x^2{}_j \left(Ri - Rj\right)$ where *Ri* is the nominal interest rate of country *i*.
(ii) Tvtotinst: indicator of relative institutional strength for country *i* with
$\text{TWTOTINST}_{ij} = \sum_j x_j^2 \left(INDEXFREEDi - INDEXFREEDj\right)$
where indexfreed is defined in the Appendix and x_j is the share of trade (total volume of export plus total volume of import) to the *j*th partner out of the *i*-th country total trade (volume of export plus volume of import).
t-stats in square brackets. Numbers in parentheses are *p*-values from the relative *F* test on the null hypothesis indicated. Significance with bootstrap standard errors at 95 per cent and 90 per cent denoted by *** and * respectively. We use the percentile and bias corrected approach with 2000 replications.
Source: Authors' elaboration based on data from Gwartney *et al.* (2000).

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that conditional convergence is supported, even though human capital is not significant (Table 12.2: column 1). Note that this is also the problem of the seminal paper in this field (Islam 1995). We overcome the problem by augmenting the baseline specification with our *TPR* variable (Table 2: column 2). The introduction of the *TPR* variable is negative and significantly supports the cost of volatility argument.

With reasonable arguments, de Grauwe and Schnabl (2004) consider that the cost of volatility must be higher for open economies, and especially for small open economies. For this reason, we conventionally create a small open economy dummy for countries with less than 10 million inhabitants and a ratio of import plus exports over GDP higher than 50 per cent. Therefore, we test whether the relationship between *TPR* and growth is significantly different for this specific group of countries. Our results are extremely strong and find that the highly significant effect of the *TPR*–growth relationship for small open economies is the main part of the overall effect (Table 12.2: column 3).[9]

In the next three specifications (Table 12.2: columns 4, 5 and 6), we wish to evaluate the impact of institutional variables on the baseline MRW specification (column 1). We try three alternative specifications respectively, considering:

(i) regulation of money credit and business;
(ii) legal structure and property rights; and
(iii) the composite index, which includes indicators (i) and (ii), plus the access to sound money and freedom to exchange with foreigners indicators (for details on the characteristics of this variable, see the Appendix).

The introduction of these regressors is strongly significant and the magnitude of the coefficients is not negligible. Consequently, the overall significance of the estimate is much higher than in the MRW baseline model. Since all variables are in logs, we may evaluate coefficient magnitudes in terms of elasticity (under the restrictive assumption of linearity of underlying variable effects). The highest impact is that of the credit, labour and business indicator (0.32 or 32 per cent elasticity of GDP growth to changes in the institutional variable), followed by the composite indicator (0.24) and the legal and property right indicator (0.06). Even though these quantitative considerations need to be taken with extreme care, we may more broadly agree on the existence of a strong and significant impact of the quality of institutions on GDP growth.

A collateral effect of the introduction of these variables is the disappearance of the impact of human capital (exactly as in the baseline MRW model). This finding is likely to be explained by the strong relationship between the returns of human capital and the institutional framework, which create high collinearity between the two variables.

In the following three specifications, we wish to evaluate what happens with the joint inclusion of the exchange rate and institutional quality variables, including also the extra effect of *TPR* on small open economies, successfully tested in column 3. Results presented in columns 4, 5′ and 6′ illustrate the joint significance of the institutional quality and of the *TPR* variable, when interacted with the small open economy dummy. Coefficient magnitudes of the institutional quality variables do not vary substantially from previous specifications. We therefore conclude that institutional quality and reduction of exchange rate volatility are two crucial variables in conditional convergence, the latter especially for small open economies – such as almost all MENA countries.

An inspection of the economic significance of the impact of *TPR* on growth reveals that our estimates imply an elasticity between 0.005 and 0.01 of the level of per capita GDP with respect to the *TPR* variable. Consequently, a 100 per cent increase in *TPR* corresponds on average to a 0.8 per cent lower level of per capita GDP growth in a five-year period. The compared magnitude of exchange rate flexibility seems much larger at first glance, since its elasticity is around 0.03. Consider, though, that our descriptive evidence clearly shows that dramatic changes of *TPR* are not uncommon (Table 12.1). For instance, in 1998 the *TPR* of transition candidates was six times its value in 2000, the 2000 *TPR* of eurozone countries is one third of its value in 1995 and one tenth of its value in 1992. Given the magnitude of these *TPR* changes, their impact on growth is not at all negligible.

A potential limit of our results depends on the ex post nature of our *TPR* variable, while the theory predicts a relationship between ex ante expected exchange rate volatility and growth. A possible solution to this problem is the definition of a proxy of ex ante *TPR*, based on the strong relationship between *TPR* and quality of institutions and macroeconomic policies often advocated in the literature (see the argument in section 2 of Van Foreest and de Vries 2002) and documented in the descriptive findings of our chapter. We therefore argue that institutional quality and/or quality of monetary policy indexes may be reasonable proxies of ex ante expected *TPR*. To maintain our multilateral framework, we build an *E* [*TPR*] variable, which is a trade-weighted difference in the quality of monetary policy with the main trading partners or, alternatively, trade-weighted difference in the quality of institutions and of nominal interest rates. Results presented in Table 12.2 (column 7) show that the negative volatility–growth nexus is still there when trade portfolio volatility is instrumented by the above-mentioned variables. This last finding solves some potential endogeneity issues that may arise from the use of the *TPR* variable, but does not allow us to disentangle the effect of the two variables, as we did in previous estimates.

In the specification, we introduce also a dummy for flexible exchange rates, which is positive and significant. This confirms our hypothesis on the coexistence of cost of volatility and advantage of flexibility effects, and also the possibility of testing them together with our *TPR* measure.[10] An additional robustness analysis is performed, by checking whether the significance and magnitude of the effect of quality of institutions on the dependent variable persist when we replace our proxies of physical and human capital investment with variables recently suggested by the literature (see Note 7). Table 12.3 summarizes the findings from this exercise, showing how our main result is robust to these changes.

By taking as a reference coefficient magnitudes of institutional quality variables, we are able to make a simple quantitative exercise and check what would have been the predicted rate of growth in the last five years for MENA countries, had their level of institutional quality been that of the eurozone countries or the transition countries that entered the EU in 2004. This simulation may help us to get an idea of the perspective gains for MENA countries from the improved institutional quality required by an advance in the process of integration with eurozone countries.

Results of this exercise (Table 12.4) show that, in the last four years, MENA countries would have gained an additional cumulative 7.2 per cent growth with the overall index of economic freedom of the OECD non-EU countries, 5.4 per cent with those of the eurozone countries and 1.5 per cent with those of the transition countries that accessed the EU in the 2004. With the index of quality in credit, labour and business, the extra growth would have been up to 13.2 per cent (the same quality as OECD non-eurozone countries), 8.4 per cent (the same quality as eurozone countries) and 6.2 per cent (the same quality as transition countries that accessed the EU in 2004).

We are obviously well aware of the limits of these quantitative exercises. Even though the exact amount of the effect is no more than a qualified guess, we are much more confident of the existence and of the robustness of a positive and significant impact of quality of institutions on growth.

Table 12.3 Sensitivity analysis on the effects of institutional quality variables in MRW estimates with different human and physical capital proxies (specifications 4, 5 and 6 of Table 12.2)

	Average quality of schooling years		**Average years of schooling**		**Secondary school enrolment ratio**
	PWT physical capital investment	**WB physical capital investment**	**WB physical capital investment**	**PWT physical capital investment**	**PWT physical capital investment**
Indexfree	0.208	0.204	0.201	0.205	0.253
	[7.23]	[6.72]	[6.64]	[7.10]	[8.33]
Credit, labour and business	0.258 [6.27]	0.265 [6.49]	0.245 [5.99]	0.239 [6.08]	0.308 [7.88]
Legal structure and property rights	0.052 [2.85]	0.061 [3.18]	0.061 [3.19]	0.053 [2.91]	0.018 [3.68]

Table 12.4 If institutional coefficients were to be taken seriously . . . (additional four-year growth of per capita GDP growth of MENA countries if institutional indicators were those of OECD non-EU, eurozone or transition candidates) (%)

	OECD non-EU	**Eurozone**	**Transition candidates**
Indexfree	7.2	5.4	1.5
Credit, labour and business	13.2	8.4	6.2
Legal structure and property rights	3.0	2.7	0.7

Notes: Simulation realized by taking coefficients magnitude from columns 4, 5 and 6 of Table 12.2 and by replacing institutional values of MENA countries with those of the group of countries indicated in each of Table 12.4 columns.

Conclusion and policy implications for MENA countries

There is a growing consensus on the substantial impact that processes of regional integration might have on the peaceful coexistence of different populations and countries. More needs to be said about the links of regional integration with economic development. Two important directions to follow in this respect are the analysis of the impact on economic growth of improvement in institutional quality and reduction of multilateral exchange rate volatility, since both of these two factors might be clearly related with regional integration processes.

In this chapter, we outline and estimate a simple conditional convergence model augmented for these two factors. Model estimates show that the positive impact of both of these is quite robust, even though the multilateral exchange rate volatility argument seems to hold particularly for small open economies. Important policy implications stem directly from this analysis, if we simply consider the composition of the institutional quality indicators. Our findings suggest that economic growth can definitely be enhanced by:

- The *quality of the legal system* (judiciary independent and not subject to interference by the government or parties in disputes; impartial court with a trusted legal framework for private businesses to challenge the legality of government actions or regulation; protection of intellectual property; overall integrity of the legal system)
- *Adequate monetary policies* that promote price stability through the independence of central banks with anti-inflationary targets and by proper regulation in credit (competitive banking system; high percentage of credit extended to private sector)
- *Labour* (no inflationary system of collective bargaining and unemployment benefit systems that preserve the incentive to work)
- *Business* (limits in price control; reduction of bureaucratic delays in starting and managing a business; limits of trade and exchange rate controls).

The implications of these results for MENA countries are quite relevant. In our findings, we observe that, while they seem quite in line with EU countries in terms of control of multilateral exchange rate volatility, they lag behind when we consider indicators of institutional quality. In a final tentative simulation, we show that MENA countries' conditional convergence is expected to be much faster, should they be able to catch up to institutional quality levels of eurozone countries, or even the level of the transition countries recently admitted into the EU. In many cases, institutional conflicts of interest and domestic policy constraints might limit consensus and power for implementing these reforms that might, on the contrary, be stimulated by the desire to increase integration with trading countries. The significant institutional convergence of this last group of countries to the eurozone levels seems to indicate that regional integration remains a powerful force that can enact the institutional change needed to accelerate the process of convergence and growth.

Appendix

Composed indicators designed to identify the quality of institutional arrangements and policies (Indexfree)

(1) *Size of government: expenditures, taxes, and enterprises*:

- (a) General government consumption spending as a percentage of total consumption;
- (b) Transfers and subsidies as a percentage of GDP;
- (c) Government enterprises and investment as a percentage of GDP;
- (d) Top marginal tax rate (and income threshold to which it applies): (i) top marginal tax rate (excluding applicable payroll taxes); (ii) top marginal tax rate (including applicable payroll taxes);

(2) *Legal structure and security of property rights (Legstrupro)*:

- (a) Judicial independence: the judiciary is independent and not subject to interference by the government or parties in disputes;
- (b) Impartial court: a trusted legal framework exists for private businesses to challenge the legality of government actions or regulation;
- (c) Protection of intellectual property;
- (d) Military interference in rule of law and the political process;
- (e) Integrity of the legal system;

(3) *Access to sound money (Moneyacces)*:

- (a) Average annual growth of the money supply in the last five years minus average annual growth of real GDP in the last ten years;
- (b) Standard inflation variability in the last five years;
- (c) Recent inflation rate;
- (d) Freedom to own foreign currency bank accounts domestically and abroad;

(4) *Freedom to exchange with foreigners (Freedomexec)*:

- (a) Taxes on international trade: (i) revenue from taxes on international trade as a percentage of exports plus imports; (ii) mean tariff rate; (iii) standard deviation of tariff rates;
- (b) Regulatory trade barriers: (i) hidden import barriers – no barriers other than published tariffs and quotas; (ii) costs of importing – the combined effect of import tariffs, licence fees, bank fees and the time required for administrative red tape raises the costs of importing equipment;
- (c) Actual size of trade sector compared to expected size;

(d) Difference between official exchange rate and black-market rate;
(e) International capital market controls: (i) access of citizens to foreign capital markets and foreign access to domestic capital markets; (ii) restrictions on the freedom of citizens to engage in capital market exchange with foreigners index of capital controls among 13 IMF categories.

(5) *Regulation of credit, labour and business (Credlabus)*:

(a) Credit market regulations: (i) ownership of banks – percentage of deposits held in privately owned banks; (ii) competition – domestic banks face competition from foreign banks; (iii) extension of credit – percentage of credit extended to private sector; (iv) avoidance of interest rate controls and regulations that lead to negative real interest rates; and (v) interest rate controls on bank deposits and/or loans are freely determined by the market;
(b) Labour market regulations: (i) impact of minimum wage – the minimum wage, set by law, has little impact on wages because it is too low or not obeyed; (ii) hiring and firing practices – hiring and firing practices of companies are determined by private contract; (iii) share of labour force whose wages are set by centralized collective bargaining; (iv) unemployment benefits – the unemployment benefits system preserves the incentive to work; and (v) use of conscripts to obtain military personnel;
(c) Business regulations: (i) price controls – extent to which businesses are free to set their own prices; (ii) administrative conditions and new businesses – administrative procedures are an important obstacle to starting a new business; (iii) time with government bureaucracy – senior management spends a substantial amount of time dealing with government bureaucracy; (iv) starting a new business – starting a new business is generally easy; and (v) irregular payments – irregular, additional payments connected with import and export permits, business licences, exchange controls, tax assessments, police protection or loan applications are very rare.

Notes

1 The third generation of currency crisis models is very akin to this way of thinking, since it shows how crises need not be triggered by misalignment of fundamentals but might be triggered by self-fulfilling agents' expectations (Obstfeld 1986, 1994).

2 These findings are consistent with the argument of Ghosh *et al.* (1996) that the de facto behaviour of exchange rate may diverge from its de jure classification. Calvo and Reinhart (2000) argue that this difference may explain why results on the effects of exchange rate regimes on growth are inconclusive. Levy-Yeyati and Sturzenegger (1999) find that 12 out of 35 countries identified as free floating have, in fact, some form of exchange rate rigidity. These authors refer to this phenomenon as 'fear of floating'.

3 A typical example to illustrate this point is that the inspection of the volatility of the bilateral dollar–Argentinian peso exchange rate would suggest low nominal (and slightly higher real) export portfolio risk before the Argentinian crisis, while our measure of export portfolio risk would have been higher including the volatility generated by the devaluation of the currency of one of its main trade partners (such as Brazil).

4 Sensitivity analysis on our cut-off criteria shows that small changes do not alter the substance of our results. Results are omitted for reasons of space and are available upon request.

5 In a recent survey paper on these indicators, Whilborg (2004) demonstrates the strong correlation between the Frazer Institute indicators on the quality of institutions, institution investor country credit rating and Transparency International's corruption perception index.

6 To estimate our model, we set the abnormal EPR levels of the two hyperinflationary countries (Bolivia and Nicaragua) at the 95th percentile value of the EPR variable.

7 Even though adopted in most empirical growth papers, the choice of gross enrolment ratios as proxies of human capital investment has been criticized, since current enrolment ratios represent the investment of future and not current workers (Wossmann 2003). The solution considered optimal by the empirical literature is to use average schooling calculated by Barro and Lee (2000) corrected for the quality of teaching, the educational infrastructure, or the curriculum. The adjustment is obtained by using Hanushek and Kimko's (2000) educational quality index, conveniently normalized by Wossmann (2003) for each country relative to the measure for the United States.

8 For each specification, we also performed the correspondent level estimates, obtaining results consistent with MRW predictions. Since the focus of the chapter is on growth, we omit presentation of level results.

9 This result is robust to the introduction of variables measuring the bilateral exchange rate with the dollar, lagged changes in terms of trade and the dummy for flexible exchange rate regimes. Evidence on this point is omitted for reasons of space and is available from the authors upon request.

10 The dummy is significant also when introduced in specifications of columns 2, 3, 4′, 5′ and 6′. Results are omitted for reasons of space and are available upon request.

References

Alesina, A. and R. Perotti (1994) 'The Political Economy of Growth: A Critical Survey of the Recent Literature', *World Bank Economic Review*, 8 (3): 351–71.

Bagella, M., L. Becchetti and I. Hasan (2004) 'The Anticipated and Concurring Effects of the EMU: Exchange Rate Volatility, Institutions and Growth', *Journal of International Money and Finance*, 23 (7–8): 1053–80.

Barro, R.J., and J.W. Lee (2000) 'International Data on Educational Attainment: Updates and Implications', *Oxford Economic Papers*, 53 (3): 541–63.

Barro, R.J. and X. Sala-i-Martin (1995) *Economic Growth* (New York: McGraw-Hill).

Baum, C. F., M. Caglayan and J.T. Barkoulas (2001) 'Exchange Rate Uncertainty and Firm Profitability', *Journal of Macroeconomics*, 23 (4): 565–76.

Bernanke, B.S. and R.S. Gurkaynak (2001) 'Is Growth Exogenous? Taking Mankiw Romer and Weil Seriously', NBER Working Paper 8365 (Cambridge, MA: National Bureau of Economic Research).

Buiter, W., G. Corsetti and P. Pesenti (1998) *Financial Markets and European Monetary Cooperation. The Lessons from the '92–93 Crisis with 1998* (Cambridge: Cambridge University Press).

Caballero, R.J. and V. Corbo (1989) 'The Effect of Real Exchange Rate Uncertainty on Exports: Empirical Evidence', *World Bank Economic Review*, 3 (2): 263–78.

Calvo, G. and C. Reinhart(2000) 'Fear of Floating', available at:www.puaf.umd.edu/papers/reinhart/rearrev.pdf

Cottani, J., D.F. Cavallo and M.S. Khan (1990) 'Real Exchange Rate Behavior and Economic Performance in LDCs', *Economic Development and Cultural Change*, 39 (3): 61–76.

Darby, J., A. Hughes-Hallett, J. Ireland and L. Piscitelli (1999) 'The Impact of Exchange Rate Uncertainty on the Level of Investment', *Economic Journal*, 109: C55–C67.

de Grauwe, P. and G. Schnabl (2004) 'Exchange Rate Regimes and Macroeconomic Stability in Central and Eastern Europe', CESifo Working Paper 1182 (Munich: CESifo).

de Melo, M., C. Denizer and A. Gelb (1996) 'From Plan to Market: Patterns of Transition', WB Policy Research Working Paper 1564 (Washington, DC: World Bank).

Devereux, M.B., C. Engel and C. Tille (1999) 'Exchange Rate Pass-through and the Welfare Effects of the Euro', NBER Working Paper 7382 (Cambridge, MA: National Bureau of Economic Research).

Dollar, D. (1992) 'Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976–85', *Economic Development and Cultural Change*, 40 (3): 523–44.

Durlauf, S.N. and D.T. Quah (1998) 'The New Empirics of Economic Growth', CEP Discussion Paper 384 (London: Centre for Economic Performance, London School of Economics).

Edwards, S. and E. Levy-Yeyati (2003) 'Flexible Exchange Rates as Shock Absorbers', NBER Working Paper 9867 (Cambridge, MA: National Bureau of Economic Research).

Esfahani, H.S. and M.T. Ramirez (2003) 'Institutions, Infrastructure, and Economic Growth', *Journal of Development Economics*, 70 (2): 443–77.

Fischer, S., R. Sahay and C. Vegh (1996) 'Stabilization and Growth in Transition Economies: The Early Experience', *Journal of Economic Perspectives*, 10 (2): 45–66.

Froot, K.A. and P.D. Klemperer (1989) 'Exchange Rate Pass-through When Market Share Matters', *American Economic Review*, 79 (4): 637–54.

Ghosh, A.R., J.D. Ostry, A.M. Gulde and H.C. Wolf (1996) 'Does the Exchange Rate Regime Matter for Inflation and Growth?', *IMF Economic Issues*, 2 September.

Ghura, D. and T. Grennes (1993) 'The Real Exchange Rate and Macroeconomic Performance in Sub-Saharan Africa', *Journal of Development Economics*, 42 (1): 155–74.

Gwartney, J. and R. Lawson with D. Samida (2000) *Economic Freedom of the World: 2000 Annual Report* (Vancouver: Frazer Institute).

Hall, R.E. and C.I. Jones (1999) 'Why Do Some Countries Produce So Much More Output Per Worker than Others?', *Quarterly Journal of Economics*, 114 (1): 83–116.

Hanushek, E.A. and D.D. Kimko (2000) 'Schooling, Labor-Force Quality, and the Growth of Nations', *American Economic Review*, 90 (5): 1184–208.

Heston, A. and R. Summers (1996) 'International Price and Quantity Comparisons: Potentials and Pitfalls', *American Economic Review*, 86 (2): 20–4.

International Monetary Fund (IMF), Direction of Trade Statistics (DOTS) database (Washington, DC: IMF).

Islam, N. (1995) 'Growth Empirics: a Panel Data Approach', *Quarterly Journal of Economics*, 110 (4): 1127–69.

King, R.G. and R. Levine (1993) 'Finance and Growth: Schumpeter Might Be Right', *Quarterly Journal of Economics*, 108 (3): 717–38.

Klein, P.G. and H. Luu (2003) 'Politics and Productivity', *Economic Inquiry*, 41 (3): 433–47.

Levy-Yeyati, E. and F. Sturzenegger (1999) 'Classifying Exchange Rate Regimes: Deeds vs Words', Business School, Universidad Torcuato Di Tella, November, available at: www.utdt.edu/~ely/papers.html

Levy-Yeyati, E. and F. Sturzenegger (2003a) 'To Float or to Fix: Evidence on the Impact of Exchange Rate Regimes', *American Economic Review*, 93 (4): 1173–93.

Levy-Yeyati, E. and F. Sturzenegger (2003b) 'A de facto Classification of Exchange Rate Regimes: A Methodological Note', *American Economic Review*, 93 (4) (Web edn).

Mankiw, N.G., D. Romer and D. Weil (1992) 'A Contribution to the Empirics of Economic Growth', *Quarterly Journal of Economics*, 107 (2): 407–37.

Mauro, P. (1995) 'Corruption and Growth', *Quarterly Journal of Economics*, 110 (3): 681–712.

McKinnon, R. (2004) 'Optimum Currency Areas and Key Currencies: Mundell I versus Mundell II', *Journal of Common Market Studies*, 42 (4): 689–715.

Meade, J. (1951) *The Theory of International Economic Policy* (London: Oxford University Press).

Mundell, R. (1961) 'A Theory of Optimal Currency Areas', *American Economic Review*, 51: 657–65.

Mundell, R. (1973a) 'Uncommon Arguments for Common Currencies', in H. Johnson and A. Swoboda (eds), *The Economics of Common Currencies* (London: George Allen & Unwin): 114–32.

Mundell, R. (1973b) 'A Plan for a European Currency', in H. Johnson and A. Swoboda (eds), *The Economics of Common Currencies* (London: George Allen & Unwin): 143–72.

Obstfeld, M. (1986) 'Rational and Self-Fulfilling Balance-of-Payments Crises', *American Economic Review*, 76: 72–81.

Obstfeld, M. (1994) 'The Logic of Currency Crises', *Banque de France Cahiers Economiques et Monetaires*, 43: 189–213.

Obstfeld M. and K. Rogoff (1995) 'The Mirage of Fixed Exchange Rates', *Journal of Economic Perspectives*, 9 (4): 73–96.
Pagano, M. (1993) 'Financial Markets and Growth: An Overview', *European Economic Review*, 37 (2–3): 613–22.
Qian, Y. and P. Varangis (1994) 'Does Exchange Rate Volatility Hinder Export Growth?', *Empirical Economics*, 19: 371–96.
Rodrik, D. (1999) 'Where Did All the Growth Go? External Shocks, Social Conflict and Growth Collapses', *Journal of Economic Growth*, 4 (4): 385–412.
Rodrik, D. (2000) 'Institutions for High-Quality Growth: What They Are and How to Acquire them', *Studies in Comparative International Development*, 35 (3): 3–31.
Rodrik, D. (2002) 'Trade Policy Reform as Institutional Reform', in B.M. Hokeman, P. English and A. Mattoo (eds), *Development, Trade, and the WTO: A Handbook* (Washington, DC: World Bank).
Sala-i-Martin, X. (2002) 'Fifteen Years of New Growth Economics: What Have We Learnt?', Working Paper 172 (Santiago: Central Bank of Chile).
Serven, L. (2000) 'Real Exchange Rate Uncertainty and Private Investment in Developing Countries', WB Policy Research Working Paper (Washington, DC: World Bank).
Solow, R. (1956) 'A Contribution to the Theory of Economic Growth', *Quarterly Journal of Economics*, 70 (1): 65–94.
Van Foreest, P. and C. de Vries (2002) 'The Forex Regime and EMU Expansion', Tinbergen Institute Discussion Papers 02–010/2, Tinbergen.
Whilborg, C. (2004) 'Financial and Legal Barriers to Growth and Conditional Convergence', Euroky-Pia Project Working Paper (Brussels: European Commission).
World Bank (2005) *World Bank Indicators* (Washington, DC: World Bank).
Wossmann, L. (2003) 'Specifying Human Capital', *Journal of Economic Surveys*, 17 (3): 239–70.

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Key: **bold** = extended discussion; f = figure; n = endnote/footnote; t = table.