The African Manufacturing Firm

An analysis based on firm surveys in seven countries in sub-Saharan Africa

Dipak Mazumdar and Ata Mazaheri

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The African manufacturing sector continues to face many problems as it struggles to progress from its presently underdeveloped state. If the countries that make up Africa are ever to raise the living standards of the vast majority of its population to a more acceptable level, then the economic growth that would result from an enlarged and improved manufacturing sector may hold an important key.

The book provides a useful source of greater understanding of African manufacturing firms and the perplexing lack of widespread industrial growth during the post-colonial decades. The comprehensive coverage includes such themes as:

- the size and distribution of firms in Africa
- entrepreneurship, labor and the regulatory business environments in Africa
- the dynamic problem of growth and investment of firms

Any reader wanting to understand the economic problems of Africa will need to read this book, and any student academic or policy-maker working in the areas of development and industrial economics will find it to be a most useful guide.

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Preface

This book is a comprehensive treatment of the organized (i.e. non-household) manufacturing sector in sub-Saharan Africa. The basic statistical database for the study is provided by the so-called RPED[1] surveys conducted in several African countries in the period 1992–96 in three waves. The surveys were organized and coordinated by the World Bank with large-scale financial support from a number of donor countries. The purpose was to collect basic information on a number of questions about the characteristics and functioning of the non-household manufacturing sector in sub-Saharan Africa. The surveys included firms of all sizes, except those that made use principally of family workers, both in the formal (registered) and the informal (unregistered) sectors.

Some technical articles have been published in academic journals on specific topics covered by the RPED, notably by the inter-University research group ISA (Industrial Survey Analysis).[2] This book is the first work of its kind which investigates in an inter-connected way many areas of the firms' operations, using the data for all seven countries and for all three waves. Much of the results are from original tabulations and analysis of the data sets, but an attempt has been made throughout to survey the results from other work done on the same data set. We have also used non-RPED studies in sub-Saharan Africa wherever appropriate and compared them with broad trends in other regions of the world.

The African manufacturing sector, as covered by the RPED surveys, is still pretty narrow. But this is the sector, which is likely to be the leading one with the economic growth in future. An understanding of the problems encountered, as the sector struggles to graduate from its relatively underdeveloped state, are of importance not only in sub-Saharan Africa (SSA), but also in other parts of the developing world. It should also be emphasized that the seven countries on which we concentrate cover a fairly wide spectrum of development, and contain a few like Zimbabwe and Côte d'Ivoire, where organized manufacturing has a more significant presence.

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[1] Research Program in Enterprise Development is the name of the unit in the World Bank entrusted with the organization of and the work on the surveys.

[2] The work of this group is cited in the bibliography, authored by Bigsten *et al.*

The book is in six parts. After a short overview of the economies we are dealing with in Part I, we turn in Part II to an examination of the size distribution of firms (enterprises), the production relations in African manufacturing and the relative productivities of small and large firms. Part III is a detailed discussion of the factors of production – entrepreneurship, finance, labor, and the regulatory and business environments in which the firms have to operate. The ranking of the different problems facing the firm and of the obstacles to growth are also included in the discussion of this Part. In Part IV we turn to static and dynamic problems in the operation of firms. The first two chapters, Chapters 9 and 10, deal with two different indices of the firm efficiency. The next two deal with the dynamic problems of investment and the growth of firms. Part V is on the critical topic of participation in the export market by African manufacturing firms. Chapter 13 deals with the general macro issues discussed in the literature, and is followed by a detailed discussion of the survey based evidence on the extent of participation, the characteristics of successful exporters, and of the impact of export activity on firm efficiency. Finally, Chapter 15 in Part VI provides an inter-connected account of the major conclusions reached in the individual chapters.

The study was initiated at the suggestion of Mr. Tyler Biggs of the World Bank who was responsible for coordinating the RPED surveys used in this book. Mr. Tyler's unit in the Africa Region of the Bank financed the first stages of the work. After Mr. Tyler's departure from the Bank the International Development Research Center (IDRC) in Ottawa provided invaluable support for the completion of the work. The authors are also grateful to Manju Shah who organized some of the datasets and contributed the first draft of Chapter 12 (with Vijay Ramachandrdan).

Part I
Introduction

1 The Economies of the Survey Countries in Africa

The economies of sub-Saharan Africa (SSA) have gone through major changes over the last three decades. The import-substitution strategy in SSA had much in common with similar strategies pursued in other regions in the developing world: quantitative control on imports to protect the balance of payments, even while high tariff barriers and overvaluation of currencies sought to favor the domestic manufacturing sector expanding in the internal rather than the world market. This bundle of policies often went hand in hand with vigorous state participation in economic activities, including state ownership of some manufacturing enterprises, and large public expenditure creating serious budget deficits. The economic crises which some of these unsustainable policies created led in its turn to a reversal of policies. Before the liberalization efforts could take place in a productive way, it was necessary for some of these economies to adopt stabilization policies to bring inflation, budget deficits and balance of payment accounts under control. Stabilization had to follow with structural adjustment of the economies to enable the badly controlled economies to try and develop along more orthodox lines with private enterprise and investment. These programs of structural adjustment were encouraged by international institutions like the IMF and the World Bank, which promised structural adjustments loans in return.

The RPED survey of the manufacturing sector in the first half of the 1990s, which is the subject of our detailed analyses in the subsequent chapters, was an attempt to study the problems of enterprises in this sector at the micro level as they responded to the structural adjustment programs of the late eighties and the early nineties. The countries in which the firm level surveys were conducted in three waves between 1992 and 1996 included two Francophone countries, Cameroon and Côte d'Ivoire, and four Anglophone ones, Kenya, Tanzania, Zambia, and Zimbabwe in East and South-East Africa, and Ghana in the western part of the continent.[1]

Although the adjustment programs had some basic elements in

[1] For a discussion of the sampling procedures see Chapter 2, Appendix.

common, the countries differed widely, in terms of the dates at which the programs were implemented, in the comprehensiveness and intensity of the reform plans, and in the degree of seriousness with which they were implemented. At the same time the geographical proximity of these countries does not ensure a similar economic performance. In fact, the underlying fundamentals of these countries might be different enough to account for the different responses to the structural adjustment programs. The inherent differences in the macroeconomics of these sub-Saharan countries might very well be responsible for the differences that can be uncovered from the analysis of the microeconomic issues of the manufacturing sector discussed in the following chapters. We begin, therefore, with an outline of the basic economic structure and the macroeconomic development of these seven sub-Saharan countries. It might provide valuable background information that can assist us in interpreting the results of the survey data undertaken in the subsequent sections.

The Position of the Countries in the Development Scale

As Table 1.1 reveals, Kenya and Tanzania with respectively 26.7 and 29.7 million people in 1995 are the most populated countries in the sample. All the other five countries are rather small with populations ranging from 8.98 million in Zambia to 13.98 in Côte d'Ivoire. One thing common among all these countries is the very high rate of population growth where it stands at around or even exceeds 3%. This rate of population growth has persisted for three decades, and moderated only slightly in the period 1989–96.

Table 1.1 also shows the degree of urbanization in these countries. For Tanzania and Kenya the urbanization rate is a little below 30% whereas more than 40% of the population in the Francophone countries and in Zambia are urbanized. Interestingly enough, except for Ghana and Zambia, the degree of urbanization appears to have increased by more than 50% between the mid 1970s and mid 1990s, a span of 20 years.

Table 1.1: Population and Urbanization

	Population	*Population Growth*			*Urban Population as a Percentage of Total Population*		
	1995	*1975–79*	*1980–88*	*1989–96*	*1975–79*	*1980–88*	*1989–96*
Cameroon	13.29	3.1	2.7	2.9	31.4	38.5	45.5
Côte d'Ivoire	13.98	3.9	3.8	3.2	34.8	39.8	44.0
Ghana	17.08	1.7	3.3	2.8	31.2	33.3	36.4
Kenya	26.69	3.7	3.6	2.7	16.1	22.4	29.5
Tanzania	29.65	3.1	3.2	3.0	14.8	19.5	24.9
Zambia	8.98	3.4	3.1	2.9	39.8	41.6	43.3
Zimbabwe	11.01	2.8	3.4	2.5	22.3	27.1	32.5

Source: African Economic Indicators.

Table 1.2 demonstrates the substantial difference in the development scale of the sub-Saharan countries covered. One important point to notice is the significant difference between the Francophone countries, Cameroon and Côte d'Ivoire, and the others. The per capita GDP in these two countries is significantly higher than the rest, with the exception of Zimbabwe. The ordering of the countries in terms of their standard of living, however, changes significantly if we use the PPP dollar rather than the US dollar at the official exchange rate (see the column showing the figures for 1994). Tanzania and Zambia still remain at the bottom of the ladder, but Ghana now joins Zimbabwe and one of the two Francophone countries as the ones with the highest living standards of the sample, and Kenya shares with Côte d'Ivoire the distinction of occupying the second tier.

Table 1.2: GDP per Capita in US Dollars and PPP

	1991	*1992*	*1993*	*1994*	*1995*	*1994 PPP*
Cameroon	930	940	770	640	610	1,950
Côte d'Ivoire	750	770	730	650	650	1,370
Ghana	410	430	410	360	350	2,050
Kenya	350	330	270	260	280	1,310
Tanzania	180	160	170	160	170	620
Zambia	400	370	380	340	330	860
Zimbabwe	910	740	670	650	650	2,040

Source: African Economic Indicators.

Trends in the Economy of Each Country

Table 1.3 also reveals deterioration in standard of living in almost all seven countries. Cameroon had a strong growth in the decade 1975–84 which the decline in the subsequent decade has almost completely wiped out. By contrast Ghana's strong decline in the 1975–84 period, and for that matter even earlier, has been compensated by a recovery after the structural adjustment programs were inaugurated in 1983. With the exception of Ghana, none of the other sub-Saharan countries covered by the RPED surveys exhibits a particularly strong growth of GDP in excess of the population growth since the mid 1980s. Zimbabwe and Kenya performed reasonably well in the second half of the 1980s, but the rate of growth appears to have slowed significantly in the 1990s. In fact, *all* countries in the sample have had a declining per capita GDP in the nineties with the sole exception of Ghana.

Table 1.3: Average Percentage Change in GDP and GDP per Capita

	GDP			*GDP per Capita*		
	1975–84	*1985–89*	*1990–97*	*1975–84*	*1985–89*	*1990–97*
Cameroon	8.5	−0.1	−0.9	5.5	−2.9	−3.9
Côte d'Ivoire	2.2	2.2	2.4	−1.7	−1.7	−0.6
Ghana	−1.1	5.2	4.4	−4.5	1.7	2.6
Kenya	4.7	5.9	2.1	0.9	2.6	−0.1
Tanzania	..	..	2.8	..	..	−0.2
Zambia	0.2	2.3	0.4	−2.8	−0.7	−2.4
Zimbabwe	3.0	4.2	2.1	0.2	0.9	–0.3

Source: African Development Indicators.

As Table 1.4 reveals, Ghana and Tanzania are by far the most agricultural-based economies with close to 50% of their value added created in the agricultural sector. On the other hand, Zambia and Zimbabwe are the two most industrialized countries with close to 40% of their gross domestic product contributed by industry. Looking at manufacturing *per se* Zambia and Zimbabwe are at the top of the league with a total share of 30% in 1995. Ghana and Tanzania bring up the bottom with only 6–8% of the value added generated in manufacturing.

Table 1.4: Structure of Production (Percentages of GDP)

	Agriculture		*Industry*		*Manufacturing*		*Services*	
	1980	*1995*	*1980*	*1995*	*1980*	*1995*	*1980*	*1995*
Cameroon	29	39	23	23	9	10	48	38
Côte d'Ivoire	27	31	20	20	13	18	53	50
Ghana	58	46	12	16	8	6	30	38
Kenya	33	29	21	17	13	11	47	54
Tanzania	46	58	18	17	11	8	37	24
Zambia	14	22	41	40	18	30	44	37
Zimbabwe	14	15	34	36	25	30	52	48

Source: Word Development Report.

Table 1.5: The Structure of Employment (Percentages of Total)

	Agriculture			*Industry*			*Services*		
	1970	*1980*	*1990*	*1970*	*1980*	*1990*	*1970*	*1980*	*1990*
Cameroon	85	73	70	5	8	9	10	19	21
Côte d'Ivoire	76	65	60	6	8	10	19	27	30
Ghana	60	61	59	15	13	13	25	25	28
Kenya	86	82	80	5	6	7	9	11	13
Tanzania	90	86	84	3	4	5	7	10	11
Zambia	79	76	75	7	8	8	14	16	17
Zimbabwe	77	72	68	11	12	8	12	15	24

Source: African Economic Indicators.

Like in many other developing countries, employment in sub-Saharan Africa appears to be concentrated mainly in agriculture. In 1990, between 60% (Ghana and Côte d'Ivoire) and 80% (Kenya and Tanzania) of total employment was concentrated in the agricultural sector whereas only 5–13% of total employment was in industry. The Francophone countries exhibit a very strong shift in employment between 1970 and 1990 when the share of employment in agriculture decreased at least 15%. For the other five countries, however, this shift appears to be rather small and stands around 9% in Zimbabwe and between 1% and 6% in the other four countries. It is also of importance to note that the observed decrease in the share of agriculture in total employment has to a large extent benefited the service sector rather than industry. For instance, the increase in the share of industrial employment between 1980 and 1990 has been at best marginal for all seven countries. In fact, it has shown a decrease from 12% to 8% in the case of Zimbabwe. However, the share of employment in the service sector has shown a steady and rather large increase. This has been rather more transparent in the case of Francophone countries and Zimbabwe where the share of employment in the service sector has nearly doubled.

Structure of Demand

Much of the economic literature on growth in sub-Saharan Africa or elsewhere concentrates on the relationship between growth and capital formation. In fact, a large number of empirical studies found a very significant positive relation between the rate of growth of real GDP and relative investment, i.e. the ratio of investment to output. For instance, for the global sample, recent studies such as that conducted by Collier and Gunning (1999) or earlier studies such as Barro and Lee (1994), and for African countries, the recent article by Ghura and Hadjimicheal (1996) emphasize this relationship. In fact, the low rate of economic growth and in many cases the deterioration of standards of living in sub-Saharan Africa has been specifically attributed to low level of investment. A closer look at the structure of demand in sub-Saharan Africa may provide valuable information on this point.

Table 1.6 reveals that the share of domestic investment in gross domestic product has declined in five out of the seven countries. The exceptions are Ghana, where it has grown from 5.6% in 1980 to 18.6% in 1995, and Zimbabwe where it grew from 16.9% to 23.2%. The decline in the share of domestic investment has been very noticeable in both Francophone countries and in Zambia, where it has plunged to 13.9% in 1995 from 23.3% in 1980. The average rate of investment in sub-Saharan Africa in the mid 1990s is significantly below ratios attained for other developing countries such as Latin America (20–22%) or Asia (27–29%).

Domestic saving should be the primary source of domestic investment and hence the low level of capital accumulation in sub-Saharan Africa has been in many studies attributed to their low level of savings. Studies of domestic savings in these countries demonstrate clearly that sub-Saharan Africa has been plagued by low levels of savings in the 1980s. Aryeetey and Udry (2000) report that the rate of domestic savings in this region amounted to only 8% of their GDP which is well below the 23% seen in southeast Asia or 35% in Newly Industrialized Economies. They also found that the rate of saving has been in consistent decline in the last three decades. This finding is also confirmed by the figures reported in Table 1.6. The rate of savings has declined in most cases and in some cases very dramatically between 1980 and 1990.

In both Ghana and Zimbabwe where the share of investment exhibits significant growth, the share of domestic savings also has grown. In Ghana, domestic savings has grown almost two folds to 9.9% whereas in Zimbabwe it has grown to 20.8% from 13.8% in 1980. Among other countries, Tanzania has negligible savings and Zambia demonstrates a severe deterioration in the rate of savings between 1980 and 1995. Cameroon and Kenya, on the other hand, show a rather healthy savings rate albeit declining in the case of Kenya. However, with the exception of the Francophone countries, the rate of savings remains well below the rate of investment in the mid 1990s. This difference is glaring for Ghana, Tanzania, and Zambia where the rate of savings is less than half of the rate of investment implying significant foreign borrowings. In Tanzania the rate of domestic savings has been strikingly low and in fact had turned negative in some sub-periods.

Table 1.6: Distribution of GDP, Domestic Investment, Domestic Savings, and Resource Balance as a Percentage of GDP

	Domestic Investment			*Domestic Saving*			*Resource Balance*		
	1980	1990	1995	1980	1990	1995	1980	1990	1995
Cameroon	21.0	17.8	14.5	20.4	20.9	20.7	−0.6	3.1	6.2
Côte d'Ivoire	26.5	6.7	13.5	20.4	11.3	18.9	−6.2	4.6	5.4
Ghana	5.6	14.4	18.6	4.9	5.5	9.9	−0.7	−9.0	−8.7
Kenya	29.2	24.3	21.8	18.1	19.1	15.9	−11.1	−5.2	−5.9
Tanzania	..	22.6	21.9	..	0.3	0.0	..	−22.3	−21.9
Zambia	23.3	17.3	13.9	19.3	16.6	7.7	−4.0	−0.7	−6.2
Zimbabwe	16.9	17.4	23.2	13.8	17.4	20.8	−3.2	0.1	−2.5

Source: African Development Indicators.

The adjustment policies of the late 1980s and early 1990s have helped to strengthen the resource balance in most countries. The resource balance in both Francophone countries had turned positive in the mid to late 1980s and continued to grow between 1990 and 1995. Ghana is the lone country that shows a significant deterioration in its resource balance where the deficit has ballooned to approximately 9% of their GDP because of heavy borrowing by the government. However, even the reform policies of the last two decades have yet to help the rate of savings in Tanzania to recover. The rate of domestic savings remained low or turned even negative during the adjustment period reflecting the heavy dissaving by the public sector caused by huge loses made by public enterprises.

Fiscal and Monetary Situation: the Impact of Adjustment

A general complaint about African economies is that the economic size of the government has been too large, contributing to serious fiscal and monetary problems. The size of the government differs significantly from country to country. For four countries (Ghana, Kenya, Zambia, Zimbabwe), government expenditure represents more than 30% of the gross domestic product. Cameroon and Tanzania with 16.2 and 18.3% respectively have the smallest relative government size. Table 1.7 also reveals that the size of government has risen dramatically in Ghana and has shrunk significantly in Côte d'Ivoire. Furthermore, except for Ghana, the relative government size has been reduced following the adjustment period of the late 1980s.

Table 1.7: Government Expenditure and Budget Deficit as a Percentage of GDP

	Government Expenditure			*Budget Deficit*		
	1980	*1990*	*1995*	*1980*	*1990*	*1995*
Cameroon	16.0	21.8	16.2	0.4	−7.6	−3.2
Côte d'Ivoire	37.4	33.4	26.5	−8.5	−12.0	−3.7
Ghana	18.7	18.2	31.8	..	−3.1	−6.7
Kenya	32.5	30.9	30.9	−7.1	−5.1	−0.6
Tanzania	..	17.2	18.3	..	−0.5	−3.9
Zambia	38.1	32.9	31.2	..	−8.3	−4.6
Zimbabwe	4.2	34.3	35.8	7.6	−6.5	−9.3

Source: African Development Indicators.

The governments are not generally able to cover the expenditure from their revenues. All seven countries show a large government deficit in 1995 with Zimbabwe and Ghana having really serious deficits. Following the austerity measures of the early 1990s, it appears that the Francophone countries have reduced their budget deficit significantly. Among Anglophone countries, only Kenya and Zambia have been successful in reducing their budget deficit whereas for Ghana, Tanzania, and Zimbabwe the budget deficit has grown dramatically. In the case of Ghana, this has coincided with the dramatic increase in the government size whereas in the case of Tanzania and Zimbabwe the declining revenue associated with dissaving in public enterprises and the reduction in the revenue base are the primary culprits.

The level of government expenditure and the associated budget deficits would be factors fueling inflation. The data on changing inflation rates in the RPED countries are presented in Table 1.8. The Francophone countries are distinct from the others. The tying of the currency to the French franc, and the rules regarding control of the money supply in the French monetary system has always kept the rate of inflation at moderate levels. In both Cameroon and Côte d'Ivoire the rate of inflation has decreased to single digit numbers since 1975. The bump in the inflation rate following the 50% devaluation with respect to the French franc in 1994–5 produced a hiccup in inflation, but as can be seen, was controlled within the year in both countries. All Anglophone countries, however, show periods of double digit and even rising inflation rates. Ghana had suffered acute problems of inflation prior to the adoption of the structural adjustment measures starting in 1983, but the inflation rate, although reduced, continued to be high touching an average close to 30% per annum in the 1990s. Zambia experienced continuing hyperinflation for the last three decades with some progress made following the structural adjustment of the 1990s. High inflation rates, usually above 20%, have been the story of Tanzania and Zimbabwe, and to a lesser extent Kenya, through the second half of the 1980s and the first half of the 1990s.

Table 1.8: Inflation

	1975–84	*1985–89*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
Cameroon	11.4	6.0	1.87	1.35	−3.62	12.60	26.8	6.44	1.95
Côte d'Ivoire	13.3	5.3	1.58	4.22	2.55	32.27	7.66	3.50	3.03
Ghana	65.8	27.8	17.99	10.10	25.03	24.88	59.46	45.60	27.90
Kenya	..	10.0	19.66	27.20	46.01	28.80	1.52	8.98	11.20
Tanzania	19.6	30.7	28.72	21.83	25.28	33.10	33.99	25.70	17.10
Zambia	14.7	57.0	92.59	197.40	189.00	55.55	34.90	43.10	24.40
Zimbabwe	..	11.2	23.33	42.05	27.64	22.25	22.60	20.88	18.54

Source: African Development Indicators.

One of the problems of these economies before the adjustment measures had been that, while the inflation rates continued to be high, nominal interest rates in the formal banking sector were controlled. Thus low or even negative real interest rates were common for preferred borrowers who had access to credit. Table 1.9 shows that the real interest rate appears to have increased substantially in the 1990s with the advent of structural adjustment programs. More specifically, for the Francophone countries, i.e. Cameroon and Côte d'Ivoire, the real interest rate has been very high and has averaged double-digit rates since the mid 1980s. For instance, the real interest rate was almost 19% in 1997 for Cameroon and has been consistently over 15% except for 1994–95 when the local currency was devaluated. The Anglophone countries also exhibit high real interest rates since the early 1990s. For instance, in 1996, the real interest rate stood at over 23% for both Zambia and Kenya and was quite high for all other countries.

Table 1.9: Real Interest Rate

	1975–84	*1985–89*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
Cameroon	0.6	12.3	14.1	19.3	15.1	5.8	−0.9	15.7	18.8
Côte d'Ivoire	1.5	15.7	15.2	16.8	..	..	..	..	..
Ghana	−23.2	−7.6	..	..	..	..	..	..	..
Kenya	0.8	6.5	6.7	3.1	16.5	0.7	15.8	23.1	12.8
Tanzania	..	−0.2	..	..	16.6	8.4	10.8	12.2	9.1
Zambia	2.5	−23.5	..	−41.8	−12.4	8.9	6.3	23.7	16.5
Zimbabwe	7.6	1.9	−11.6	−6.2	11.8	9.0	22.1	6.0	14.2

Source: Global Development Finance & World Development Indicators.

Table 1.10: Black Market Premium

	1975–84	*1985–89*	*1990*	*1991*	*1992*	*1993*	*1996*	*1997*
Cameroon	2.90	1.92	5.74	2.43	2.04	1.97	..	..
Côte d'Ivoire	2.90	1.92	3.48	2.43	2.04	1.97		
Ghana	820.7	72.91	10.80	3.90	3.32	2.56	1.60	1.49
Kenya	15.27	10.06	1.88	9.59	38.42	56.61	4.19	5.68
Tanzania	176.9	160.60	49.91	59.02	36.35	9.43	4.26	7.31
Zambia	97.24	246.80	301.5	107.7	18.51	22.20	6.49	19.05
Zimbabwe	106.3	59.4	37.07	50.01	32.63	19.46	7.45	15.87

Source: Levine and Renelt; World's Currency Yearbook (for 1985, 1990–93); Adrian Wood, Global trends in real exchange rates: 1960–84, WB Discussion paper no. 35. 1988 (filling in missing observations); Global Development Finance & World Development Indicators (for 1996–97, calculated as [(parallel Exchange/official Exchange-1)*100].

Like many other developing countries, the sub-Saharan countries suffered from overvalued currencies which has led to the establishment of black markets in exchange rate. With the exception of the Francophone countries where the currency union with France has contained the black market over the last three decades, the premium has often been in double-digit numbers in the rest of the countries. However, the currency devaluations in the adjustment period have sought to correct this particular distortion. The success in the Ghana case has been spectacular as can be seen from Table 1.10. The other Anglophone countries had also achieved a fair amount of success in this regard by the mid 1990s.

A high rate of inflation, such as has persisted in the sub-Saharan economies erodes international competitiveness, unless it is compensated by required adjustments of the exchange rate. The state of international competitiveness of a country has often been analyzed using the real effective exchange rate (REER) index, which is calculated as the weighted average of prices of traded goods in the country relative to that of its main competitors. A decline (increase) in the value of the REER indicates real depreciation (appreciation) of the exchange rate. Fluctuations in the REER are caused by the fluctuation in its components, namely the domestic and/or foreign prices and the nominal exchange rate. These indices are reported in the following table.

Table 1.11: Real Effective Exchange Rate

	1990 = 100						
	1975–84	*1985–89*	*1993*	*1994*	*1995*	*1996*	*1997*
Cameroon	84.2	98.9	88.0	59.1	55.9	52.8	49.7
Côte d'Ivoire	102.2	102.1	99.2	60.9	70.2	70.5	77.8
Ghana	32.0	86.0	129.0	157.8	129.7	118.5	113.3
Kenya	141.2	120.5	89.3	112.0	111.0	108.7	94.7
Tanzania	..	138.3	94.0	93.6	97.0	117.8	134.5
Zambia	143.7	85.3	101.6	98.6	94.6	98.1	117.5
Zimbabwe	175.6	130.3	86.5	84.1	90.1	83.5	82.6

Source: African Economic Indicators.

The External Sector

Export Trends

Sub-Saharan Africa has long suffered from a declining export sector. A comprehensive analysis of trade data completed at the World Bank reached the following conclusion:

> During the last three decades the sub-Saharan African global exports either declined in absolute terms or expanded at a slower pace than world trade. Although global market conditions for major African countries in the mid-1990s were far more favorable than those prevailing over most of the last two

> or three decades the evidence suggests that Africa continued to be marginalized in world trade. The Africa share of global non-oil exports is now less than one-half of what it was in the early 1980s (Ng and Yeats 2000, p. 10).

Admittedly the share of world trade was never very high for this region. But the degree of marginalization of Africa in international economic relations can be gauged from the fact that while in the early 1950s sub-Saharan Africa accounted for 3.1% of world exports, this share had fallen to one-third of this ratio by the early 1990s. Table 1.12 reproduces some statistics from the above study on the growth rates of exports for different periods, and also sets the record of the RPED countries against the background of the rest of the region.

For the several periods distinguished in Table 1.12, the growth rate of exports of African countries – including those in the RPED sample – was either negative, or positive but well below the growth rate for non-SSA countries. The exception is the period 1993–96. These years seem to represent an anomaly when the global demand for Africa's traditional exports (cotton, coffee, leather etc.) was well above historical levels. The East Asian crisis and its impact on world trade seem to have choked off this demand in the post-1996 period.

Table 1.12: Compound Annual Growth Rates for Exports for Selected Periods, 1980–98

Countries	*1980–85*	*1985–90*	*1990–93*	*1993–96*	*1996–98*
All non-oil					
SSA	–6.9	8.0	–4.6	13.9	0.6
Non-SSA	1.2	16.6	3.3	12.6	2.5
Cameroon	–5.9	4.3	–5.2	15.5	–0.3
Côte d'Ivoire	–0.6	–1.4	–2.3	15.9	–1.2
Ghana	–14.1	15.3	–1.7	12.9	4.8
Kenya	–0.4	2.9	2.5	10.4	–2.1
Zambia	–15.4	12.6	–15.4	–7.9	–0.9
Zimbabwe	10.5	12.2	–5.1	14.1	–5.1

Source: Ng and Yeats (2000) Table 3.1. The SSA sample includes 14 major African countries that exported more than $1 billion in 1998.

Turning to the specific experiences of the RPED countries, all of them with the exception of Zimbabwe in the 1980s and Ghana in the post-adjustment period after 1985, performed *worse* than the Ng and Yeats sample. Overall for the entire period since 1980, Kenya might also have beaten the SSA export performance, but not by very much. Côte d'Ivoire and Zambia share the distinction of being the worst performers, even relative to the SSA experience.

The decline in Africa's export sector has been matched by its failure to diversify its export structure. Table 1.13 brings together data on the commodity composition of exports in six of the seven RPED countries.

Table 1.13: Percentage Share of Each Commodity Group in Total Exports

Country	*All Foods*	*Agricultural Materials*	*Fuels*	*All Mfg.*	*Ores and Metals*
Cameroon					
1985	22.2	6.9	66.1	1.6	3.0
1998	24.2	37.7	29.2	3.9	4.8
Côte d'Ivoire					
1985	79.7	14.5	0.2	3.1	0.2
1998	79.0	13.2	0.2	6.0	0.2
Ghana					
1985	72.3	7.9	4.9	4.2	10.4
1998	52.2	10.0	1.4	23.4	12.2
Kenya					
1985	81.0	7.3	1.0	9.4	0.5
1998	73.5	13.7	0.2	11.0	0.9
Zambia					
1985	1.8	1.7	0.0	1.9	94.4
1998	9.1	3.0	0.0	11.4	72.5
Zimbabwe					
1985	37.8	14.6	0.0	26.2	21.1
1998	48.9	11.2	0.5	26.4	12.5

Source: Ng and Yeats, Table 3.3.

It is clear that in the last two decades the exports of the RPED countries, along with most of sub-Saharan Africa have continued to be dominated either by agriculture-based products or by Ores and Metals. The only country with some significant progress in the export of manufactures has been Ghana. The picture presented for the changing share of Zambia is slightly misleading because the drastic fall in the share of exports in the Ores and Metals category is due much more to the collapse of copper prices than to the growth of other exports. In fact, as we have seen in Table 1.12 Zambia suffered the most severe negative growth of exports in this group of countries.

Volatility and Terms of Trade Decline

It is well known that the lack of diversification of exports makes it very susceptible to price fluctuations of the narrow range of products in the world markets. Collier and Gunning add: "This natural volatility is compounded by policy volatility. Although the two sources of shocks are conceptually distinct, in practice in Africa they are correlated, since governments have used trade policy to equilibrate the balance of payments" (Collier and Gunning 1999, p. 73). The authors cite a number of studies which have reached a consensus that this volatility has reduced growth. It should be added that the negative effect of trade volatility on investment and growth is additional to the long-term deterioration of the terms of trade which some of these economies have suffered along with other countries of sub-Saharan Africa (Table 1.14)

The terms of trade measures the relative movement of export and import prices and is calculated as the ratio of a country's export unit values to its import unit values. The falling commodity prices in the world market and the periods of high inflation between 1975–84 have led to significant deterioration in the terms of trade for all seven countries. In more recent years, however, countries like Cameroon and Kenya have managed to increase their terms of trade whereas Côte d'Ivoire, Ghana, Tanzania, and Zambia still demonstrate significant erosion in their terms of trade. In fact, for the least developed countries of Tanzania and Zambia the terms of trade have fallen by 40% between 1987–96.

Table 1.14: Terms of Trade

	1987 = 100			*Annual % change*		
	1975–84	1985–89	1993	1994	1995	1996
Cameroon	−2.9	1.2	103.8	118.3	133.4	127.3
Côte d'Ivoire	−5.2	−7.0	76.7	80.3	82.3	80.5
Ghana	−1.4	−1.0	71.3	81.1	85.7	77.6
Kenya	−3.8	−1.9	133.1	180.7	128.9	149.1
Tanzania	..	..	60.1	56.2	56.9	59.0
Zambia	−8.5	4.8	54.2	58.8	69.9	67.4
Zimbabwe	−5.1	0.1	101.2	101.2	101.0	104.7

Source: African Development Indicators.

Supply and Demand Factors in Export Trends

Export trends are influenced by demand as well as supply factors. Exports from a particular country or region might fall off if world demand moves away from its principal exports. They could also be due to the country or region not being able to maintain its share of the world market in its major exports. We can make an initial assessment of the relative importance of these two factors by calculating two statistics $E_{d,i}$ and $E_{c,i}$. The measures can be calculated as follows:

$$E_{d,i} = (s_{oj})\,(D_{tj} - D_{oj}) \qquad (1)$$

$$E_{c,j} = (s_{tj} - s_{oj})(D_{t,j}) \qquad (2)$$

where D_{oj} and D_{tj} represent world trade in product *j* at time periods *o* and *t* respectively, and s_{ti} and s_{oj} are the shares of the country *i* in the global exports of product *j* in time periods o and t respectively.

The supply factors in (2) above can be attributed to changes in the competitive position of the country concerned. Of course, this could be the result of discriminatory factors undertaken by world importers, but while such discrimination could be directed against special product groups, it has to be shown that it affects the African group of countries particularly strongly.

Ng and Yeats undertake this calculation for a number of African countries and present the overall result for each country by summing the decompositions over all product groups. The relevant calculations for the RPED countries are presented in Table 1.15. The figures show clearly that in the 1990–94 period the loss of competitiveness was a much more important cause of the deterioration of the export values from the region. For all the RPED countries, as well as for the total of the sample studied, it is seen that exports would have grown significantly in absolute value if the countries had been successful in maintaining their shares of the world markets in the individual product line. The change in the pattern of world demand was *not* the reason for the export decline. The situation seems to have been reversed in the 1994–98 period, and reflects the impact of the unusually strong increase in world demand for Africa's traditional exports. This unusual bump has already been noticed in the discussion above, but it was also seen that the boom might have been temporary and was cut by the slump following the East Asian crisis. We wait for the analysis of more recent years to see if the 1994–97 was a purely temporary bulge. A second point to note is that for the Ng and Yeats sample, the second period saw an improvement of Africa's competitiveness, but the change from the previous period might have been exaggerated by the substantial improvement in export trade of one country – South Africa. Excluding South Africa we see from Table 1.15 that erosion of competitiveness continued to have a strong negative effect on Africa's exports, but this effect was overshadowed in this period by the demand boom of 1994–97.

Table 1.15: Impact of Demand and Supply Factors on Exports, 1990–98 ($ Million)

	1990–94		*1994–98*	
Country	*Overall Demand*	*Supply Factors*	*Overall Demand*	*Supply Factors*
Cameroon	57.4	−407.9	72.7	66.2
Côte d'Ivoire	611.0	−441.0	419.5	431.1
Ghana	217.6	−118.2	208.9	20.5
Kenya	250.7	−63.1	240.0	−61.7
Zambia	57.7	−520.6	178.2	−302.2
Zimbabwe	197.0	−177.3	182.5	−22.8
All SSA Countries*	900.5	−4,533.6	5,396.8	1,156.0
Excluding S. Africa	(−534.5)	(−5,305.6)	(1,800.1)	(−534.8)

Source: Ng and Yeats, Table 3.7.
*Apart from the RPED countries the Ng and Yeats sample includes Angola, Democratic Republic of Congo, Gabon, Liberia, Mauritius, Nigeria and South Africa. The figures in parentheses give the totals for all these countries without South Africa.

The reasons for the apparent loss of competitiveness in export markets for a large number of African countries will be the subject of further analysis in Part V of this book.

Exports as a Percentage of GDP

It will be wrong to conclude from the evidence of the declining export values that the African countries were by and large "closed" economies. On the contrary, exports were a sufficiently large part of total GDP, and, of course, a much larger part of the monetized sector in theses economies. Table 1.16 brings out the importance of the external sector for the RPED countries.

The value of total exports relative to the GDP in 1995 stands as high as over 40% for Côte d'Ivoire and Zambia and the lowest is in the range 23–26% for Tanzania, Ghana, and Cameroon. The relative value of export appears to be stagnant or even decreasing prior to 1990. However, the policies of the early 1990s and the 1993–96 economic booms have led to a substantial increase in the export ratio. For instance, in Côte d'Ivoire the relative share of exports increased from just over 33% of GDP in 1990 to more than 46% in 1995 whereas in Ghana it increased from close to 17% to around 26% or even more dramatically in Tanzania it increased almost two fold to 24% of the GDP. Two points, however, need to be made by way of caution in drawing conclusions from these figures. First, the export ratios undoubtedly give a rosy picture for 1995 because as we have already seen this year was at the height of the export boom of sub-Saharan Africa. Second, the increase in the export ratio was not necessarily associated with an improvement of the current account balance. The progress made in increasing exports had substantially improved the current account balance in Cameroon, Côte d'Ivoire, and Kenya and to a lesser extent in Ghana. However, the current account balance appears to have deteriorated significantly between 1990 and 1995 in both Tanzania and Zimbabwe as imports grew at a faster rate than exports.

Table 1.16: The External Sector as a Percentage of GDP

	Value of Exports			*Current Account Balance before Official Transfer*			*Current Account Balance After Official Transfer*		
	1980	*1990*	*1995*	*1980*	*1990*	*1995*	*1980*	*1990*	*1995*
Cameroon	26.90	20.49	26.03	−8.4	−2.0	−0.8	−8.4	−2.0	−0.8
Côte d'Ivoire	35.39	33.34	46.37	−18.0	−12.2	−6.7	−18.0	−12.2	−6.0
Ghana	27.31	16.72	25.80	−1.2	−7.3	−6.5	0.65	−3.7	−2.3
Kenya	30.25	26.12	33.06	−17.0	−8.0	−5.4	−15.4	−5.6	−4.4
Tanzania	..	12.39	23.86	..	−18.1	−26.1	..	−5.6	−11.8
Zambia	41.84	40.85	42.61	−13.8	−11.8	−14.1	−13.3	−2.8	−4.5
Zimbabwe	4.72	23.22	35.88	−6.6	−2.9	−4.8	−5.8	−1.7	−2.6

Source: African Development Indicators.

External Debt

Like many other developing countries, sub-Saharan Africa has been plagued with the debt explosion of the 1980s. The relative value of external debt between 1980–95 has doubled or tripled for most of these seven sub-Saharan countries. In 1995, the total external debt burden of four out of seven countries exceeded their gross domestic product and for Zambia and Côte d'Ivoire it has been close to twice their gross domestic product. Furthermore, considering the fact that the export growth during this period has been sluggish at best, one can appreciate the severity of the debt burden in these countries.

This increase in total external debt can be attributed to external factors such as stagnation in industrial countries and their high inflation and interest rates specially between the 1970s and 1980s, or internal factors such as inappropriate macroeconomic policies, budget deficits, and wrong exchange rate policies. The development economics literature has been flooded with studies arguing for or against the importance of each of these two sets of factors. However, there is not much argument against the detrimental effect that this high debt burden has had on the economic growth of sub-Saharan Africa. Not surprisingly, the vast majority of the debt was held by public sector. In fact as Table 1.17 reveals, with the exception of Ghana, the private sector has managed to hold its debt share or decrease it rather significantly in countries such as Kenya and Zambia.

Table 1.17: External Debt as a Percentage of GDP

	Total External Debt			*Total Private Debt*			*Total Debt Service*		
	1980	1990	1995	1980	1990	1995	1980	1990	1995
Cameroon	38.4	59.9	117.4	15.0	15.4	14.4	3.7	4.3	4.9
Côte d'Ivoire	73.3	159.8	189.1	50.0	51.3	53.5	12.9	10.1	10.2
Ghana	31.5	65.8	95.0	3.0	4.4	7.6	3.2	6.0	5.5
Kenya	46.6	82.7	81.2	17.7	22.3	12.6	5.2	8.3	9.5
Tanzania	..	151.9	160.6	..	11.5	9.2	..	4.0	4.9
Zambia	84.0	220.9	207.8	18.7	14.5	5.3	10.6	4.3	11.3
Zimbabwe	11.8	37.0	65.7	8.9	13.0	12.2	0.7	4.8	8.0

Source: Calculated from African Economic Indicators.

The Manufacturing Sector

This book is about the manufacturing sector. As already noted above (Table 1.4) the surveyed countries varied enormously in the importance of their manufacturing activity. At the top of the scale were Zambia and Zimbabwe with 30% of GDP originating in this sector (in 1995). Côte d'Ivoire was moderately industrialized with the share of manufacturing at 18%. But the other four – Cameroon and Ghana on the west coast, and Kenya and Tanzania on the east – had a share of manufacturing of only 10% or less.

The RPED surveys concentrated on firms in four manufacturing sectors

– textiles and garment; food processing, woodworking and metalworking. Thus only the light industries were covered, the surveys missing out chemicals, transport and equipment and non-metallic minerals in particular. It is unlikely that in the mid 1990s electrical and related industries would have been at all significant in the manufacturing scene of sub-Saharan Africa.

For Zimbabwe, data available from the 1989 Census of Production show that in 1988 the four RPED sectors accounted for no less than 71% of gross output in manufacturing (Zimbabwe Country Background Paper, table 9). It should also be noted that the Census figures presumably referred to only the “registered” firms in the formal sector. The RPED surveys, however, also included non-registered firms, provided they had more than five workers. (The sampling scheme is described fully in the Appendix to Chapter 2.) These small firms are more likely to be concentrated in the four light industries covered. Thus the share of these industries in total manufacturing output is likely to be higher than 71%.

Zimbabwe is the most industrialized of the RPED countries. The other countries can be expected to be even more dominated by the four industries included in the RPED survey. The only exception might be Zambia, which has a large minerals industry.

Exports of Manufactured Products

Part V of the work is devoted to an analysis and discussion of the exports of manufactured goods, and the characteristics of exporting firms. Table 1.18 provides a background of the role of manufactured exports in the RPED countries.

Table 1.18: Manufacturing Exports as a Percentage of Total Merchandise Export

	1980	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Cameroon	4	7.9	8.0	8.6	7.6	8.2	10.9
Côte d’Ivoire	..	36.5	35.2	38.0	35.3	33.9	31.1
Ghana	..	..	..	..	..	..	..
Kenya	12	14.6	13.9	13.2	12.9	12.7	13.4
Tanzania	14	22.1	16.2	14.4	13.4	15.7	17.0
Zambia	16	0	0	0	0	0	0
Zimbabwe	36	32.1	42.6	46.6	42.6	36.5	33.6

Source: African Economic Indicators.

It is apparent that, contrary to some impressions, the manufacturing sector in these countries is not overwhelmingly oriented to the domestic markets. Manufacturing exports are a significant proportion of total exports in a majority of the countries, and the ratio seems to have been an upward trend, at least in the 1980s.

Part II
The Economic Structure and Production Relations

2 Size Distribution of Firms in African Manufacturing and Market Structure

Introduction

The size distribution of firms in the industrial sector is an important issue from the point of view of the ability of the sector to make efficient use of the factors of production available to it. As explained in the theoretical section below, if factor markets, particularly of labor, capital and entrepreneurship, operated smoothly without too much "segmentation", the distribution of firms by size would approximate a lognormal distribution. On the other hand, if small firms faced serious impediments to growth due to differential factor prices facing firms of different sizes, we would tend to observe a bi-modal distribution which has been described in the literature as a case of "industrial dualism." This type of distribution is costly to the economic sector in terms of loss of efficiency and it also causes the distribution of assets as well as earnings to be more unequal than otherwise. We begin therefore by looking at the size distribution in terms of employment from the data set generated by the RPED surveys. Since the RPED surveys, we explain, may not for all countries be fully reflective of the universe of manufacturing enterprises they sampled, other sources of data on size distribution are also referred to in the discussion.

The RPED surveys *excluded* household enterprises from the scope of the surveys. But its aim was to go beyond the limits of the 'registered' sector[2] to sample firms which, although small, had all the characteristics of modern manufacturing enterprises in so far as they used some non-household labor, hired for a wage. There were serious sampling problems here. In sub-Saharan Africa the list of registered firms is often incomplete for small firms below a varying threshold of size, and hence smaller firms

[2] The registered sector refers to those enterprises which are formally registered with a relevant government agent for the purposes of enforcement of labor laws or other relevant legislation.

can be seriously underrepresented. Since the RPED design wanted to cover all sizes of manufacturing firms outside the household sector, they had to depend on variety of other sources for obtaining a sample of such firms. For instance, in Zimbabwe a special survey of firms employing less than 50 workers was available, called the GEMINI survey, which was used to supplement the sample of registered firms employing more than 50 workers. The survey managers adopted the criterion of a minimum size of five workers (including the manager) for the enterprise to be included in the sample. The procedure for sample selection in Zimbabwe is described in detail in the Appendix to this chapter. The RPED surveys in other countries, while making use of the most suitable universe available, generally sought to go by the principle of excluding enterprises which made use of only a few hired workers.

As is explained in the Appendix, for Zimbabwe the sampling method was based on the equal probability of each *worker* being selected. This meant a larger representation of large firms than would be present in the sample if the sampling was based on an alternative procedure, giving each *unit or enterprise* an equal probability of being selected in the sample.

Zimbabwe was lucky in having the carefully executed GEMINI survey for small firms with less than 50 workers which could be sliced into the registered sector universe of firms, used for enterprises with more than 50 workers. Micro and small enterprises constitute the bulk of labor employed in the so-called informal sector, even if we exclude household units depending mostly on family labor. The lists for such enterprises existed for only a very few countries, and special surveys such as the Zimbabwe GEMINI survey were not available for most of them. Generally, the surveys depended on the lists provided by the authorities, who maintained a list of “registered” manufacturing enterprises. However, as one of the Country Study Reports for Ghana clearly states: “It appears that the 1987 Industrial Census omitted the vast bulk of small scale enterprises. Thus, the use of the Industrial Census as a sampling frame creates the danger that any sample would over-represent the large relative to the small-scale sector. Equally to use the Population Census estimates of the number of small-scale enterprises as a sampling frame, even if practical, would imply such numbers of large enterprises in any survey that one of the major objectives of the exercise, a comparison of enterprises across size categories, would be impossible. In order to construct the sample frame, we used the Industrial Census but over sampled small enterprises. Our objective was to have a sufficient sample in terms of size to enable us to show, within a cross-section context, the results for firms of different size” (Ghana: Country Study Series, August 1993, pp. 27–8).

Thus the conclusions derived from the sample about size distribution should be treated with caution as an adequate representation of reality. This pertains specifically to size distribution at the lower end, of less than 50 workers. We try to refer to sources other than the evidence from the sample on this issue. On the other hand, the sample *does* contain adequate numbers of firms in the entire range of size groups, ranging from the micro to the very large,[3] so that the analysis pertaining to the characteristics of the firms across size groups can be performed without the problem of sample bias.

Theory

The distribution of firms at one point in time is the outcome of a growth process – in which entry and exit, economics of scale, and the competitiveness of markets for input and output all play a role. In neoclassical economics the determinant role of technology and market size is stressed. Firms graduate to a "most efficient scale" of operation, given the technology and market size. Deviations from the prevailing "optimum" size could be either due to the fact that firms are still in the process of realizing the full potential of minimum costs; or due to imperfection in the markets for outputs and inputs such that different size groups of firms face different prices. The empirical implication of this type of theorizing is presumably that firms will be normally distributed with a strong mode establishing the "optimum" size.

An alternative theoretical approach views growth as a stochastic process. The size distribution of firms observed at a point of time is the result of purely random growth of firms of different sizes. Firms grow each year following a random drawing from a distribution of growth rates. Both large and small firms have identical probabilities of growth. Moreover, the distribution of probable growth rates around the mean growth rate is similar for all firms. This reasoning is the basis of the so-called "Gibrat's Law of Proportional Effect." Stochastic growth models based on this Law generate lognormal types of the size distribution of firms (Pareto).

Work on the size distribution of firms done in developed industrial economies has not generally supported the hypothesis of random growth. A *negative* relationship between size and growth is the general finding in

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[3] In what follows, unless otherwise stated size groups are defined in terms of all workers employed (part-time measured as one-half of full time) and are as follows:
Micro (less than 10); Small (10–49); Medium (50–99); Large (100–249); Very Large (250 and over).

several studies across the world. This is not unexpected because of the purely statistical effect of starting from a much smaller base for small firms, and can be additionally explained by the existence of the limits of scope economies.

The stochastic models provide no role for entrepreneurs and their varying abilities. They have generally been discarded in favor of learning models, which have come to be used as the major explanatory framework for the analysis of firm growth (Jovonavic 1982). These models predict that firm age and firm size are both *negatively* correlated with growth rate. The argument is as follows: firms expand their activities when their managers observe that their guesses about the capacity of the firm have understated their true efficiency. As the firm ages, the manager's guess about their managerial efficiency becomes more accurate. After controlling for age, larger firms grow more slowly because they are already at a higher level of efficiency and consequently do not have scope for large increases in efficiency – particularly when we remember that they are already starting from a large absolute size.

It has often been suggested that the observed size distribution of manufacturing firms in developing countries – including sub-Saharan Africa – would be "dualistic," meaning there would be two strong modes, one at a small size group, and another at a large one, with a conspicuous "missing middle" (cf. Tybout, p. 16). The learning model, as expounded in the last paragraph, cannot predict the emergence of a dualistic structure of industry. If small firms were expected to grow significantly faster than larger firms, the bi-modal distribution of firms by size would disappear as small firms graduate to being middle-sized ones, and middle-sized firms become large ones. For a dualistic structure to emerge we need to introduce additional determinants of firm growth such that the growth of small firms is constrained at a certain level. Such factors could refer to segmentation of factor and product markets (Little, Mazumdar and Page, chapters 13–15); to fiscal and other regulations which tax firms when they cross a certain size threshold; and to the heterogeneous quality of entrepreneurs (Rauch 1991).[4]

Distribution by Size Groups of the RPED Sample Firms

We have referred earlier that the Zimbabwe survey included both registered

[4] Readers may wish to refer to the results presented in Chapter 12 which do show that small firms indeed have limited upward mobility in the RPED sample.

units and a sample of non-household small units. It is not clear to what extent the RPED surveys in other countries were able to adhere to this pattern of sampling.

The distribution of employment and value added by size groups in the samples available for the seven countries, pooling all three waves together are given in Table 2.1.

Table 2.1: Relative Distribution of Employment and Value Added

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Employment							
Micro	0.013	0.006	0.039	0.017	0.027	0.022	0.004
Small	0.066	0.046	0.194	0.081	0.091	0.125	0.016
Medium	0.053	0.049	0.118	0.130	0.066	0.121	0.039
Large	0.116	0.071	0.228	0.176	0.135	0.188	0.142
Very Large	0.752	0.828	0.421	0.596	0.681	0.544	0.799
Value added							
Micro	0.005	0.001	0.012	0.008	0.008	0.009	0.002
Small	0.048	0.029	0.100	0.101	0.029	0.081	0.008
Medium	0.099	0.037	0.050	0.155	0.030	0.085	0.026
Large	0.230	0.038	0.255	0.259	0.060	0.163	0.102
Very Large	0.617	0.894	0.583	0.478	0.872	0.662	0.861

It appears that in terms of employment, Zimbabwe and Côte d'Ivoire are the two countries, whose size-distribution is extremely skewed to the largest (250+) group. Since value added per worker is generally higher in large firms (because of their higher capital-intensity), the distributions in terms of value added are even more skewed. Ghana, Kenya and Zambia are the three countries in which small and medium firms play a much more prominent role, and the share of employment in the "very large" is correspondingly less. Cameroon and Tanzania occupy an intermediate position between the two groups of countries. In the case of Tanzania, its public sector firms are mainly responsible for tilting the size distribution to the largest size group.

The "Dualistic Pattern": Is It a Myth?

The common perception of a "dualistic" distribution is thus not borne out by the data for that sector of manufacturing which the RPED surveys covered. This is not surprising since the informal household enterprises –

operating largely with family labor, and perhaps only one or two hired workers, was deliberately excluded from the RPED surveys. The conclusion based on the figures of Table 2.1 are not in the least inconsistent with the findings of Leidholm and Mead that in the four countries – Tanzania, Ghana, Kenya and Zambia – surveyed by them, between 49% and 84% of manufacturing enterprises is concentrated in micro enterprises. Leidholm and Mead specifically targeted the household enterprises excluded by the RPED, and probably included a large number of repair shops, since at this level it is difficult to distinguish production from service activities.

The dualistic pattern becomes striking to the observer only when household enterprises and the more formal firms in manufacturing are lumped together. Within the formal sector, making use of some hired labor outside the household, the size distribution is undoubtedly skewed to the larger firms. In this respect the African pattern does not differ qualitatively from what was observed in South Asian countries like India and Pakistan in the late seventies, and documented in Little, Mazumdar and Page (Chapter 6, specially pp. 86–91). It differs markedly from the size distribution of manufacturing enterprises in Far Eastern countries like Japan, where small enterprises played a much more important role even in the “formal” sector, or even in the United States of the late seventies, where the size distribution resembled much more a “normal” curve with a prominent mode in the middle size-group (*ibid.,* Figure 6.6).

A cautionary point, however, needs to be made here. The conclusions made on the basis of grouped distributions in a descriptive way might sometimes give a misleading picture. In this kind of simplistic presentation much depends on the way the size-groups are formed and the ranges of employment size chosen to designate the different groups. The following section summarizes a more formal analysis of size distribution made for one of the RPED countries, Côte d’Ivoire, but based on a different data set.

Testing for Log Normality of the Size Distribution

Sleuwaegen and Goedhuys (1996) provide evidence from Côte d’Ivoire basing themselves on the data provided by the Banque de Données Financier (BDF). “All firms that follow the French Accounting System are required to file their balance sheets with the BDF. Coverage of the manufacturing sector is extensive but not complete. The sector of large manufacturing enterprises is well covered, with a few enterprises missing. Among medium sized firms the majority is covered by the BDF while small enterprises are less well represented by the BDF. Despite these deficiencies the BDF represents the most complete list of formally registered list of formally registered establishments."

The authors discuss the size distribution in Côte d'Ivoire for 1987 in terms of *production.* The hypothesis of a lognormal distribution by size is decisively rejected. Figure 2.1 reproduces the "normal probability plot" as given in the cited paper. It is seen that "the plot fills out with a '+' sign the actual size distribution of the firms (denoted by *) to obtain a hypothetical normal distribution. The figure suggests that firms in the largest and smallest size categories are relatively over-represented, while the opposite holds for firms in the middle. Taking into account that smaller firms are less completely represented, it can be assumed that the *actual bi-modal shape* is even more pronounced" (*ibid*., p. 2, italics not in the original).

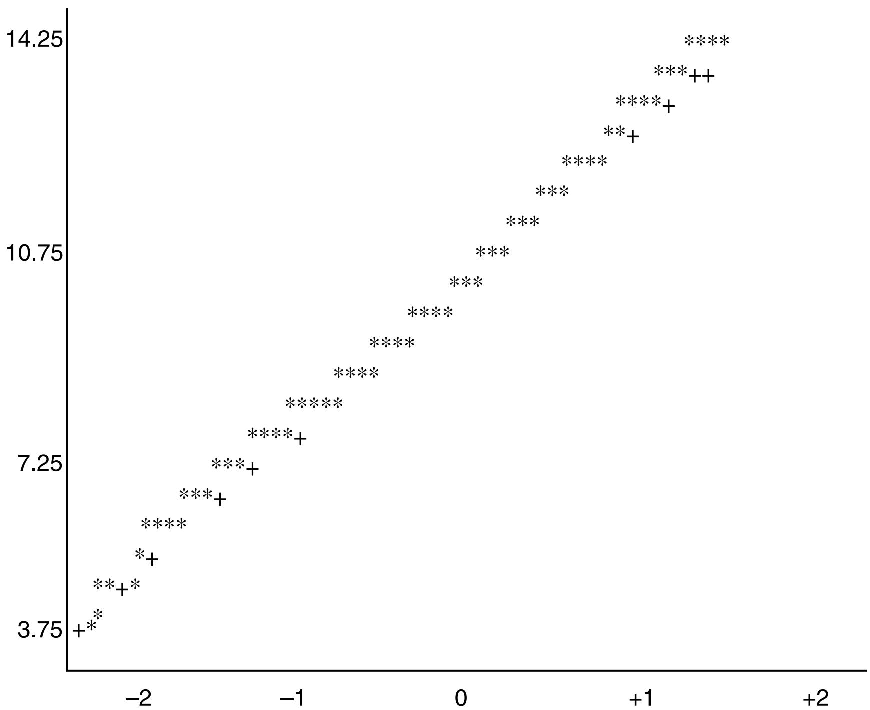

Figure 2.1: Normal Probability Plot, Côte d'Ivoire

Source: Sleuwaegen and Goedhuys (1996).

Sleuwaegen and Goedhuys also looked at the size distribution of firms at the disaggregated industry level. In the sub-sector "agro-industries" (Food etc. in the RPED classification) the firm size is largest with an average production of 492 million CFA francs, and the lognormal pattern of distribution is rejected at the 99% probability level. There is overrepresentation of firms at both extremes of the distribution. A similar pattern is found in the textiles and clothing sectors (with the average production about half that in agro industry). The hypothesis of lognormal distribution is rejected at the 95% level. The null hypothesis *cannot* be rejected in the wood and metal working sectors. The average size of firm is smallest in metal working at 184 million.

We conclude that for Côte d'Ivoire the size structure of manufacturing firms in the range we are studying is dualistic. Although small firms are more represented in the economy than would appear from the RPED sample of Table 2.1, their progression into medium and large size groups is extremely constrained. At the same time very large firms dominate the manufacturing scene, at least in terms of their contribution to value added. We shall see in a subsequent chapter if the evidence on growth rates of firms from the RPED surveys supports this conclusion.

Oostendorp in Gunning and Oostendorp (1999) maintain that the size distribution in Zimbabwe is *not* bi-modal. He plots the percentage of firms against a log-scale of employment size and obtains a size distribution which is monotonically decreasing (*ibid.,* Figure 3.1, p. 48). He concludes that "There is no evidence of a dualistic structure. The manufacturing sector in Zimbabwe is actually well balanced in terms of size, with many medium-sized firms bridging the gap between the small and large firms." In general, the hypothesis of a dualistic structure refers to a bi-modal distribution of *employment or production, not numbers of firms by size-classes* and hence a monotonically decreasing distribution of the number of firms by size group is not sufficient to indicate a non-dualistic distribution.

The size distribution of firms in Zimbabwe as presented in Table 2.2 provides some insight into this issue. The table provides the unweighted size distribution of firms where the sampling was done on the basis of employment so that every worker had an equal opportunity of being selected. The table also provides the weighted distribution (numbers in parentheses) as obtained by blowing up the sample distribution by the weighting factors so that each firm rather than each worker has equal opportunity of being drawn. After weighting, the sector totals remain almost unchanged whereas the size distribution changes dramatically. It is seen that if the sample were drawn on the basis of equal probability per firm, the number of small firms would probably have tripled.

Table 2.2: Distribution of Firms by Size-groups in Zimbabwe, Unweighted versus Weighted

Size	*Food*	*Wood*	*Textile*	*Metal*	*Total*
<=10	8 (47)	6 (15)	17 (40)	9 (19)	40 (121)
11–100	14 (8)	9 (5)	29 (55)	14 (4)	66 (72)
101–250	10 (10	7 (1)	21 (2)	9 (1)	47 (5)
>250	17 (1)	4 (0)	22 (2)	5 (0)	48 (3)
Total	49 (57)	26 (21)	89 (99)	37 (240)	201 (201)

Note: The numbers in parentheses are the weighted values.

The estimated size distribution of the 201 firms as in the 1993 RPED survey provides further information. In order to get a better understanding of this distribution, we have also graphed the normal probability plot in Figure 2.2, using the level of production (sales) as the measure of firm size to ensure comparability with the Côte d'Ivoire case discussed above. The figure shows that Zimbabwe has exactly the opposite distribution from Côte d'Ivoire. The very large and the small firms are under-represented in the sample, whereas both micro firms and middle size groups are over-represented. Hence, using the production size measure, it appears that the size distribution is not dualistic in the sense that medium size firms are not under represented as in the case of Côte d'Ivoire.

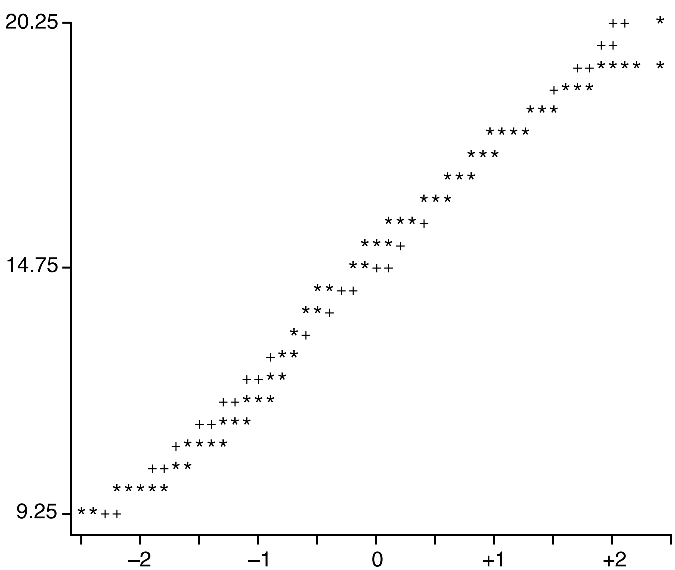

Figure 2.2: Normal Probability Plot for Zimbabwe Using Production Level

A size distribution using employment size rather than production size groups demonstrates a different picture (Figure 2.3). Here, we see an over representation of the small size firms whereas the large firms are under-represented as before. Hence, in general and based on the RPED survey one can safely argue against the existence of a dualistic distribution in Zimbabwe.

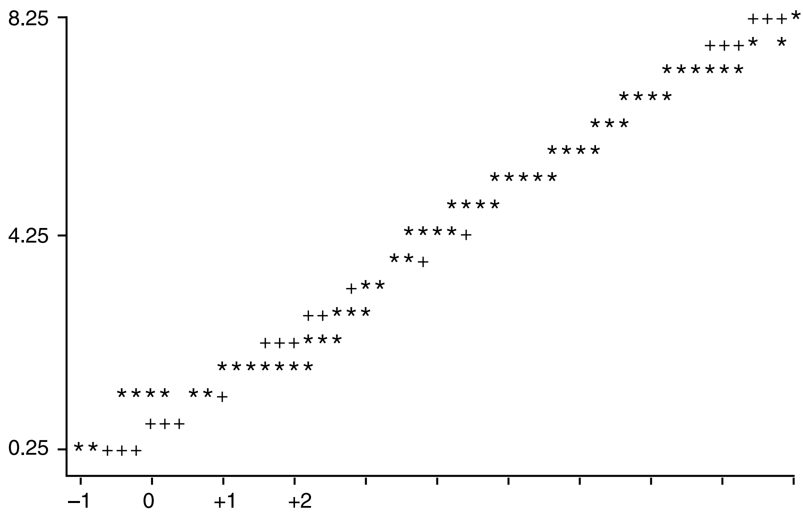

Figure 2.3: Normal Probability Plot for Zimbabwe Using Employment Level

Oostendorp goes on to make another point: "What is characteristic of Zimbabwean manufacturing is therefore not a dualistic size distribution, but a dualistic ownership structure within the manufacturing sector, with black entrepreneurs typically owning the smaller firms, and white entrepreneurs the medium-sized and large firms."

The dualistic ownership in the manufacturing sector has its roots in the colonial and UDI period. Although accurate data are not available, at the time of independence about 60–70% of the productive assets were estimated to have been controlled by non-resident shareholders, mostly multinationals (Oostendorp, p. 49).

Zimbabwe, however, seems to have been unique among the sample countries in terms of the existence of a dualistic ownership category. Côte d'Ivoire is the other country in which foreign ownership is very important. But while in both countries African owners dominate the micro and small sectors, the proportion of *privately owned* firms in the large and very large categories controlled by foreigners was as high as 85% in Zimbabwe, but only 56% in Côte d'Ivoire.

Table 2.3: Percentage of Firms by Size Groups and Ownership

	Micro	*Small–medium*	*Large*	*Very Large*	*Total*
Foreign	6	12	45	14	18
African	89	78	4	2	82

Source: Oostendorp, *op. cit*., Tables 3.1 and 3.2. Foreign ownership defined in terms of majority stake.

Ghana and Kenya

The size distributions based on production size in the other five countries follow somewhat similar patterns. The null hypothesis of lognormal distribution is rejected strongly for all cases. In all these five countries, there appear to be excess representation of the small firms or small to medium firms. Furthermore, countries like Kenya, Ghana, and Tanzania demonstrate a mild over-representation of large firms and hence exhibit a bi-modal distribution where the middle size firms are under-represented. It is also interesting to note that if the size distribution, is calculated based on the employment rather than the production level, then the probability of a dualistic distribution becomes much stronger as the larger firms appear to be over-represented.

The RPED country reports for two countries – Ghana and Kenya – present data on employment distribution by size groups as estimated from a variety of sources, independent of the sample surveyed. These data are presented below:

Table 2.4: **Percentage Distribution of Employment by Size Groups in Ghana**

Sector/employment size	*1–4*	*5–29*	*30–99*	*100 plus*	*Total*
Food processing	6.6	20.2	16.4	56.9	100.0 (25.8)
Textiles and garments	8.1	45.6	10.2	36.1	100.0 (28.2)
Wood Products	3.5	22.9	12.1	61.6	100.0 (36.5)
Metal working	6.9	44.7	15.2	33.1	100.0 (9.5)
Total	8.8	30.7	13.6	50.4	100.0 (100.0)

Source: *Economic Reform and the Manufacturing Sector in Ghana* edited by Amoah Baah-Nuakoh and Francis Teal. RPED Country Studies, August 1993, table 2.7, p. 30. Original data are from Industrial Census, Central Bureau of Statistics 1987.
Note: Figures in parentheses give the column percentages.

Table 2.5: Percentage Distribution of Employment by Size Groups in Kenya

Ownership type	*1–5*	*6–20*	*21–75*	*76–500*	*501 plus*	*Total*
Private owners–Kenyan	28.8	24.4	9.5	15.9	21.5	100.0 (70.2)
Private owners–foreign	0.0	1.2	8.2	31.6	56.6	100.0 (5.6)
Private owners–Kenyan and foreign	0.0	1.5	2.7	39.5	55.2	100.0 (10.7)
State and private	0.0	0.0	0.0	18.5	81.5	100.0 (6.4)
State	0.0	0.0	0.0	0.0	100.0	100.0 (7.2)
Total	20.2	17.6	7.4	18.3	36.5	100.0 (100.0)

Source: First Report on Kenya Survey RPED Paper no 14, September 1993, Table 1.8.
Note: Figures in parentheses are column percentages.

The Ghana and Kenya data suggest that like in the Côte d'Ivoire case the size distribution of employment in manufacturing sector is bimodal, with peaks at the small and large employment size groups, with a marked missing middle. This point is more valid for Kenya as in Table 2.5, for Ghana there is a possibility that grouping our "large" and "very large" firms together in the 100+ category might give a misleading picture of the prominent mode in the largest size-group. Another point to emphasize is revealed by the Kenyan data – the private Kenya-owned enterprises have a very distinct bi-modal distribution, while the other ownership categories tend to have distribution very much skewed to the large size.

Size-Distribution, Productivity Gap and Economic Welfare

Distribution by size-groups in manufacturing could be considered with respect to either value added or employment. In fact, the former is the more basic of the two and is the product of two separate variables: first, the distribution of employment by size groups; and second, the differences in productivity or value added per worker as between size groups. In what follows we will work with these two variables to shed more light on the economic processes involved. Wages generally increase proportionately with labor productivity. Thus, the extent of productivity differentials between small and large units would reflect differences in wage levels between them. Therefore, as far as informal sector undertakings would have wage and productivity near to the levels found in the smallest size group in the formal sector, the large–small productivity differential in the formal sector would also be a measure of the economic distance between the informal and the formal sector firms in the economy concerned.

Turning to the question of economic welfare, the two variables mentioned have implications for both economic efficiency and the distribution of earnings or labor income. A very large productivity differential implies that factor prices facing firms of different sizes are widely different, and hence factor ratios (particularly the capital–labor ratio) also vary considerably. Thus, we could expect the ratios of marginal products of capital and labor to be very different among enterprises of different sizes implying that economic efficiency could be improved significantly by reducing the differentials in factor prices and the resultant misallocation of inputs. The extent of the loss in efficiency would also be determined by the numbers of enterprises with "inappropriate" factor ratios – and hence by the pattern of distribution of firms in the different size classes.

A qualification needs to be made here relating to the sources in factor market behavior which cause the labor productivity to be higher in large firms. Productivity per worker is generally higher because of higher use of capital per worker in large firms. This might be due partly to wages increasing with size and partly to price of capital *falling* with size. It is, however, possible to hypothesize that the higher wage in large firms might be partly due to "efficiency wage" effects, implying that a worker supplies more units of work of standard efficiency in larger firms. In fact, we will argue in Chapter 6 that this is most likely to be an important source of the size-related wage difference observed in Africa. In this case the observed differential in labor productivity is not so much as the "true" difference in productivity per efficiency unit of labor. Thus only that part of the productivity differential could be considered "distortionary" which is either due to the wage difference caused by factors other than "efficiency wage" effects, or due to the lower price of capital in large firms.

The two factors, productivity differential and the employment size distribution of firms, also affect the distribution of labor earnings. Given the size distribution of employment, the larger the productivity (and hence wage) differential between the size classes, the more unequal would be the distribution of wage earnings. For a given productivity differential the worst scenario for unequal distribution of earnings is the concentration of employment in the small and very large size groups, with the middle size groups conspicuous by their virtual absence. Since modern or "formal" manufacturing sector (the part under the purview of the Census of Manufacturing) exists side by side with a large "informal" manufacturing sector, the existence of a distribution of employment heavily skewed to the large size groups would precisely signify the existence of this kind of bipolar distribution for manufacturing employment as a whole.

The African Scenario Compared with East Asia

An interesting question concerns the potential differences between firms in sub-Saharan Africa and those in the more dynamic parts of the developing countries, in particular with respect to the shape of the size distribution of establishments and their productivity differentials by size groups. To this end in Table 2.6 we provide the statistics of value added per worker by size groups for the different sub-Saharan countries.

Table 2.6: Value Added per Worker by Size Groups in African Countries (PPP Dollars and Relatives, by Size Groups)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Median	9656	1122	1304	3337	1862	2962	3999
Standard Deviation	54,168	43,265	4878	19,515	11,394	9394	8135
By Size							
Micro	28	13	22	56	39	38	44
Small	41	53	35	118	38	67	63
Medium	111	69	33	119	61	65	79
Large	113	103	72	165	55	71	81
Very Large	100	100	100	100	100	100	100

Table 2.7: Relative Productivity (Value Added per Worker) by Size Groups of Enterprises in Manufacturing, Selected Asian Countries around 1985

Size-groups	*Korea 1986*	*Japan 1987*	*Hong Kong 1982*	*Taiwan 1986*
5–9	31	32	54[5]	34
10–49	42	39	61	35
50–99	59	50	66	38
100–199	56	59	71	49
200–499	81	76	82	
500 and over	100	100	100	100

Source: See Mazumdar (1999), Table 1.

There are large variations among the countries. If we concentrate on the two extreme groups, micro and very large, the biggest difference is found in Côte d'Ivoire, closely followed by Ghana and Cameroon. All these three countries are interestingly in West Africa. By contrast the productivity differential in *all* the East African countries seem to be

[5] 1–9 for Hong Kong.

modest. To get some background for the extent of differentials in other parts of the world we reproduce some data for East Asia in Table 2.7.

A quick comparison of the data given in the two tables suggests that a big difference exists between Africa and the Asian economies as far as the productivity gap between "micro" and "small" establishments is concerned. The African countries, with the sole exception of Tanzania, have a much larger difference between these two groups than any of the East Asian economies. This finding is, of course, consistent with general expectation. It is very likely that less mechanized techniques survive more in the micro firms in sub-Saharan Africa compared to East Asia. However, it should be remembered that the RPED definition of the micro firms goes down to smaller sizes than are covered in the East Asian manufacturing (though such firms with less than 5 workers are not too frequent in the RPED surveys). Furthermore, the quality of the data collected in the RPED exercise for such firms may not be entirely satisfactory. Thus, it might be more meaningful to compare the RPED data with the Asian figures for size groups of 10–49 (small) with the very large (500 and over). The rather unexpected finding here is that except for Ghana and Tanzania the productivity differential in Africa is *no larger* than in East Asia, and decidedly lower for countries like Kenya, Zambia and Zimbabwe. In East Asia the very large–small differential in value added is the lowest for Hong Kong – just under 75% more. The other East Asian economies show much larger differential – about two and a half times that of the "small" group. As compared to that only Ghana and Tanzania in our sample has a differential of this magnitude.

Table 2.8: Relative Productivity (Value Added per Worker) in Other Asian Economies

Size-groups	*India 1987*	*Philippines 1988*	*Indonesia*	*1985*
10–49	39	30	5–19	21
50–99	45	56	20–49	44
100–199	60	74	50–199	84
200–499	74		200–999	95
500 and over	100	100	1000 and over	100

Source: Mazumdar (1999) Table 1.

Of course the data reproduced in Table 2.7 refer to all manufacturing, which in East Asia includes much modern capital-intensive sectors where the differential in labor productivity by firm might be larger. We could check on this point in further work. But from the all-industry data available to us at this point, it is worth noting that the small–very large differential in less industrialized countries of Asia like India, Indonesia and the Philippines, seems to be larger than in Africa. (Table 2.8)

The Market Structure in African Manufacturing

Industrial concentration can be measured by a summary statistic reflecting the size distribution of firms in the industry. It is generally agreed that this should be a one-dimensional measure, incorporating the two relevant aspects of industrial structure, namely the number of firms (*N*) and the degree of inequality in the size distribution (*I*). It is expected that the smaller the number of firms and the more unequally sized they are, the more market power they can exert as a group. The measures of inequality are primarily based on the relative shares, D_{ij}, defined in terms of value of sales as follows:

$$D_{ij} = \frac{s_{ij}}{S_j}$$

Where s_{ij} is the sales of firm *i*, and S_j is the total sales of industry j. In general, there is an inverse relation between the number of firms in an industry and their market shares. Clearly, if all firms are of equal size, their market share will be equal at (*1/N*).

The two important measures of concentration, the CR5 and the Hirschman–Herfindal (*H*) index are considered as complementary measures. The former denotes the share of the top five largest firms in that specific industry, whereas the latter takes the entire firm size distribution into account. In other words,

$$H_j = \sum_{1}^{N} (S_{ij})^2$$

H represents the sum of the squares of the firms' market shares and hence varies between zero and one. For each given sample size, *N*, the more unequal the firm sizes, the larger the index. By squaring the firms relative sizes, the *H* index gives greater weight to firms with large market share. Hence, if all the firms have the same size, then the value of *H* index is equal to the reciprocal of the number of firms.

We have used the aforementioned measures of market concentration to provide a rough approximation for industry characteristics of the seven sub-Saharan countries. It will be recalled that in some countries the sample might not reflect the true size distribution of the universe. But the validity of our concentration measures is sensitive only to the possible over representation of very large firms relative to the large and middle size categories. Although micro and small firms are likely to have been under represented in some countries, most of the concentration measures will be only marginally affected, since the contribution of these firms to total value added is quite small. The concentration indices among the firms in the sample show a high degree of concentration in all countries. Table 2.9 gives the share of the five largest firms in total sales in each of the four industries for all the seven countries, while Table 2.10 presents the figures for standard concentration indices.

CR5 is over 60% almost for all countries and sectors. Other indices also show a strong concentration in the manufacturing sector. The value of *H* index is fairly large. In US competition policy a market with an index value exceeding 0.18 is regarded as strongly concentrated. The estimated *H* value shows even stronger concentration for all seven countries and specifically for Cameroon, Ghana, and Tanzania. These results provide reasons to believe the existence of strong market power in the sub-Saharan Africa manufacturing sector.

The concentration indices do not always rank industries and countries in the same order. The CR5 indices show the dominance of the largest five firms, but the *H* index also is affected by the distribution of sales among these largest firms as well as among all the other firms. There are important inter-industry differences. Textiles are clearly the most concentrated of the industries in all countries. But Food, which is the least concentrated in most countries, has a very high degree of concentration in Tanzania.

Looking across all industries, Table 2.9 suggests that industry is the most concentrated in Cameroon, Ghana and Tanzania. Kenya is probably the country showing the least concentration, followed by Zimbabwe. Côte d'Ivoire and Zambia are in the intermediate range. Côte d'Ivoire, in fact, is peculiar in having a generally high CR5 but the *H* index is on the low side. The country evidently has more equal distribution of market share among its five largest firms (Table 2.10).

Table 2.9: Share of Five Largest Firms in Total Sales

	Firm 1	*Firm 2*	*Firm 3*	*Firm 4*	*Firm 5*
Cameroon					
Food	34.9	14.3	11.4	8.9	6.8
Metal	46.1	10.7	7.0	5.6	5.1
Textile	48.6	20.6	11.5	8.2	4.8
Wood	45.1	14.0	12.6	8.3	7.4
Côte d'Ivoire					
Food	27.9	17.4	13.1	12.3	9.9
Metal	27.0	17.7	11.0	6.9	6.0
Textile	40.8	23.9	15.6	9.3	6.0
Wood	22.8	17.7	16.7	11.7	6.9
Ghana					
Food	58.0	14.0	8.0	5.7	2.8
Metal	34.2	25.4	18.6	4.7	4.1
Textile	43.1	28.2	9.4	6.3	4.3
Wood	49.4	10.4	9.1	8.5	4.9
Kenya					
Food	19.9	13.1	12.0	9.7	8.0
Metal	29.9	14.3	9.2	7.4	6.1
Textile	45.1	13.6	7.4	5.5	3.8
Wood	37.2	13.6	8.3	7.3	6.3
Tanzania					
Food	77.9	7.8	5.1	2.8	2.1
Metal	39.4	21.2	11.9	6.1	3.4
Textile	42.2	26.6	11.9	7.1	2.6
Wood	32.7	17.5	10.8	8.6	5.1
Zambia					
Food	32.8	27.0	11.3	6.0	4.2
Metal	31.4	17.3	10.0	9.3	7.2
Textile	40.5	19.9	14.3	3.9	2.7
Wood	40.1	26.0	13.8	5.3	3.2
Zimbabwe					
Food	33.0	17.1	10.6	6.6	5.4
Metal	24.2	14.0	10.0	8.0	7.0
Textile	24.2	14.0	10.0	8.0	7.0
Wood	34.5	10.7	11.3	7.1	6.6

Table 2.10: Concentration Indices

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Share Per Firm							
Food	2.26	3.23	4.48	2.58	5.26	2.40	2.61
Metal	2.04	3.08	3.75	2.33	2.38	2.73	3.03
Textile	3.00	3.64	2.21	2.16	3.45	2.14	1.32
Wood	3.13	3.39	3.57	2.27	2.26	2.94	4.29
CR5							
Food	76.2	80.6	88.5	62.7	95.6	81.3	72.6
Metal	74.5	68.6	87.1	66.9	82.0	75.1	63.2
Textile	93.7	95.6	91.2	75.4	90.6	81.3	57.6
Wood	87.4	75.8	82.2	72.6	74.6	88.5	70.3
Herfindal Index							
Food	0.220	0.158	0.397	0.106	0.624	0.206	0.157
Metal	0.265	0.134	0.231	0.145	0.234	0.163	0.118
Textile	0.381	0.264	0.403	0.240	0.284	0.263	0.102
Wood	0.308	0.140	0.298	0.186	0.185	0.281	0.177

Note: The indices are averaged over all the waves.

Table 2.11 utilizes a direct question put forward to the managers to gauge the competitive nature of the manufacturing industry. It presents the number of competitors and the size of the competitor as reported by the firms in each of the five Anglophone countries. Tanzania, which was found to have the highest concentration in its manufacturing sector, was also found to have the highest percentage of firms reporting no competitors. However, nearly half of the firms in the remaining countries report that they compete with more than 10 firms; the next highest category being 2–5 competitors. It is also interesting to note that the highest frequency is in the same category for all five countries, despite widely varying degrees of economic liberalization.

Table 2.11 also reports the size of the main competitor. Most firms in the survey have competitors that are in the middle of the range with the exception of Zimbabwe where firms are faced with very large competitors. Almost 52% of firms in Zimbabwe report that their main competitor is a firm with over 250 employees. Ghana and Tanzania are also different, reporting that more than 60% of their competitors employ less than 10, which is in sharp contrast to other countries, especially Zimbabwe and Zambia. This difference reflects the difference in the degrees of industrialization of the countries concerned, and the resulting difference in the size structure of firms. According to World Bank data the percentage of GDP accounted for by manufacturing in 1995 was 8% in Tanzania, 6% in Ghana, and as much as 30% in Zambia and Zimbabwe (see Chapter 1, Table 1.4). The first two have a much larger proportion of small firms.

Table 2.11: The Structure of Competition in sub-Saharan Africa

	*Cameroon**	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
	Number of Competitors						
None	5.1	9.7	5.5	1.4	11.7	1.1	4.3
One	7.7	7.4	4.4	4.2	5.0	3.8	4.8
2–5	29.1	30.4	23.1	30.8	22.3	22.7	26.9
6–10	9.2	7.8	12.1	15.0	12.3	14.5	16.8
More than 10	45.9	44.7	54.9	48.6	48.6	57.9	47.3
	Size of the Competitor						
1–4 Employees	14.6	19.7	14.1	22.9	21.1	19.9	7.3
5–10 Employees	33.9	17.0	44.7	17.3	34.9	15.2	8.9
11–99 Employees	28.1	29.3	25.6	21.2	22.4	35.9	17.3
100–250 Employees	23.4	14.4	16.1	31.3	13.2	17.4	14.5
>250 Employees		19.7	..	7.3	8.6	11.8	52.0

Note: Numbers represent the percentage of firms indicating each case in response to the question.
* For Cameroon for the main competitor four size groups (1–4, 5–29, 30–99, >=100) are suggested.

Table 2.12 presents the structure of competition by firm size. As is to be expected smaller firms are faced with more competitors whereas larger firms have less competition. Furthermore, smaller firms are more likely to compete with smaller firms whereas larger firms are more likely to compete with larger firms. Special interest attaches to the competitive environment faced by the large/very large firms in the countries surveyed. It is interesting to note that only in Tanzania we find a sizable group who could be considered monopolists (24%). Typically more than half of the large firms faced six or more competitors. However, large firms acting in an oligopolistic situation are also common – if we consider oligopoly to be a market structure in which firms faced 1–5 competitors. The percentage of such firms ranges from a low of 35.5% in Zimbabwe to a high of 54.2% in Ghana. It might be surprising to find Zimbabwe, which has the highest concentration of large firms, seems to have the lowest incidence of oligopoly. This is probably due to the larger presence of multinationals in this country, which are faced with a good deal of international competition.

Table 2.12: The Structure of Competition in sub-Saharan Africa, by Firm Size

	*Cameroon**	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Micro Firms							
Number of Competitors							
None	3.2	..	4.2	6.7	12.9	0.7	6.2
One	1.6	3.8	5.0	2.2	1.4	3.7	1.2
2–5	14.5	23.8	16.9	23.9	21.0	12.6	25.9
6–10	6.5	5.0	17.7	13.0	10.0	15.6	4.9
More than 10	66.1	67.5	60.6	60.0	55.7	67.4	61.7
Size of the Competitor							
1–4 Employees	3.8	10.9	2.8	51.4	33.3	47.8	34.3
5–10 Employees	12.4	6.5	54.7	27.1	74.4	23.9	20.0
11–99 Employees	34.3	39.1	14.7	14.3	10.5	14.9	20.0
100–250 Employees	9.5	10.9	2.7	7.1	7.0	8.2	8.6
>250 Employees	39.0	32.6	.		1.8	5.2	17.1
Small/Medium Firms							
Number of Competitors							
None	13.8	24.4	6.9	2.0	7.1	1.2	5.0
One	3.4	15.6	1.1	2.6	7.1	1.8	1.7
2–5	41.4	24.4	23.0	35.9	23.8	25.9	17.5
6–10	13.8	6.7	10.3	12.4	14.5	14.1	19.2
More than 10	27.6	18.9	58.6	47.1	42.6	57.1	46.7
Size of the Competitor							
1–4 Employees	26.3	41.3	7.2	6.3	15.6	3.6	1.8
5–10 Employees	35.1	28.0	44.3	13.9	32.5	12.5	10.5
11–99 Employees	29.8	21.3	35.1	29.1	27.5	54.8	35.1
100–250 Employees	8.8	5.3	13.4	39.2	15.6	17.3	14.0
>250 Employees		4.0	.	11.4	9.1	11.9	38.6
Large/Very large Firms							
Number of Competitors							
None	6.7	6.3	4.2	1.6	24.0	1.6	2.9
One	40.4	13.8	12.5	12.7	8.0	9.8	8.6
2–5	30.3	41.3	41.7	33.3	24.0	36.1	26.9
6–10	22.5	18.8	16.7	25.4	12.0	13.1	20.6
More than 10		20.0	25.0	27.0	32.0	39.3	41.1
Size of the Competitor							
1–4 Employees	16.0	3.0	.	.	5.6	3.3	..
5–10 Employees	8.0	18.2	14.8	3.3	5.6	3.3	3.4
11–99 Employees	16.0	24.2	22.2	16.7	38.9	30.0	4.6
100–250 Employees	60.0	54.5	63.0	66.7	22.2	38.3	17.2
>250 Employees			.	13.3	27.8	25.0	74.7

Note: Numbers represent the percentage of firms indicating each case in response to the question.

* For Cameroon for the main competitor four size groups (1–4, 5–29, 30–99, >=100) are suggested.

Another aspect of a non-competitive market structure is the exclusive involvement of sellers with one or few buyers. The RPED survey tried to throw light on this aspect of market relationships. Firms were asked about the percentage of their sales accounted by their largest customer. Table 2.13 presents the distribution of the market share of the largest customer for four sub-Saharan countries. It appears, in general, that the market is not characterized by monopsonistic behavior as only between 12% and 25% of firms have a primary buyer that accounts for more than half of their sales. Tanzania stands out as the country with the most non-competitive structure with nearly a quarter of the firms reporting that they sell more than 50% of their output to the largest customer.

Table 2.13: Percentage of Sales Accounted for by Largest Customer

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
<5%	31.7	26.3	32.1	28.7	44.0	32.1
5–10%	14.5	15.1	15.8	13.2	11.0	15.8
10–25%	20.4	18.3	15.3	13.2	11.5	15.3
25–50%	17.7	23.1	22.0	20.1	15.5	22.0
50–99%	9.1	12.9	12.4	22.9	16.0	10.4
100%	1.6	4.3	0.5	1.72	1.0	1.6

Table 2.14: Entry and Exit of Firms in the Past Twelve Months (Percentage of Existing Sample)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Entry							
Yes	19.4	23.9	42.3	36.1	28.5	38.6	43.1
No	80.0	76.1	54.4	63.9	71.5	59.4	56.9
Exit							
Yes	33.8	19.1	30.5	35.1	16.4	36.6	21.1
No	66.2	80.9	65.7	64.9	83.6	60.4	78.9

Note: The entries in each cell represent the percentage of firms exiting or entering as reported by the respondents to the questionnaire administered to the sample firms.

Firms were also questioned about how much entry and exit of competitors had occurred over the past twelve months. This question provides us with a very good indicator of the degree of competitiveness of the private sector. Table 2.14 presents the results. The percentages of firms reporting entry in the last twelve months are very close together for all countries with the exception of Tanzania, where a markedly smaller proportion of firms report entry of a new competitor over the last twelve months. For all other countries between 36% and 43% of firms report that a new competitor has entered in the last year. Interestingly enough, fewer firms in Tanzania report the exit of a competitor – only about 16%. This percentage is higher for Zimbabwe at 21% and substantially higher for Ghana, Kenya, and Zambia where it stands at over 30%. Table 2.15 also reveals that firms in Zimbabwe appear to have a high degree of entry and a low degree of exit when compared with the other firms in the survey.

The general conclusion to be drawn from these various measures of competitiveness is that in spite of the concentration ratio being high, the African manufacturing sector does not show striking evidence of being oligopolistic in structure. There is no inherent contradiction between the two pieces of finding. A few large firms in an industry might account for a high proportion of total sales, but the existence of potential competition from smaller firms in the domestic market, and of multinationals operating from outside, might prevent monopolistic conditions from emerging. It should be noted, however, that although the existence for potential competition has been demonstrated, the data provided in this chapter do not have anything to say about the impact of the threat of competition. For this we need to consider the evidence on profitability and on the price–cost margin of the firms in different industries and size groups. This topic is addressed in the following section.

To conclude we can classify the countries as competitive (C), non-competitive (M), and intermediate (I) in terms of the various approaches to competitiveness reviewed above. It is clear that by all the criteria used Tanzania stands out as being the least competitive. Equally at the other end of the scale Kenya and Zimbabwe appear to have a very competitive industrial environment, with a low concentration ratio, large number of potential competitors, relative unimportance of large buyers, and substantial entry of new firms. The two Francophone countries, and to some extent Ghana, seem to be quite non-competitive. Along with a relatively high concentration ratio, they are less competitive as judged by the oligopolistic character of their market environment, and in the case of Côte d'Ivoire in particular a smaller degree of entry/exit of new firms compared to the other countries.

Table 2.15: Classification of Countries in Terms of Competitiveness

Country	*Concentration*	*No and Size of Competitors*	*Share of Largest Buyer*	*Entry/Exit*
Cameroon	M	M	C	I
Côte d'Ivoire	I	M	C	M
Ghana	M	M	n.a.	C
Kenya	C	C	C	C
Tanzania	M	M	M	M
Zambia	I	C	C	C
Zimbabwe	C	C	C	C

Note: C = competitive, M = non-competitive, I = intermediate.

Price–Cost Margin, Size Distribution, and the Market Structure

A natural question, which follows from the analysis of the size distribution and competitiveness of firms, is the extent to which this market structure affects the operating margins at the firm level. These margins can be calculated using what has been known in the literature as price–cost analysis. The price–cost margin is measured as the value of the output minus expenditures on labor and materials. It is thus equivalent to the sum of economic profits and payment to fixed factors, i.e. capital, as a proportion of the total revenue. In other words,

$$PCM_{it} = \frac{\Pi_{it} + (r_t + \delta)K_{it}}{P_{it}Q_{it}}$$

Where *PCM* stands for price–cost margin, Π stands for economic profit, r is the competitive rate of return on capital, δ is the depreciation rate, K is the physical capital, and PQ is the total revenue. The price–cost margin, as evident from this equation, has an upper limit of one, and varies across firms with variations in capital intensity and in the rate of economic profit. Hence, all the factors that can impact firm's surplus above wage and material costs will also affect the price–cost margin. Thus a higher margin for a firm or class of firms need not point to a higher market power. It might as easily be due to a larger share of capital because of a higher capital intensity. Also firms with a larger price–cost margin might simply be more efficient, though in this case it is possible to argue that superior ability of managers is just the way the firm enjoys a higher market power. But if we find the margin being positively associated with an index of market concentration, after controlling for other relevant factors, we have a strong suggestion that the relationship is causal.

Salinger (1990) reviews the extensive literature on the relationship between the concentration of firms in the marketplace and price–cost margins. While it demonstrates some evidence of correlation between price–cost margins and firm concentrations, Salinger argues that it may be the result of short-term monopoly power arising from dynamically competitive process in which firms compete to lower costs and improve their products. In this view the relationship between concentration and margins reflects both competition and market power leaving inconclusive the debate over which one is more important.

In general, it is crucial to know if the variation in the firm performance index as measured by the price–cost margins, can be attributed to firm-specific factors, as measured by size and capital intensity, or other industry-wide effects such as sector specialization, market structure or other country specific factors. This can be done using a Tobit regression where the price–cost margins are estimated as a function of those industry-wide and firm specific factors. However, before we perform the analytical analysis, we have summarized the distribution of the price–cost margins in Table 2.16. It is interesting to note that the margins are found to be fairly high at around 30% of total revenue.

As Table 2.16 reveals, Zambia with a mean value of 0.365 has the highest price–cost margin whereas Ghana with a mean of 0.292 exhibits the smallest average margin. However, the average price–cost margin, with the exception of Zambia, is very close together across all the countries. In fact, despite the significant differences in socio-economic conditions in which the firms operate, the average margins appear to be statistically similar for the countries covered. It is also interesting to note that, judging from the value of the medians, the distributions are close to normal with the majority of the values clustered between 0.200 and 0.400.

Table 2.16 also provides the distribution of the price–cost margins by size groups and by number of competitors. Overall, it appears that the margins increase with the size. However, as one may expect, the micro firms in several countries including Zambia and Zimbabwe appear to have higher average margins. It is also important to note that firms with more market power appear to have higher margins for Kenya, Tanzania, and Zambia. The results, here, however are rather weak and should be analyzed further using our Tobit estimation as presented in Table 2.17.

Table 2.16: Distribution of Price–Cost Margin by Size and Market Structure

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*All*
Mean	0.292	0.314	0.327	0.365	0.317	0.325
	(0.19)	(0.20)	(0.20)	(0.18)	(0.18)	(0.18)
Median	0.267	0.300	0.311	0.365	0.309	0.310
25%	0.150	0.184	0.167	0.240	0.206	0.192
75%	0.399	0.434	0.469	0.478	0.421	0.444
By Firm Size						
Micro	0.274	0.274	0.298	0.376	0.367	0.303
	(0.18)	(0.19)	(0.19)	(0.20)	(0.16)	(0.19)
Small	0.285	0.320	0.326	0.332	0.319	0.320
	(0.19)	(0.20)	(0.21)	(0.17)	(0.20)	(0.19)
Medium	0.300	0.326	0.369	0.371	0.298	0.329
	(0.17)	(0.18)	(0.25)	(0.17)	(0.18)	(0.18)
Large	0.381	0.347	0.352	0.399	0.318	0.345
	(0.22)	(0.20)	(0.16)	(0.19)	(0.16)	(0.19)
Very Large	0.310	0.383	0.406	0.422	0.336	0.368
	(0.14)	(0.18)	(0.19)	(0.18)	(0.16)	(0.17)
By Competition						
<=2 Competitors	0.293	0.451	0.382	0.427	0.299	0.363
	(0.17)	(0.19)	(0.23)	(0.22)	(0.16)	(0.21)
2–5 Competitors	0.297	0.277	0.359	0.364	0.334	0.323
	(0.17)	(0.17)	(0.19)	(0.17)	(0.17)	(0.18)
6–10 Competitors	0.275	0.291	0.340	0.339	0.302	0.305
	(0.19)	(0.20)	(0.22)	(0.17)	(0.18)	(0.19)
>10 Competitors	0.311	0.324	0.282	0.359	0.319	0.325
	(0.20)	(0.21)	(0.19)	(0.19)	(0.16)	(0.19)

Note: Numbers in parentheses are standard deviations. The Size groups are defined as before.

This Tobit model of Table 2.17 estimates the price–cost margins on a set of explanatory variables that includes not only the size of the firm and the dummy variables for the number of competitors, but also two other firm specific factors namely the capital intensity and foreign ownership. Furthermore, we have also included a set of country and industry dummy variables to capture the possible industry-wide or country specific effects. We have estimated the model for all firms with and without capital intensity and for firms that employ more than 5 and 10 workers.

The price–cost margin as indicated includes the return to fixed capital. The capital-intensity variable is used to control for that part of the inter-firm variations in the margin which can be attributed to the varying use of capital per unit of output.

Table 2.17: Tobit Estimation of the Determinants of Price–Cost Margin

	All(I)	*All(II)*	*>5*	*>10*
Constant	−1.07 (0.19)	−1.13 (0.17)	−1.18 (0.218)	−1.38 (0.15)
Ln(Size)	0.061 (0.024)	0.071 (0.023)	0.069 (0.029)	0.064 (0.021)
K/Q	0.021 (0.022)		0.035 (0.035)	0.007 (0.017)
Foreign Dummy	0.200 (0.105)	0.193 (0.103)	0.205 (0.110)	0.105 (0.067)
Competition				
<=2 Competitors	−0.394 (0.137)	−0.398 (0.129)	−0.349 (0.149)	−0.191 (0.091)
2–5 Competitors	−0.373 (0.152)	−0.373 (0.144)	−0.337 (0.143)	−0.180 (0.101)
>10 Competitors	−0.257 (0.131)	−0.262 (0.123)	−0.207 (0.143)	−0.164 (0.090)
Country				
Ghana	−0.069 (0.116)	−0.030 (0.106)	−0.051 (0.129)	0.029 (0.086)
Kenya	0.110 (0.103)	0.157 (0.099)	0.165 (0.113)	0.209 (0.073)
Tanzania	0.038 (0.118)	0.138 (0.109)	0.064 (0.131)	0.184 (0.088)
Zambia	0.207 (0.105)	0.126 (0.097)	0.186 (0.116)	0.250 (0.074)
Sector				
Food	−0.092 (0.094)	−0.128 (0.089)	−0.060 (0.102)	−0.075 (0.065)
Metal	0.022 (0.095)	−0.006 (0.096)	0.087 (0.107)	0.059 (0.069)
Wood	−0.072 (0.095)	−0.127 (0.092)	0.035 (0.112)	0.015 (0.075)
Log-Likelihood	−2486.96	−2683.16	−2196.42	−1355.89

Note: The numbers in parentheses are standard errors.

The one-sided Tobit analysis presented in Table 2.17 confirms the relation between firm size and the price–costs margins. There appears to be significant and positive relationship between the two, regardless of whether the capital intensity variable is included or not or if the micro firms are excluded. In fact, the coefficient remains stable across all these scenarios, which further strengthens our finding. However, the capital intensity as measured by the ratio of capital to output is positive but insignificant in all scenarios. This might sound inconsistent with the definition of the price–cost margin. But higher capital intensity leads *citrus paribus* to a higher margin only if the rate of economic profit remains constant across firm sizes. It is possible to argue that, because of capital market segmentation, the cost of capital and hence the rate of profit actually falls with firm size (see the next chapter for further analysis on this point). Also, as one may expect, capital intensity itself varies across different industries and countries. The pooling of the data for all industries and countries might have contributed to the result that capital intensity was insignificant in all our estimations. In fact, this hypothesis is borne out by the fact that a re-estimation of the determinants of price–cost margin as in Table 2.17 without the size variable and industry and country dummies resulted in a much higher positive and significant value for the variable, capital intensity.

The strong result in Table 2.17 is that the price–cost margin increases with firm size, after controlling for other factors, including capital intensity. The hypothesis that suggests itself to explain this pervasive phenomenon is that there are significant economies of scale in African manufacturing. We shall see in the next chapter that this is indeed so.

The results reported in Table 2.17 also confirm that, after controlling for firm size, firms with monopoly power are likely to enjoy higher price–cost margins. However, it is important to note that the relationship between margins and number of competitors is not linear implying that a higher number of competitors does not necessarily lower margins. In fact, we did not find statistically significant difference between firms with 2–5, 6–10, or >10 competitors although all of these three group of firms appear to enjoy lower margins than those companies that have 1 or less competitor.

Conclusions

The size structure of firms in the African manufacturing sector is biased to large firms in most countries if we confine ourselves to the RPED sample. This is not surprising in so far as the RPED sought to exclude the household enterprises which employ none or very few wage employees. Some other reports, working with different sources of data, have however found a dualistic structure, even within the *formal or registered* sector, in some countries but not others. Côte d'Ivoire, Ghana and Kenya do show the pattern associated with industrial dualism, in the sense of having two modes at the small and large size classes, with a markedly smaller proportion of workers found in the middle groups. It should be emphasized, however, that this is true for the distribution of *employment* by size classes, not the number of firms. Also the Kenya example suggests that this is more true of private-native owned firms rather than the manufacturing sector as a whole, which includes firms with state and foreign participation.

The dualistic pattern often leads to a significant economic distance between small and large firms – as has happened in countries like India and Indonesia (Mazumdar, 2000). But judging by the ratio of value added per worker in small-firms relative to the large, the African pattern does not seem to show a particularly large size-related differential. In fact, with the exception of Ghana and Tanzania, the differentials in the other African economies seem to be decidedly lower than in the Asian examples given.

The RPED data shows that the concentration ratio is high in all countries and industries surveyed. At the same time other parts of the data-set concerning the number of competitors regarded as important by the firm surveyed, the percentage of sales going to the largest customer, and the entry and exit of firms, all point to the prevalence of a market structure which is far from monopolistic or even oligopolistic. The two findings need not be inconsistent. But to know if the firms truly operate in a competitive environment we really need to look at the price–cost margins. Our analysis on this point shows that the most important determinant of the price–cost margin is the firm size, after we have controlled for capital-intensity and also for industry and country variations. The result strongly suggests the prevalence of increasing returns to scale in African manufacturing. The use of the market share variable, shows that monopoly does increase the margin, after controlling for the other factors including firm size, but that the impact does not extend to a more general result that the margin decreases systematically with the number of competitors facing the firm. The factors behind the strong positive relationship of firm size with the price–cost margin might become clearer after we have explored in detail the properties of the production functions linking the inputs and outputs of our sample of firms. This is the subject of the next chapter.

Appendix to Chapter 2

The Sampling Method of the RPED Surveys

This book is based on the analysis of data generated by the Regional Program on Enterprise Development (RPED), a multiyear study of the manufacturing sector in eight African countries: Cameroon, Côte d'Ivoire, Ghana, Kenya, Burundi, Tanzania, Zambia and Zimbabwe. The RPED has been organized by the Africa Regional Technical Department of the World Bank, and has been funded by a number of European and the Canadian governments. The RPED surveys have been designed to collect information on the performance of the manufacturing sector in the (post-) structural adjustment period in the various countries, and they have generated a unique data set containing a wealth of firm-level information comparable across the eight African countries surveyed. The survey generated very detailed firm-level information on a wide range of firm behavior aspects.

While most of the data refer to the current year, recall questions were asked for some of the variables. For instance, employment and sales data were collected for some selected dates in the past.

The RPED surveys were intended to cover the entire universe of *non-household* manufacturing firms. In sub-Saharan Africa, as in other parts of the developing world, enterprises involved in manufacturing range all the way from household units, operating almost entirely with family labor, to very large units employing 500 or more hired workers. Within the class of enterprises employing some hired labor a distinction should be made between the "registered" and the "unregistered" units. The former are registered with administrative units responsible for one or more sets of laws relating to licensing, labor laws or other forms of regulations. The unregistered units are mostly small enterprises, which do employ some hired workers, along with the worker-entrepreneurs, but are not covered by the operation of the more important regulatory bodies. In some cases there is a formal size limit laid down below which the enterprise is not registered, but other criteria are also used to define the boundaries of the registered sector. Examples are the degree of mechanization, use of electricity, location etc. Unregistered firms are sometimes considered part of the "informal" sector along with the household enterprises.

Generally the list of firms available with government departments refers to the registered units. Special surveys as available were used to cover the non-registered (necessarily small) firms in the *non-household* sector.

The sample design and selection of firms followed the same format in all the countries though the details might have differed slightly from country to country. We can illustrate the procedure by the way it was actually implemented in the case of one country – Zimbabwe.

The Zimbabwe Survey

The Selection of the Sample

The RPED industrial surveys for Zimbabwe[6] were conducted during the Winter in June–July 1993, 1994, and 1995, and used a sample of manufacturing firms in four sectors: food processing, textile and garments (including leather and footwear), woodworking and furniture, and metalworking. The sub-sectors were defined in terms of ISIC codes:

Table 2A.1: ISIC Codes

	ISIC Codes
Food processing	3111–3139
Textile, garments, leather and footwear	3211–3240
Woodworking and furniture	3311–3329
Metalworking	3811–3824

A broad definition of “manufacturing” was used. Any kind of processing of raw materials or intermediates was accepted. Millers, butchers, bottlers, spinners and weavers were all included. However, neither tobacco processing nor electronics was included.

For a firm to be included in the sample it should employ at least five employees (including owner-managers) and be in a position to make its own investment decisions (i.e. it should not be a totally dependent subsidiary and it should have separate accounts). The former restriction excludes many existing firms from the survey. Mead *et al*. (1994), on the basis of a very large-scale survey, estimated that there were approximately 15,000 small-scale enterprises in Zimbabwe. The vast majority of these were tiny enterprises, typically one or two person “firms” engaged in production at home, e.g. in crocheting. Most of the entrepreneurial decisions on which the survey focuses do not arise in such activities so that it was decided to impose a minimum size.

[6] This section draws heavily from Chapter 2 of *Industrial Change in Africa* edited by Gunning and Oostendorp (mimeo, May 1999).

The sample includes both registered formal sector enterprises and unregistered informal ones. From the Central Statistical Office (CSO) a list of registered (formal sector) firms could be obtained. This list has been used for firms with 50 employees or more, which virtually guarantees that the coverage of the CSO list is complete. Smaller firms are included on the CSO list (since many of them are registered) but here the CSO cannot possibly cover all firms. For these smaller firms use was made of the GEMINI survey of small-scale and micro firms (most of them in the informal sector) held in August 1991 (Mead *et al.*, 1993).

The GEMINI survey was conducted in randomly selected areas throughout Zimbabwe, using stratified cluster sampling. The enumerated clusters (areas) were selected on the basis of the 1982 population census, but with a certain distribution over four urban and four rural strata. The survey covered only enterprises with 50 or fewer employees (including the proprietor(s)), marketing at least 50% of their product and engaged in an economic activity other than agriculture or primary product production. The survey covered over 15,000 households and shops, and 5,575 micro and small enterprises were identified. For these 5,575 firms the number of employees is known. Although 60% of the enterprises were engaged in manufacturing activities, the number fitting our definition of a firm turned out to be small. Of the 5,575 firms only 561 employed at least five employees and of these only about a third (182) were engaged in manufacturing. When confining ourselves to the four selected sub-sectors this number falls to 107. These firms were included in our sampling frame.

In order to combine the CSO and the GEMINI lists, blow-up factors were applied to the GEMINI firms, corresponding to the sampling fractions. The CSO list was then used for firms with more than 50 employees and the GEMINI list for enterprises with 50 or fewer (but at least five) employees. GEMINI did not distinguish formal and informal firms. The CSO list, however, contains only formal enterprises. Therefore we have implicitly assumed that there are no informal enterprises with more than 50 employees.

The sampling procedure gave each worker the same probability of being chosen. This was achieved by drawing randomly from the list of workers where each firm is represented by the actual number of workers times the blow-up factor. Selection was done by taking fixed steps from a random starting value (fixed interval sampling). Although drawing firms, the sampling criterion was to give equal probability to each worker of being drawn. Thus, in fact, a worker was drawn and then the corresponding firm was selected.

The selected sample consisted of 133 firms from the CSO list and 67 from GEMINI, distributed over the four sub-sectors. In case a selected firm was unwilling to cooperate or could not be found, the most suitable replacement was selected.

In total 205 firms were interviewed in the first round (1993), 107 of which were in the original sample. Four firms were rejected (two from the original sample), three because the interview was incomplete, and one because the information given seemed highly unreliable. Therefore the final response rate turned out to be 52.2%.

In the first and second rounds of the Survey (June–July 1993 and 1994) a maximum of 10 workers were interviewed in each firm (fewer than 10 workers in firms with less than 10 employees). The fact that not all workers were interviewed in firms with more than 10 workers implies that workers in large firms are underrepresented in the sample. Each firm was asked to indicate how many workers it employed in each of 10 broad occupational categories: management, administration and clerical, technical (primarily engineers and scientists), sales, equipment maintenance and repair, factory supervisors and foremen, skilled production workers, semi-skilled and unskilled production, support staff (janitors, night watchmen, canteen staff), and apprentices. The sample was drawn according to these occupational categories in proportion to their representation in the firm's total labor force.

In the second round only the workers were interviewed which were also in the first round sample. While the first round yielded responses of 1,717 workers in all 201 firms, only 637 workers in 116 firms were interviewed in the second round. No workers were interviewed in the third round. The relatively small number of employees interviewed in the second round compared to the first round is due to a number of reasons: (1) recording worker's names was not a uniform practice in the early part of the first-round, so the workers from some firms could not be identified and included in the second round, (2) some workers were no longer working at the firm or unavailable for a second interview, and (3) the firm was not interviewed in the second round because of non-response.

Attrition and Selection of Replacements

As noted, the first round yielded complete interviews for 201 firms. During the second round of the Zimbabwe surveys in June–July 1994, these firms were contacted again for a follow-up interview. Ten firms that were successfully interviewed in 1993 could not be interviewed again in 1994. In three cases this was because the firm went bankrupt, in one case the firm's owner was seriously ill and unable to do business, in another case the firm was in the process of moving to other premises, and in one case the firms' books were not available. The other four firms refused to participate in the survey mainly for reasons of time. The sample's attrition rate between 1993 and 1994 was therefore 5%.

During the second round of interviews in June-July 1994, 12 additional firms were interviewed to make up for the 10 firms which could not be interviewed again, as well as for 2 firms which had temporarily stopped their production. The replacement firms were selected from the same sector as the firm to be replaced, and of roughly similar size in terms of employment.

The total sample size for the 1994 survey was therefore 203: 191 of the original firms, plus 12 replacements for firms that could not be re-interviewed or that had temporarily stopped producing. For one of these 203 firms, we have only been able to re-interview some of its workers from the previous year. This leaves a sample of 202 firms in 1994 with information about other issues than workers.

During the third, and last, round of the Zimbabwe surveys in June–July 1995, each of the 203 interviewed firms of the previous year was contacted for another interview, of which 11 firms could not be interviewed again. Five of these firms went bankrupt or closed down for lack of perspective. Three firms had been taken over by other firms or were in the middle of a merger, and three others refused to be interviewed again for reasons of time. This means that the sample attrition rate between 1994 and 1995 was also (about) 5%.

Because no replacement firms were selected for this year's survey, the total sample for 1995 consists of 192 firms. In four cases the interviews could be completed only partially, because of an inability or refusal to provide financial data. Nevertheless, because these interviews contain other valuable information, they are included in the final sample.

Table 2A.2: Sector Distribution of all Firms in 1993 and Non-response Firms in 1994 and 1995 (Percentage)

	All 1993	*1994*	*Non-Response*
Food	24	20	18
Wood	13	30	9
Textile	44	30	55
Metal	18	20	18

It is noticeable that the number of firms which went out of business in the course of the year was very low for the periods 1993–94 and 1994–95

(1.5% and 2.5% respectively). Furthermore, the sector distribution of non-response firms mirrors the sector distribution of all firms interviewed in 1993 (Table 2A.2): non-response had no effect on the sectoral distribution of the sample.

In this part we will use four size classes (in terms of employment): 10 or less ("small"), from 11 up to 100 ("medium"), from 101 up to 250 ("large"), and more than 250 ("very large"). Table 2A.3 reports the frequency of firms by size class and sector for the initial 1993 sample. Size is measured as the employment at the time of the interview in 1993. When classified according to size, the firms are roughly equally distributed over the chosen categories: 40 firms employ less than 10 employees, 66 firms between 10 and 100, 47 firms between 100 and 250 workers, and 48 employ more than 250 people.

Table 2A.3: Selected Firms by Size (Employment) and Sector (Unweighted Sample)

Size	*Food*	*Wood*	*Textile*	*Metal*	*Total*
<=10	8	6	17	9	40
11–100	14	9	29	14	66
101–250	10	7	21	9	47
>250	17	4	22	5	48
Total	49	26	89	37	201

Because the sample was selected by drawing workers rather than firms, Table 2A.3 does not reflect the distribution of firms in the population – larger firms are over-represented. In Table 2A.4 we therefore present the frequency of firms if we give an equal probability to each firm to be in the sample by re-weighting the actual sample. We observe that sector totals have not changed much, but size classes change dramatically. Most firms in Zimbabwe are small firms (10 or fewer employees), with the exception of the textile sector where a majority of the firms is medium-sized (between 11 and 100 employees). So, if we had drawn our sample on the basis of equal probability per firm, the number of small firms would probably have tripled. However, because we are interested in firms across the entire size distribution, the sample procedure of giving equal probability per employee was chosen to have a sufficient number of large and very large firms in the sample.

Table 2A.4: Selected Firms by Size (Employment) and Sector (Weighted Sample)

Size	*Food*	*Wood*	*Textile*	*Metal*	*Total*
<=10	47	15	40	19	121
11–100	8	5	55	4	72
101–250	1	1	2	1	5
>250	1	0	2	0	3
Total	57	21	99	24	201

Finally, we look at the location of the sample firms (Table 2A.5). Of the 201 firms visited in 1993, 110 firms were located in Harare, 56 in Bulawayo and 35 in regional centers and growth points. When ranked according to size, we observe that the small and medium sized firms were mostly concentrated in the regions.

Table 2A.5: Size Distribution of Firms by Location (Unweighted Sample)

	Employment				
Location	*5–10*	*11–100*	*101–250*	*>250*	*Total*
Harare	17	33	29	31	110
Bulawayo	8	22	15	11	56
Other	15	11	3	6	35
Total	40	66	47	48	201

Note: Differences between the column totals and the row totals are due to rounding.

To complete the comparison we also show the weighted sample by location, ranked according to size. As small firms are typically located outside the two large cities, giving more weight to them results in a larger number in the other regions. Of the 201 firms 57 would then be located in Harare, 32 in Bulawayo and 112 in regional centers and growth points.

Table 2A.6: Size Distribution of Firms by Location (Weighted Sample)

	Employment				
Location	*1–10*	*11–100*	*101–250*	*>250*	*Total*
Harare	38	15	2	2	57
Bulawayo	17	13	1	1	32
Other	66	45	0	1	112
Total	121	73	3	4	201

"Urban" was defined as a town with an estimated 1982 population of more than 20,000. The urban strata distinguished were: high-density areas, low-density areas, commercial districts and industrial areas. The four rural strata were: smaller towns, growth points, district councils and rural councils.

GEMINI used estimated growth rates of the population of the eight strata (and the whole of Zimbabwe), based on growth prior to 1982, to get estimates of the population per stratum in 1991. The population per stratum was divided by average household size to get the number of households per stratum. This number of households was then used to calculate the fraction of enumerated households. The inverse of this fraction was used as the blow-up factor.

This procedure of drawing a worker and then selecting the corresponding firm leads to firms being selected more than once. The step size in the interval selection procedure was adjusted in such a way that finally 200 firms were selected. It may be noted that firms with more employees than the step size are always in the sample. The same applies for GEMINI firms if the product of employment size and blow-up factor is larger than the step size.

3 The Production Function in African Manufacturing: Relative Productivity of Small and Large Firms

This chapter is devoted to a statistical examination of the production function of the manufacturing industries, as indicated by the samples in the RPED surveys in the seven countries. Since we are interested in the first instance at differences between countries we pool all industries together. The motivation for this chapter is to study the characteristics of firms of different size-groups. It confronts the issues surrounding the policy concerns of the popular thesis of "small is beautiful." How different is the use of capital relative to labor in different size groups? Protagonists of large-scale production maintain that the promotion of small firms is misguided because, given the mix of technologies found in African economies, more productive technologies are the more capital-intensive ones, and there is strong positive correlation between capital intensity and firm size. Is there any evidence of increasing returns to scale in African manufacturing? On the other side of the debate, there is a persistent argument in favor of special promotion of small firms based on the theory of correct "social" price of the factors of production. It is maintained that, while at market prices, large firms might indeed show higher private profitability, small firms are at a serious disadvantage in the capital market. Hence, if this distortion in the capital market were removed, small firms would perform better in terms of their profitability than is revealed by the market data. It is true, the argument continues, that small firms pay lower wages than larger firms. But this wage advantage does not offset the higher relative cost of capital. This is because a major reason for the observed wage differential is that labor in larger firms is more efficient. Thus, the cost of an efficiency unit of labor would be much less than the observed difference in wage per worker. In section 3 to follow, we try to take account of this argument by calculating social benefit–cost ratios for different classes of firms at alternative interest rates, which are uniform across size classes.

It should be emphasized at this point that all the data presented and arguments examined in this chapter refer to *average* productivity of firms of different sizes. A different basis for comparison is the different degrees of inefficiency of small and large firms. How do these classes of firms compare in terms of their divergence from the most efficient firms in their own groups? This is the subject of forthcoming chapters.

Changes in the Economic Ratios by Firm Size

How do the basic economic ratios vary by size of firms in the different countries? The overall picture can be best understood in terms of the elasticity of these ratios with respect to size. This is presented in Table 3.1. We give the estimates for the whole sample including all three waves, both with all industries pooled together, and with the industry variables included as dummies in the estimated equation, which effectively controls for the variation of industry shares in employment across countries. As can be seen, the estimated elasticity differs only slightly in value for the two models.

Table 3.1: Estimated Size Elasticity of Basic Production Ratios

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*Overall*
K/L	0.32	0.43	0.68	0.44	0.53	0.32	0.35	0.43
	(0.04)	(0.06)	(0.07)	(0.04)	(0.05)	(0.04)	(0.03)	(0.02)
Y/L	0.36	0.54	0.33	0.32	0.09	0.20	0.25	0.27
	(0.04)	(0.05)	(0.05)	(0.03)	(0.05)	(0.03)	(0.03)	(0.02)
Y/K	0.04	0.11	−0.35	−0.12	−0.44	−0.12	−0.10	−0.16
	(0.04)	(0.05)	(0.06)	(0.04)	(0.06)	(0.05)	(0.03)	(0.02)
W/L	0.17	0.37	0.34	0.10	−0.04	0.13	0.17	0.27
	(0.05)	(0.04)	(0.05)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
Constant Sector								
K/L	0.31	0.39	0.62	0.38	0.54	0.27	0.36	0.46
	(0.04)	(0.06)	(0.09)	(0.04)	(0.06)	(0.05)	(0.03)	(0.02)
Y/L	0.34	0.49	0.36	0.25	0.01	0.22	0.24	0.25
	(0.03)	(0.04)	(0.07)	(0.04)	(0.06)	(0.04)	(0.03)	(0.02)
Y/K	0.03	0.10	−0.26	−0.13	−0.44	−0.05	−0.12	−0.16
	(0.04)	(0.06)	(0.08)	(0.04)	(0.07)	(0.06)	(0.03)	(0.02)
W/L	0.16	0.35	0.29	0.08	−0.02	0.16	0.16	0.27
	(0.05)	(0.04)	(0.06)	(0.03)	(0.04)	(0.03)	(0.03)	(0.02)

Note: The numbers in parentheses are standard errors.

As is to be expected, capital intensity (K/L) increases strongly with firm size. The elasticity is well above the average value in Ghana and Tanzania, and well below average in Cameroon, Zambia and Zimbabwe, with the value for Kenya and Côte d'Ivoire being the same as the average for the sample countries. On the face of it this result is surprising. As we have seen in the last chapter, there is a much larger proportion of large firms in precisely those countries in which the capital-intensity elasticity is low while we would expect that in these countries the large firms would be more capital intensive. An examination of the ratios by size-groups presented in the Appendix shows that this is indeed not so. The capital–labor ratio in the largest size group is indeed the highest of the sample in Ghana and Tanzania. Another point emerging from these group-wise ratios is the fact that the capital intensity in the "micro" size group is, in several countries, very low. The economic data collected from micro firms is often of variable quality, which might be affecting the results. We have, therefore re-estimated the corresponding size elasticity for these factors of production after excluding the micro firms from the sample. The results are presented in Table 3.2.

Table 3.2: Estimated Size Elasticity of Basic Production Ratios Excluding Micro Firms

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*Overall*
K/L	0.31	0.19	0.85	0.18	0.37	0.19	0.19	0.28
	(0.06)	(0.08)	(0.12)	(0.06)	(0.09)	(0.07)	(0.07)	(0.03)
Y/L	0.25	0.27	0.58	0.12	0.24	0.30	0.24	0.30
	(0.05)	(0.06)	(0.09)	(0.06)	(0.08)	(0.06)	(0.04)	(0.03)
Y/K	−0.06	0.08	−0.27	−0.06	−0.13	0.11	−0.06	−0.02
	(0.06)	(0.08)	(0.11)	(0.06)	(0.10)	(0.08)	(0.04)	(0.02)
W/L	0.16	0.19	0.37	0.05	0.09	0.29	0.18	0.38
	(0.08)	(0.05)	(0.07)	(0.04)	(0.06)	(0.04)	(0.03)	(0.03)
Constant Sector								
K/L	0.30	0.19	0.81	0.16	0.31	0.18	0.33	0.29
	(0.06)	(0.09)	(0.12)	(0.06)	(0.10)	(0.07)	(0.05)	(0.03)
Y/L	0.25	0.33	0.54	0.11	0.30	0.29	0.25	0.32
	(0.05)	(0.06)	(0.09)	90.05)	(0.09)	90.06)	(0.04)	(0.02)
Y/K	−0.04	0.14	−0.27	−0.05	−0.01	0.12	−0.08	−0.03
	(0.06)	(0.08)	(0.11)	(0.06)	(0.11)	(0.08)	(0.04)	(0.03)
W/L	0.17	0.25	0.36	0.05	0.15	0.28	0.19	0.39
	(0.08)	(0.05)	(0.07)	(0.04)	(0.06)	(0.03)	(0.03)	(0.03)

Note: The numbers in parentheses are standard errors.

The overall size elasticity of K/L is reduced for almost all countries, as is to be expected. There is, however, some reorganization of countries in the order of the size elasticity. Ghana – which is paradoxically the one country which had its size elasticity *increased* after the exclusion of micro firms – is still at the top of the list. Cameroon, Tanzania and Zimbabwe are in the middle and practically at the average for all the countries – particularly if we control for industrial composition. Côte d'Ivoire, Kenya and Zambia are the countries with moderate values of size elasticity of K/L.

As capital intensity increases with firm size, we would normally expect the output-capital ratio (in this case output is measured by value added) to decline due to diminishing returns to the use of capital per worker. This tendency can be offset by strong economies of scale, as more capital-intensive firms are able to adopt superior technology.

The data in Table 3.2 (excluding the micro enterprises) suggest that the Y/K ratio shows the "normal" results except for two countries – Côte d'Ivoire and Zambia. However, the coefficients are statistically significant for only two countries – Ghana and Zimbabwe – and for these two the normal negative relationship prevails when we control for the composition of industry (the bottom panel). The result strongly implies that there are significant economies of scale in African manufacturing, and this is indeed borne out in the next section.

Production Functions

Aggregate Functions for the Whole Sample

The summary figures of economic ratios can be supplemented by the estimates of simple production functions to test for the existence of economies of scale.[7] This is done in Table 3.3 for the whole sample by country, including all firms for which data could be collected in the three waves; and secondly, for a subset of firms excluding micro firms (for reasons of possible poor quality of data for such firms).

The results suggest a pervasive presence of increasing returns to scale in African manufacturing. For all countries, with or without micro firms,

[7] The estimation of production function and hence the corresponding returns to scale suffers from many difficulties primarily because of the quality of the data. For instance, poor input data especially those on physical capital can lead to downward bias in returns to scale. For a more detailed analysis of these difficulties and the subsequent remedies see Tybout and Westbrook (1995).

the sum of the coefficients of labor and capital exceeds unity. The statistical tests reported reject the null hypothesis of constant returns to scale in all countries except Kenya. This evidence of increasing returns to scale is consistent with the evidence given in the last chapter about the high degree of concentration in African manufacturing. It, however, raises the question as to what prevents small firms from growing strongly to challenge the larger ones. The obverse to this question what prevents large firms from exploiting their economies of scale to grow into the markets served by small firms. How do small firms survive at all in an economy and a spectrum of technology showing evidence of pervasive increasing returns to scale?

Table 3.3: Production Function

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All Firms							
Constant	4.90 (0.35)	4.49 (0.17)	3.69 (0.22)	4.56 (0.28)	5.44 (0.32)	6.15 (0.31)	4.29 (0.25)
Ln(L)	0.82 (0.06)	1.04 (0.07)	0.65 (0.07)	0.83 (0.06)	0.76 (0.07)	0.95 (0.06)	0.69 (0.05)
Ln(K)	0.40 (0.04)	0.32 (0.04)	0.39 (0.03)	0.33 (0.04)	0.20 (0.04)	0.17 (0.04)	0.41 (0.03)
RTS	1.22	1.36	1.14	1.16	0.96	1.12	1.10
LRT Test	38.59**	67.90**	0.1170	20.59**	0.4695	11.63**	15.05**
Adjusted R^2	0.8113	0.8261	0.7707	0.8083	0.6203	0.7667	0.8683
Without Micro							
Constant	5.37 (0.45)	5.48 (0.50)	2.92 (0.36)	4.80 (0.44)	3.59 (0.60)	5.51 (0.46)	4.55 (0.30)
Ln(L)	0.75 (0.07)	1.00 (0.08)	0.84 (0.11)	0.74 (0.07)	1.04 (0.11)	1.11 (0.07)	0.77 (0.06)
Ln(K)	0.39 (0.04)	0.28 (0.05)	0.38 (0.04)	0.33 (0.05)	0.21 (0.05)	0.15 (0.04)	0.36 (0.04)
RTS	1.14	1.28	1.23	1.07	1.25	1.26	1.13
LRT Test	7.98**	24.56**	7.00**	1.94	9.55**	23.18**	14.48**
Adjusted R^2	0.7307	0.7562	0.7242	0.6502	0.5877	0.6679	0.8068

Notes: RTS stands for return to scale. The numbers in parentheses are standard errors. LRT indicates the value of likelihood ratio in the test of the null hypothesis of constant return to scale.
** is significance at 1%. In all cases, sector, location, and wave dummies are included but not reported.

The answers to this question turn round (i) segmentation of factor and product markets, and (ii) dynamism of firms and obstacles to growth. As for (i) segmentation of capital and materials markets in particular are thought to affect small firms in a discriminatory way which prevents their achieving their potential. At the same time, product market segmentation allows firms of different sizes to produce goods of different qualities – even within the same narrow industrial category – which serve the requirements of different groups of consumers. Thus, the micro and small firms might find a niche serving low quality products to low income consumers, while the larger firms concentrate on the higher income segment of the market (see Little, Mazumdar and Page, Chapter 14 for a detailed discussion and examples from specific industries in India). (ii) Obstacles to growth, emanating from entrepreneurship characteristics and factor market segmentation might also constrain the growth of firms leading to the dualistic structure referred to in Chapter 1, with a missing middle. Some of these issues will be the special concerns of several chapters to follow, particularly Chapters 5 and 8.

Table 3.4: Production Functions for Firms in Different Size Groups

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Micro							
Constant	5.27 (0.63)	4.48 (0.71)	4.50 (0.45)	5.17 (0.51)	6.59 (0.41)	6.36 (0.50)	3.14 (0.74)
Ln(L)	0.67 (0.16)	0.68 (0.32)	0.33 (0.15)	0.79 (0.17)	0.26 (0.16)	0.52 (0.16)	0.78 (0.31)
Ln(K)	0.38 (0.06)	0.36 (0.10)	0.35 (0.05)	0.27 (0.07)	0.24 (0.05)	0.23 (0.06)	0.55 (0.09)
RTS	1.05	1.04	0.68	1.06	0.50	0.75	1.33
LRT Test	0.1195	0.0174	4.61	0.1860	11.14**	3.38	1.41
Adjusted R^2	0.4581	0.3921	0.4970	0.3421	0.2503	0.2731	0.4675
Small+Med							
Constant	5.66 (0.57)	5.46 (0.78)	3.61 (0.53)	4.32 (0.60)	2.75 90.78)	6.60 (0.62)	4.07 (0.68)
Ln(L)	0.95 (0.14)	0.98 (0.16)	0.62 (0.18)	0.87 (0.13)	1.08 (0.19)	0.95 (0.14)	0.64 (0.16)
Ln(K)	0.31 (0.05)	0.16 (0.06)	0.38 (0.04)	0.32 (0.06)	0.25 (0.06)	0.10 (0.05)	0.43 (0.07)
RTS	1.26	1.14	1.00	1.19	1.33	1.05	1.07
LRT Test	4.69	2.56	0.0004	2.95	3.85	0.1742	0.3481
Adjusted R^2	0.4880	0.4611	0.5553	0.4644	0.3785	0.3663	0.4957
Large+ Very Large							
Constant	7.32 (1.33)	5.91 (1.19)	4.52 (0.96)	6.07 (0.14)	5.34 (1.78)	3.42 (1.01)	5.70 (0.40)
Ln(L)	0.33 (0.12)	0.90 (0.17)	0.60 (0.31)	0.49 (0.08)	1.06 (0.31)	1.09 (0.17)	0.79 (0.07)
Ln(K)	0.42 (0.10)	0.32 (0.07)	0.36 (0.10)	0.35 (0.26)	0.11 (0.14)	0.31 (0.07)	0.28 (0.04)
RTS	0.75	1.22	0.96	0.84	1.17	1.40	1.07
LRT Test	5.69	1.99	0.0182	1.75	0.425	7.80**	1.75
Adjusted R^2	0.4046	0.5278	0.4623	0.5215	0.3811	0.6080	0.7635

Notes: See Table 3.3.

Disaggregated Production Functions

Another possibility is that there might be discreet jumps in technology and the associated requirements for capital as we move from micro to small-medium to large size groups. In this case, the increasing returns to scale, which we observe for the sample as a whole, might not exist when we consider the sub-groups of forms of different size ranges. There is some support for this hypothesis in the production function estimates presented in Table 3.4 for different size groups of firms.

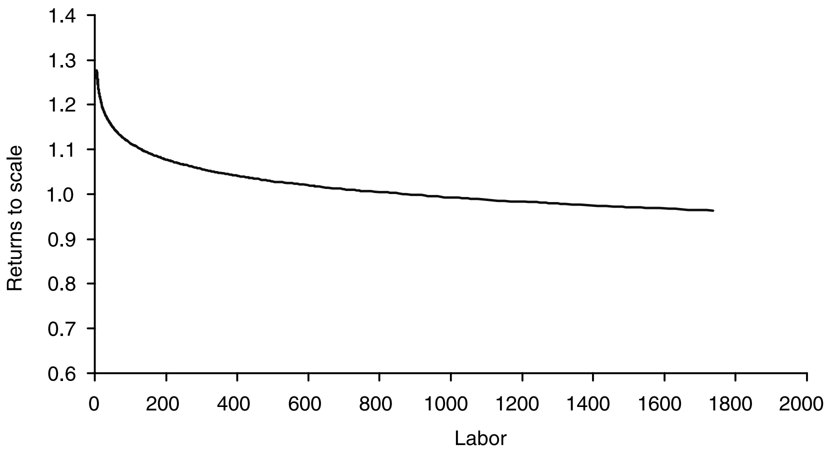

Figure 3.1: Returns to Scale and Size

The relation between returns to scale and firm size can also be analyzed within the framework of a translog production function where the returns to scale is not assumed constant (see Tybout and Westbrook, 1995). In Figure 3.1, estimating this translog production function with labor and capital as inputs and a host of other firm specific variables as determinants, we have illustrated the returns to scale as a function of the firm size. As expected, the returns to scale seems to be highest for small and medium size firms. The larger firms, on the other hand, appear to be closer to constant returns to scale. Some readers might raise the question that our results depend too much on aggregating *all four* industries in each country.

While it is impractical to estimate production functions for each industry in each country, we have tried the alternative route of estimating the function by industry for all countries pooled together. These results are presented in the Appendix (Table 3A.4). It is seen that all industries show significant returns to scale, and further that there is hardly any difference in the magnitudes of the summed coefficients of capital and labor, as between industries. At the same time, when we break down the sample by size groups, the evidence of returns to scale is mostly statistically non-significant for individual industries, as it was for individual countries.

Production Function: Other Studies Revisited

The production function, as estimated in this chapter, deliberately ignores many specifications that may affect the production process. However, an objection to the specification of the production functions estimated, particularly across size groups of firms, is that it does not allow for the variations in the quality of the factors of production, both capital and labor. In fact, the objection is more pertinent in the case of labor than of capital. Capital is measured in value, ostensibly in terms of their replacement value. Conceptually the replacement values should reflect the superior quality of capital used in larger firms. It is, however, entirely possible that measurement difficulties have prevented respondents to properly assess the replacement values of the machines. If their estimates veered towards book values, the underestimate of the values of machines of improved quality or of more recent vintage might have been significant. As far as labor is concerned, it is measured in terms of physical units – numbers of workers. Thus it is underestimating the quality of labor which can be expected to increase with firm size. This part of the problem might be taken care of to some extent by adding a quality dimension to the labor factor in the production function. The simplest way of doing this is to have a specification of the production function as:

$$\ln(Y) = \beta_0 + \beta_1 Ln(K) + \beta_2 \ln(L) + \beta_3 \ln(H)$$

where H is a measure of human capital added to the inputs, and is defined as $(L \times h)$, *h* being the average level of human capital of workers in the firm concerned. The dimensions of the human capital that can be measured from the RPED surveys are numbers of years of education, and of the tenure of workers in the firm (to approximate on-the-job training). Production functions with this alternative specification have been estimated by Bigsten *et al.* (2000b). Table 3.5 presents the estimation of Equation 1 as provided by Bigsten *et al.*

In modeling the production function, Bigsten *et al.* use the panel structure of the data to make both physical and human capital predetermined variables by using the lagged values as instruments. Hence the estimation is restricted to a limited number of firms where data was available for all variables in all three waves. Furthermore, in Table 3.5, the human capital is simply the total years of education of workers in the firm. Bigsten *et al.* also report results where the human capital is estimated by both years of education and tenure. A test is also reported for restricting the return to scale to unity and this was rejected at the 1% level in Cameroon and Zimbabwe, but accepted in the other countries. At the bottom of the table, Bigsten *et al.* report the implied rate of return for physical and human capital. The rate of return of physical capital is obtained by taking the median value added to capital ratio and multiplying it by the coefficient of physical capital stock variable in the production function. The rate of return to human capital in a form commensurate with that for physical capital can be obtained by dividing the coefficient of human capital as reported in Table 3.5 by the median human capital. As reported here, Bigsten *et al.* find that for all countries the returns on physical capital massively exceed those of human capital. The rate of return of human capital ranges from 1 to 9% whereas the rate of return to physical capital ranges from 10% to 35%.

Table 3.5: Returns to Physical Capital and Human Capital

	Cameroon	*Ghana*	*Kenya*	*Zambia*	*Zimbabwe*
Ln(L)	0.25 [0.8]	0.63 [2.6]	0.16 [0.7]	0.5 [2.5]	0.13 [0.5]
Ln(K)_{t-1}	0.32 [4.7]	0.32 [8.2]	0.36 [6.9]	0.20 [2.7]	0.44 [11.1]
Ln(H)_{t-1}	0.43 [1.5]	0.04 [0.02]	0.48 [2.0]	0.23 [1.1]	0.43 [1.7]
Adj. R^2	0.81	0.70	0.7	0.60	0.88
N	170	230	199	98	261
Test of CRS	59.2 [4.0]	3.1 [0.3]	17.5 [1.5]	0.1 [0.9]	37.5 [2.4]
Rate of Return (%)					
Physical Capital	19	32	22	10	35
Education	4	1	6	3	9

Source: Bigsten *et al*. (2000).
Note: The numbers in brackets are t values.

A quick comparison between the production function of Bigsten *et al.* as reported in Table 3.5 and the estimation of this chapter reveals that the addition of the human capital has significantly reduced the coefficient of log labor in the production function. In fact, the coefficient of physical capital as reported in the Bigsten *et al.* study is within the two standard error of those we found in this Chapter (Table 3.3). For instance, for Zimbabwe, the coefficient of physical capital in our study is 0.41 versus 0.44 reported in Bigsten *et al.* But the coefficient of labor in our study is 0.69 compared to only 0.13 reported in Table 3.5. Furthermore, the coefficient of log labor reported in Table 3.3 is closer to the sum of the coefficient of human capital (*H*) and labor (*L*) in the Bigsten study, which again does not come as a surprise considering the way human capital (*H*) is derived. Hence, despite the fact that Bigsten *et al.* use a much smaller sample size, their results are in line with those found in this chapter.

In an attempt to examine the impact of firm-based training and investment in technology on enterprise productivity in three sub-Saharan countries: Ghana, Kenya, and Zimbabwe, Biggs *et al.* (1995) re-estimate production function. Their pooled production function, augmented by training and technology variables, shows a return to scale of 1.10 which is close to the 1.13 we found in our seven country pooled production function as reported in the appendix to this chapter. In another study, Ramachandran and Shah (1997) attempt to quantify the effect of foreign ownership on enterprise productivity by augmenting the production function with variables for foreign ownership, training, and general manager education. The exercise uses the first wave of RPED data for Zimbabwe, Ghana and Kenya and finds a return to scale ranges of 1.03, 0.98, and 1.13 for Zimbabwe, Ghana, and Kenya respectively all three close to those found in Table 3.3. The difference between this study and that of Bigsten *et al.* is the fact that, here, education is not the sum of education for all workers but for the general manager only and hence the coefficient of labor in the production function is not affected too much.

Van Biesebroeck (2001) estimated a simple Cobb-Douglas type of production function for nine countries (which included Burundi and Ethiopia in addition to our seven countries) and found increasing returns to scale in six out of the nine countries. He notes an econometric problem which might bias the estimates. Firm-level productivity differences are unobserved, but firms take them into account in their input choices. His solution to correct for this problem is to estimate the production function with a fixed-effects panel estimator for the sample of firms which are reported in successive waves. The assumption here in effect is that the inter-firm productivity differences are constant over time and are netted out in the estimation. The result is that, for the entire sample, the return to scale drops from 1.19 to 1.14 – which is still significantly positive (Van Biesesbroeck, 2001, pp. 35–36).

Total Factor Productivity

One of the major questions on the analysis of economic data by firm size is how productive the different classes of firms are as revealed by the input-output data. A standard way of looking at how productive different classes of firms are, is to consider their total factor productivity (*TFP*). *TFP* can be calculated as:

$$TFP_{it} = \log\{\frac{\frac{Y_{it}}{Y_{mt}}}{(\frac{L_{it}}{L_{mt}})^{S_L}(\frac{K_{it}}{K_{mt}})^{1-S_L}}\} \quad (1)$$

where s_L is the wage share in value added, averaged by country and year. As before, here *Y* is real value added, *L* the total number of employees, and *K* the deflated capital stock, defined as the replacement value of the plant and equipment. The real values are then normalized by dividing each by the values for the median firm (*m*) in the same country and year. Equation (1) also assumes constant returns to scale which is not supported by the data. We have already seen that the evidence of increasing return to scale found in the work reported above is confirmed by Van Biesebroeck (2001) who found strong evidence of increasing returns to scale in six out of nine countries (our sample of seven countries plus Ethiopia and Burundi) and even stronger for the pooled sample. However, arguing that the firm-level variation is much larger than the effect of scale economies and that scale economies are not that different from productivity advantages as both allow a firm to produce more output from the same amount of inputs, Van Biesebroeck calculates equation 1 for his pooled sample of nine sub-Saharan countries and depicts the results in Figure 3.1.

As Figure 3.1 demonstrates, Kurtosis is inversely related to firm size indicating that the distribution of smaller firms has noticeable thicker tails. Van Biesebroeck also calculates *TFP* distribution for each country separately and shows that countries with the lowest level of development have the most spread out distribution. In addition, he shows that the distribution is right-skewed in poorer and left-skewed in richer countries. As Figure 3.1 reveals, the median productivity for micro and small enterprises is marginally lower than for medium-sized enterprises, and hardly different from large enterprises. The main difference between smaller and larger firms is that variation in productivity decreases substantially with size. In fact, around 40% of the micro enterprises, and even more of the small enterprises, have higher productivity than the median for large firms.

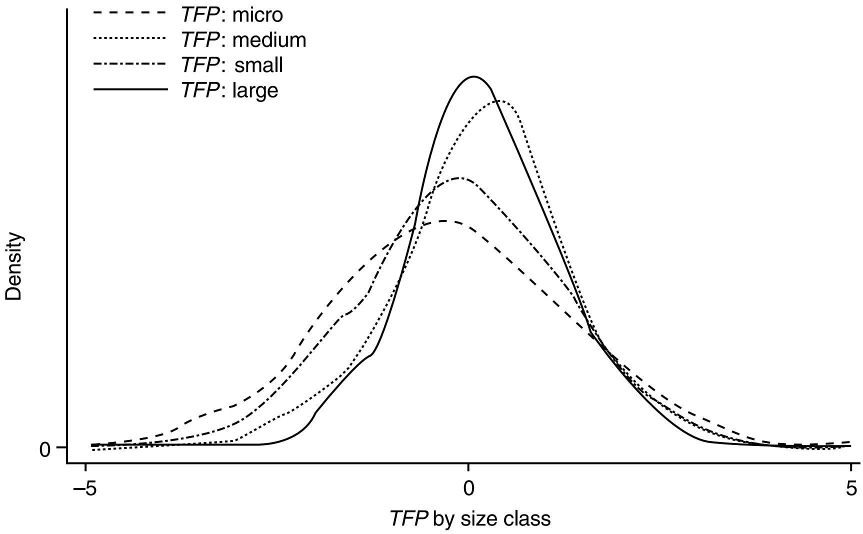

Figure 3.2: Size Distribution of *TFP* for Nine sub-Saharan Countries
Source: Van Biesebroeck (2001).

In an attempt to compare the results in this section with the findings for developed countries, although only few studies report the entire distribution, Van Biesebroeck writes:

> One statistic reported in Bartelsman and Doms (2000) for USA manufacturing firms is that the average *TFP* for establishments in the 9th decile was double the average for firms in the 2nd decile in 1972. By 1987, this ratio had climbed to 2.75. In the sample the ratio ranges from 4.7 in Zimbabwe to 18.7 in Ghana, with an average of 9.7. Another comparison can be made with the results summarized in Tybout (2000). Studies using the stochastic frontier estimation find that the median efficiency is 70% of the maximum on average. The results here imply that the median firm only attains 19% of the productivity of the 90th percentile firm on average. It ranges from 11% in Tanzania to 32% in Zimbabwe. Clearly, the dispersion is enormous. There is some tendency for the ratio to be smaller for countries at a higher level of development, such as Cameroon and Côte d'Ivoire. One would expect that a more developed (and competitive) manufacturing sector achieves more convergence in firm productivity. Zimbabwe in particular, as the most developed manufacturing sector and by far the most compact productivity distribution.

We will get back to these issues when we present our study of technical efficiency later in this book.

Private and Social Profitability by Firm Size

The approach of total factor productivity summarized in the previous section can be used as to indicate difference in social profitability of different classes of firms only on the assumption that market prices of factors reflect their true social opportunity cost. The observed wage share in value added can then be used in equation (1) as a social welfare weight to evaluate the costs of labor and capital, as shown. The analysis of social profitability seeks to correct for the fact that market prices might not reflect the true opportunity costs of inputs (or for that matter the true competitive values of outputs) because of various distortions in the economy. In theory, such corrections could be made for all major inputs and outputs. In the discussion below we concentrate on one input – capital. It is well known that capital markets are notoriously distorted as they affect small and large firms. The effective interest rates at which large firms obtain their loans are generally much lower than those facing small firms. In fact, there is some evidence to suggest that the supply of finance to small firms might be constrained, so that after a certain volume the marginal price of capital might indeed be infinite for such firms. We will go into the details of the market for finance, and the evidence on the differential interest rates for firms of different sizes in a later chapter of this book. For the moment we accept the distortion in the capital market as given. The firms in the RPED surveys supplied their own numbers on profits made during the years of the survey. However, for obvious reasons these numbers can be expected to be low in the scale of reliability. We have, therefore, worked with an alternative measure of "accounting profits," which simply is the difference between value added and the wage-salary bill. The value added as elsewhere is the value of total sale minus the raw materials and indirect cost. The depreciation value has not been subtracted because of the poor quality of reported depreciation rates. This index, thus, measures the return to entrepreneurship as well as capital.

Table 3.6 provides the calculated elasticity of profits per worker. Profit per worker obviously increases with firm size since capital intensity and labor productivity increases with size. However, the larger amount of capital used in larger firms has to be paid for. Thus, the more satisfactory measure of private profitability is profit per unit of capital.

Table 3.6: Size Elasticity of Profit

Profit per worker	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Accounting Profit	0.41	0.31	0.33	0.14	0.18	0.24
	(0.05)	(0.06)	(0.05)	(0.05)	(0.04)	(0.03)
Reported Profit	0.31	0.32	0.12	−0.31	0.21	0.19
	(0.06)	(0.13)	(0.05)	(0.10)	(0.07)	(0.04)

Note: The numbers in parentheses are standard errors**.** The elasticity of profit per unit of capital has been calculated by subtracting the elasticity of K/L with size given in Table 2.1 from the profit per worker given in this table.

Table 3.7 also calculates the distribution of profit–capital ratio, using both the accounting profit and the actual profit as reported by the firm. Amazingly, for all the countries the elasticity of actual profit per unit of capital is *negative,* with varying degrees, and very strongly negative for Ghana and Tanzania. The accounting profit also reveals the same picture, though to a lesser degree. To see if this finding holds if one excludes the micro firms, we have repeated the exercise without them. The elasticities are still negative and rather strong. If these data are to be believed then the relative profitability at the prices declared by the firms, decreases significantly with firm size. This conclusion is also confirmed by examining the figures of profits per unit of capital by size groups given in Table 3.7.

Two comments need to be made about the pervasive evidence of the decline in private profitability with increasing firm size. First, it suggests that there might be serious under-utilization of capital, or to put it in another way, serious over-investment in fixed capital in larger firms in the African countries in our sample. The problem of relative efficiency by firm size and the way it is affected by varying degrees of capacity utilization is the subject of Part IV. Second, the sharply declining marginal product of capital with firm size, brought out by the data in Table 3.7, is only compatible with the continued viability of private firms, who are after all the overwhelming majority in the sample surveyed, only on the assumption that capital market segmentation is strong and significant in these economies. Larger firms have markedly lower levels of the marginal product of capital because the price of capital they have to pay is so much lower. We are not able to test the validity of this assumption directly in the absence of reliable data on this variable by size of firm. The analysis of finance in Chapter 5 of Part III, however, provides some support for this hypothesis.

Table 3.7: Size Distribution of Profit per Unit of Fixed Capital

	Côte d'Ivoire	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
1. Size Elasticity–Profit Per Unit of Capital (Accounting Profit)	0.13 (0.05)	−0.30 (0.06)	−0.03 (0.05)	−0.27 (0.07)	−0.05 (0.06)	−0.11 (0.04)
2. Size Elasticity–Profit Per Unit of Capital (Reported Profit)	−0.24 (0.12)	−0.57 (0.08)	−0.29 (0.05)	−0.62 (0.12)	−0.14 (0.07)	−0.23 (0.05)
3. Size Elasticity–Profit Per Unit of Capital (Excluding Micro Firms)	−0.31 (0.19)	−0.56 (0.14)	−0.18 (0.08)	−0.60 (0.19)	−0.10 (0.10)	−0.14 (0.06)
Distribution						
Micro	1.58	2.07	2.39	2.33	1.86	2.09
Small	0.78	0.73	0.58	0.53	0.68	1.11
Medium	1.18	0.37	0.72	0.60	0.51	0.76
Large	1.04	0.25	0.52	0.13	0.44	0.73
Very Large	0.76	0.29	0.30	0.09	0.66	0.81

Note: The values in parentheses are standard errors. The ratios are relative to the median. The elasticity of profit per unit of capital has been calculated by subtracting the elasticity of K/L with size given in Table 2.1 from the profit per worker given in this table.

The decline in the marginal product of capital with firm size is compatible with the evidence of increasing return to scale in the estimated production functions, in so far as the increase in labor productivity more than offsets the fall in capital productivity with firm size. Average earnings per worker do increase strongly with firm size in the RPED sample, suggesting a strong increase in the marginal product of labor with size. The increase in earnings per worker with firm size is partly due to the higher measured human capital of the workers, but not exclusively so. This is seen from the data presented in Table 3.8. A two-way relationship between earnings and labor productivity is possible as firm size increases. Efficiency wage effects translate higher wage into higher labor productivity. At the same time there might be a significant element of rent sharing as employers share the higher level of productivity and surplus with their workers. Theses relationships have been studied in detail elsewhere (Mazumdar and Mazaheri 2001, Chapters 15 and 16).

Table 3.8: The Elasticity of Earnings and Productivity in African Countries

Elasticity	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Earnings (1)	0.24	0.20	0.17	0.14	0.23	0.25
Productivity	0.54	0.33	0.32	0.09	0.20	0.25
Earnings (2)	0.15	0.14	0.12	0.10	0.17	0.20

Source: The elasticities for the African countries are calculated from the RPED data set, regressing the log of average monthly earnings and value added per worker on log size. Earnings (1) are the values calculated from the regression equation which controlled only for sex and the "wave" of the survey (the regression used pooled data from all three waves of the RPED surveys). Equation (2) reports the values from the equation which include controls for the education and experience of the workers, as well as the industry they worked in.

Social Profitability

The evidence and analysis presented above show clearly that not much can be concluded about the relative social profitability of small and large firms, unless we know fairly accurately the "shadow prices" (i.e., the social opportunity cost) of at least the two factors, labor and capital. The data show very strongly that earnings per worker *increases* sharply and monotonically with firm size (even after controlling for measurable human capital differences), and that the price of capital *falls* monotonically with firm size (as shown by the decline in the rate of profit per unit of capital).

The wage-size relationship might be due to three different groups of factors: institutional influences like trade unions, public sector pay policy, influence of foreign ownership etc.; efficiency wage effects; and profit sharing. The social price of labor for large firms should be lower than the reported earnings per worker (after standardizing for observed human capital differences) to the extent that the higher wage is due to institutional factors. If the efficiency wage considerations predominate, then the correction would be small. The implications of profit sharing are more ambiguous. In so far as profit sharing preserves industrial peace and raises workers' morale, it could be considered to be an aspect of efficiency wage: the higher wage is offset by higher efficiency of workers. But there might be a part of profit-sharing which is the result of a specific type of industrial relations which bumps up wages in larger firms with higher profits per worker. The exploration of these hypotheses about the size-wage relationship has been carried out in some detail in Mazumdar and Mazaheri (2001), and some of the results are summarized in Chapter 6, Part III below. Briefly, the evidence *does not* point to major institutional factors as contributing greatly to the size-wage relationship. The major factor would seem to be a mixture of efficiency wage and profit-sharing effects. As a first approximation we can probably assume that high wages paid to workers in large firms are to a large extent offset by higher worker efficiency, so that the difference in the cost of an efficiency unit of labor is much less than the difference in wage per worker.

We can then focus on capital market segmentation as the major factor which has to be taken into account in revising market prices of the factors of production to social prices. Unfortunately we do not have sufficient direct evidence of the cost of borrowing for firms of different sizes. The observed difference in profits per unit of capital could be used as a proxy but it requires the unrealistic assumption that all firms act as in perfect competition models equating the marginal product of capital to its supply price. It might be more revealing to have simulation results showing the benefit–cost ratios of different size-groups of firms on the assumption that all firms face the same opportunity cost of capital. Since we do not know the true social price of capital we calculate the benefit–cost ratios for different assumed rates of interest rates applied uniformly to all sizes of firms.

We present in Table 3.9 a series of hypothetical values of the benefit–cost ratio for the size groups. We call this the benefit cost ratio because it is the ratio of value added over the total cost of two inputs – labor and capital. In the calculation, labor is valued at its market (declared) cost, while capital is valued at alternative rates of return (interest) as shown in the table. With the exception of one case, the median benefit–cost ratio stays above one for all countries at every assumed interest rate.

The size elasticity of benefit–cost ratio, calculated to demonstrate the sensitivity of changes in this ratio to the size of firm, differs rather strongly across different countries and different interest rate assumptions. At the lowest assumed interest rate, i.e. 10%, the Francophone countries, have the highest elasticity at 0.10–0.12 whereas Ghana and Tanzania both demonstrate negative elasticity. As one might expect, this elasticity is very sensitive to whether the micro firms are included or not. If micro firms are excluded and 10% interest rate is assumed, all seven countries show positive elasticity, though the elasticity is statistically significant only for Côte d'Ivoire, Zambia, and Zimbabwe. Judging from the simulation results reported in Table 3.9, however, in general the increase in the assumed interest rate reduces the estimated size elasticity. For instance, when the assumed interest rate is increased from 10 to 40%, the estimated size elasticity of benefit–cost ratio drops from 0.05 to –0.02 in the case of Zimbabwe and from 0.08 to 0.02 in the case of Kenya. In fact, if the micro firms are excluded from the sample, at interest rates of 20% or higher the ratio is statistically invariant with respect to firm size for all countries with the exception of Côte d'Ivoire. Since the figure of 20% is not at all an overestimate for the social opportunity cost of capital, and many small firms would be paying more than this, we would not be wrong in concluding that the RPED data suggest the social benefit–cost ratio is probably at the same level for small and large firms.

Table 3.9: Benefit–Cost Ratio for Different Cost of Capital Alternatives

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
r = 10%							
Median	1.49	3.09	2.54	2.67	1.87	2.10	1.95
	(2.45)	(2.65)	(3.23)	(3.14)	(2.89)	(2.84)	(2.12)
Size Elasticity	0.10	0.12	−0.09	0.08	−0.06	0.00	0.05
	(0.03)	(0.03)	(0.04)	(0.02)	(0.04)	(0.03)	(0.02)
Size Elasticity	0.02	0.09	0.06	0.03	0.02	0.11	0.06
(excluding Micro Firms)	(0.05)	(0.04)	(0.06)	(0.04)	(0.07)	(0.05)	(0.03)
r = 20%							
Median	1.13	2.70	2.11	1.98	1.43	1.60	1.57
	(2.18)	(2.43)	(2.91)	(1.62)	(2.89)	(1.97)	(1.85)
Size Elasticity	0.11	0.12	−0.14	0.06	−0.12	−0.03	0.02
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.02)
Size Elasticity	−0.01	0.08	0.00	0.02	−0.01	0.11	0.04
(excluding Micro Firms)	(0.05)	(0.04)	(0.06)	(0.05)	(0.06)	(0.06)	(0.03)
r = 30%							
Median	0.99	2.48	1.78	1.59	1.20	1.29	1.32
	(2.03)	(2.19)	(2.60)	(2.56)	(2.75)	(2.29)	(1.57)
Size Elasticity	0.11	0.12	−0.15	0.05	−0.15	−0.03	−0.00
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.02)
Size Elasticity	0.02	0.08	0.00	0.01	0.03	0.11	0.02
(excluding Micro Firms)	(0.05)	(0.04)	(0.06)	(0.05)	(0.06)	(0.06)	(0.03)
r = 40%							
Median	0.85	2.29	1.57	1.32	1.07	1.08	1.16
	(1.77)	(2.13)	(2.50)	(2.41)	(2.61)	(2.17)	(1.60)
Size Elasticity	0.10	0.12	−0.18	0.02	−0.18	−0.05	−0.02
	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)	(0.03)	(0.02)
Size Elasticity	−0.03	0.07	−0.02	0.02	−0.01	0.10	−0.02
(excluding Micro Firms)	(0.05)	(0.04)	(0.06)	(0.05)	(0.07)	(0.06)	(0.03)

Note: Values in parentheses are standard deviations or standard errors.

Conclusions

An important issue in the policy debate about the desirability, from a social welfare perspective, of small and large firms is the relative productivity of the two major factors of production – labor and capital. At a later point of the book we address the question of relative *technical efficiency* of firms of different size groups, using the method of frontier production function analysis. This technique quantifies the distance of different firms from the most efficient frontier. The topic of the present chapter is not relative efficiency in this sense, but the *average productivity* of different size-classes of firms.

We start with a study of partial productivity – the economic ratios relating capital, labor and value added. The major finding is that, while the capital–labor ratio increases strongly with size, the ratio of value added to capital does not fall significantly. This suggests the expected diminishing returns to capital are being overshadowed by significant returns to scale. The analysis of production functions, with different specifications, in this chapter, as well as in other studies, seems to support this conclusion.

If prices of outputs and inputs reflected true opportunity costs, the measure or private profitability would also give an indication of social profitability. The elasticity of profit rates with respect to firm size was calculated, using data on profits reported by firms themselves, as well statistics of accounting profit calculated from the firm's business data on value added and costs. Either measure of profitability has a wide margin of error. But in spite of this, the overwhelming evidence is that of declining rate of profit per unit of capital with increase in firm size. It has been noted that measured at the median of the *Y/K* ratio the rate of return to physical capital is very high in the survey countries – in the range of 20–35% with the exception of Zambia. This reflects the relative shortage of capital in African economies. But it is also seen that the rate of return drops fairly rapidly for larger firms.

The decline in the marginal product of capital with firm size is compatible with the evidence of increasing return to scale in the estimated production functions, in so far as the increase in labor productivity more than offsets the fall in capital productivity with firm size. Average earnings per worker do increase strongly with firm size in the RPED sample, suggesting a strong increase in the marginal product of labor with size. The increase in earnings per worker with firm size is partly due to the higher measured human capital of the workers, but not exclusively so.

Capital market segmentation makes private profitability an unsuitable index for evaluating the social benefit–cost ratio of different classes of firms.

In the absence of direct reliable evidence on the difference in the cost of capital facing small and large firms, we present some simulation results on the benefit–cost ratios for different size groups. These ratios are calculated on the basis of alternative rates of interest uniformly applied at all size classes. As is to be expected, in general the increase in the assumed rate of interest reduces the size elasticity of the calculated benefit–cost ratio with respect to firm size. In fact, if micro firms are excluded (the business accounts data for this group being highly suspect), at interest rates of 20% or higher, the social benefit–cost ratio seems to be invariant with respect to firm size.

Appendix to Chapter 3

Table 3A.1: Distribution of Capital–Labor and Value-added–Labor Ratios

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
	Capital–Labor Ratio						
Median	11496	5469	946	4511	4065	4417	4382
Standard Deviation	49134	23592	7878	10234	11150	9313	9406
By Size							
Micro	0.763	0.424	0.295	0.370	0.449	0.522	0.270
Small	0.808	0.893	0.773	0.899	0.814	0.920	0.696
Medium	1.148	1.739	1.352	0.853	0.856	0.951	0.851
Large	2.156	1.639	1.481	1.203	0.903	1.031	0.913
Very Large	1.388	1.525	2.001	1.060	1.828	1.129	1.196
By Sector							
Food	1.157	1.749	2.016	1.005	1.031	0.945	1.106
Metal	1.170	0.935	1.744	0.586	0.746	0.884	1.133
Textile	0.715	0.409	0.851	0.513	0.649	0.774	0.716
Wood	0.849	0.837	1.179	0.915	1.085	0.557	0.582
	Value-added–Labor Ratio						
Median	9656	1122	1304	3337	1862	2962	3999
Standard Deviation	54168	43265	4878	19515	11394	9394	8135
By Size							
Micro	0.501	0.242	0.588	0.478	0.784	0.601	0.544
Small	0.731	0.959	0.919	1.000	0.758	1.050	0.772
Medium	1.988	1.251	0.868	1.011	1.220	1.017	0.970
Large	2.011	1.860	1.899	1.395	1.117	1.392	1.000
Very Large	1.784	1.805	2.656	0.848	2.016	1.576	1.230
By Sector							
Food	1.459	1.472	2.015	1.603	1.848	1.153	1.796
Metal	0.924	1.213	1.103	0.578	1.042	1.487	0.954
Textile	0.659	0.335	0.773	0.549	0.553	0.666	0.780
Wood	0.798	0.889	0.703	0.802	0.478	0.534	0.640

Note: The Median and Standard Deviation are in US dollars. All other values are relative to the median.

Table 3A.2: Distribution of Value-added–Capital Ratio

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Mean	0.89	2.45	1.41	0.81	0.66	0.64	0.88
Standard Deviation	3.11	3.90	5.17	3.52	4.99	3.59	3.08
By Size							
Micro	0.65	1.77	2.42	1.07	1.60	1.03	1.49
Small	1.11	2.36	1.28	0.70	0.31	0.54	0.84
Medium	0.87	2.32	0.95	0.84	0.40	0.47	0.70
Large	0.80	2.65	0.65	0.73	0.37	0.59	0.93
Very Large	0.88	2.97	0.77	0.48	0.19	0.78	0.75
By Sector							
Food	0.85	2.01	1.47	0.91	0.60	0.66	0.91
Metal	0.99	3.09	1.11	0.83	0.67	0.68	0.62
Textile	0.78	1.67	1.99	0.86	0.53	0.47	1.01
Wood	0.85	2.76	1.01	0.75	0.72	0.70	0.98

Note: All values are in US dollars. The averages are across three waves of data.

Table 3A.3: Production Function for Different Sector and Size Groups (All Countries Polled)

	All	*All Without Micro*	*Micro*	*Small+Medium*	*Large+VLarge*
Constant	4.74 (0.12)	4.61 (0.12)	5.28 (0.23)	4.68 (0.25)	5.65 (0.35)
Ln(L)	0.82 (0.02)	0.85 (0.03)	0.50 (0.07)	0.85 (0.06)	0.67 (0.05)
Ln(K)	0.32 (0.01)	0.32 (0.02)	0.33 (0.02)	0.30 (0.02)	0.33 (0.03)
RTS	1.14	1.17	0.88	1.15	1.01
LRT Test	92.88**	67.85**	7.71**	9.25**	0.01
Adjusted R^2	0.8081	0.7555	0.3875	0.5730	0.6485
Food Sector					
Constant	5.21 (0.27)	4.85 (0.33)	5.97 (0.65)	5.17 (0.48)	5.01 (0.70)
Ln(L)	0.83 (0.05)	0.83 (0.06)	0.85 (0.21)	0.97 (0.11)	0.52 (0.09)
Ln(K)	0.33 (0.03)	0.35 (0.03)	0.28 (0.06)	0.27 (0.04)	0.47 (0.06)
RTS	1.16	1.18	1.13	1.24	0.99
LRT Test	1.62	26.50**	0.4127	6.48**	0.30
Adjusted R^2	0.8045	0.7735	0.3540	0.4973	0.6201
Metal Sector					
Constant	5.06 (0.24)	5.62 (0.037)	4.90 (0.44)	5.67 90.52)	6.00 (1.02)
Ln(L)	0.86 (0.04)	0.88 (0.06)	0.58 (0.13)	0.84 (0.10)	0.92 (0.17)
Ln(K)	0.30 (0.03)	0.26 (0.03)	0.34 (0.04)	0.27 (0.35)	0.22 (0.07)
RTS	1.16	1.14	0.92	1.11	1.14
LRT Test	28.66**	8.08**	0.4526	1.40	0.85
Adjusted R^2	0.7908	0.6812	0.4338	0.5656	0.5339
Textile Sector					
Constant	5.14 (0.21)	4.48 (0.28)	5.69 (0.42)	4.59 (0.49)	6.23 (0.39)
Ln(L)	0.86 (0.05)	0.93 (0.06)	0.53 (0.12)	0.86 (0.14)	0.73 (0.07)
Ln(K)	0.28 (0.03)	0.30 (0.03)	0.29 (0.05)	0.32 (0.05)	0.26 (0.04)
RTS	1.14	1.23	0.82	1.18	0.99
LRT Test	26.62**	39.61**	2.79	2.21	0.60
Adjusted R^2	0.8199	0.7979	0.2965	0.5320	0.7711
Wood Sector					
Constant	4.70 (0.25)	4.87 (0.38)	5.13 (0.44)	5.18 (0.56)	4.62 (1.11)
Ln(L)	0.76 (0.05)	0.82 (0.07)	0.30 (0.15)	0.81 (0.13)	0.94 (0.18)
Ln(K)	0.36 (0.03)	0.32 (0.04)	0.40 (0.05)	0.32 (0.04)	0.28 (0.08)
RTS	1.12	1.14	0.70	1.12	1.22
LRT Test	12.82**	6.36**	6.35**	1.31	1.80
Adjusted R^2	0.7825	0.7346	0.3375	0.5993	0.6142

Notes: RTS stands for return to scale. LRT indicates value of likelihood ratio in the test of the null hypothesis of constant return to scale.
** is significance at 1%.

Part III
Factors of Production

4 Entrepreneurial Firms in Africa

The performance of entrepreneurial firms has recently attracted much attention in both academic and applied circles and in particular in the context of developing countries. The massive failure of parastatals in generating sustainable growth in most developing countries has rejuvenated the interest in the private sector, both modern and formal, as an engine of economic growth. Theoretically, these entrepreneurial firms, consisting of mostly small-scale firms, are more flexible, better managed, and more competitive and hence can operate more efficiently. These assumptions have led to a widespread effort by developing countries to provide the socio-economic environment suited better for the growth and prosperity of these entrepreneurial firms. The extensive government-embarked structural adjustment programs implemented under supervision of the World Bank were primarily aimed at this issue. The aim of this section is to provide a closer look at these entrepreneurial firms, both in terms of their characteristics and performance. Entrepreneurial firms are defined as those owned by one or a few private individuals. They are therefore explicitly distinguished from state-owned enterprises, and subsidiaries or firms of which the ownership is dispersed over a large number of people (Sleuwaegen and Goedhuys, p. 2).

The Share of Entrepreneurial Firms in the Sample

We first present the distribution of entrepreneurial and other types of firms in our sample of seven sub-Saharan countries. Table 4.1 provides the distribution by type of organization of both the number of firms and the proportion of employment. It appears from this table that sole proprietorship and limited liability are the predominant legal forms of the entrepreneurial firms. With the exception of Kenya and Tanzania and to a lesser extent Ghana, a rather small percentage of entrepreneurial firms are formed as partnership.

Among non-entrepreneurial firms, the Francophone countries are unique in the sense that a good percentage of those firms are private corporations, whereas Tanzania features rather a large number of parastastals.

Table 4.1: Distribution of Entrepreneurial Firms in the RPED Sample

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
				Number of Firms			
Entrepreneurial	119	135	153	203	147	175	160
Sole Proprietorship	66	85	76	70	48	42	41
Partnership	2	4	13	34	22	9	8
Limited Liability	50	46	63	98	75	122	98
Private Corporations	62	53	1	2	23	0	3
Parastatals	9	6	10	5	33	16	5
Subsidiaries of MNE	0	9	0	3	0	2	9
				Proportion of Employment			
Entrepreneurial							
Sole Proprietorship	0.02	0.04	0.10	0.03	0.02	0.04	0.04
Partnership	0.00	0.00	0.03	0.03	0.01	0.01	0.01
Limited Liability	0.07	0.11	0.63	0.68	0.22	0.53	0.63
Private Corporations	0.32	0.34	0.07	0.09	0.02	..	0.12
Parastatals	0.59	0.47	0.17	0.18	0.75	0.43	0.18
Subsidiaries of MNE	..	0.07	..	0.02	..	0.03	0.06
Number of Firms	190	203	164	213	203	193	177

Table 4.1 also provides the distribution of these firms by employment. It is interesting to note that despite the overwhelming number of entrepreneurial firms, their share of total employment is very small for the Francophone countries and Tanzania and to some extent for Zambia. It appears that several large parastatal firms dominate the employment in the Francophone countries, Tanzania, and Zambia. Furthermore, the Francophone countries are unique in the fact that the private corporations there employ a sizable (greater than 40%) portion of total employment. However, for other countries in our sample, entrepreneurial firms and, within them, limited liability enterprises provide more than 50% of the total employment. Sole proprietorship firms constitute a very small portion of

total employment with only 2–4% of total employment for all countries except for Ghana, where this percentage stands at 10.

Table 4.2 gives the distribution of entrepreneurial firms by the nationality of the owners. The total shares of such firms in the sample, both for numbers and employment are also given for easy reference.

Table 4.2: Distribution of Entrepreneurial Firms by Ownership Structure

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
% of Firms	0.61	0.68	0.93	0.96	0.72	0.91	0.85
Private Local	0.81	0.48	0.86	0.88	0.86	0.88	0.85
Foreign	0.14	0.48	0.02	0.01	0.07	0.07	0.05
Private and Foreign	0.05	0.05	0.12	0.11	0.07	0.05	0.10
% of Employment	0.09	0.15	0.76	0.74	0.25	0.55	0.61
Private Local	0.41	0.21	0.60	0.57	0.77	0.57	0.59
Foreign	0.42	0.60	0.05	0.30	0.13	0.23	0.15
Private and Foreign	0.17	0.19	0.35	0.13	0.10	0.20	0.25
Number of Firms	118	135	153	193	147	174	156

The two Francophone countries, which we have seen to be dominated by corporations and parastatals, are also the ones in which foreign presence is largest among the small entrepreneurial sector in terms of employment. Tanzania, the other country with a low share of employment in the entrepreneurial category (about 25%), has by contrast mostly local owners operating in this sector. Strong foreign presence, whether in the form of joint ownership with locals, or by itself as in Kenya, does, however, increase the share of employment in this category in all the other Anglophone countries.

Sources of Start-up Finance

The first question we can ask of the data set is: how did the entrepreneurial firms get to be set up in the first place? Table 4.3 reveals that in order to finance the start-up of their activities, firms in general rely heavily on non-formal sources. Among these, own saving is the predominant source in all the countries. In general, the internal sources of finance that includes saving and borrowing from friends or relatives constitute the lion's share of total finance: between 71% and 92% of the total. It is also interesting to note that the percentage of saving in total start-up finance does not decrease substantially with the increase in the firm size as fast as might be expected. In fact, the results do not reveal significant difference in this percentage between micro and small firms or even to some extent the medium and large firms. However, there is a significant decrease in the share of saving when one considers the very large firms separately.

Table 4.3: Sources of Start-up Finance (Percentage)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Start-up Finance							
Savings	66.07	83.38	75.96	71.16	78.44	83.83	77.53
Friends or relatives	5.11	7.38	16.16	5.74	9.32	4.01	5.80
Foreign bank or Donor	3.47	3.23	0.57	2.15	3.09	4.23	1.27
Local bank	8.83	2.97	2.69	16.16	3.65	5.01	7.61
Money lender	1.15	0.41	0.37	0.67	0.00	0.16	1.27
Supplier	4.17	1.21	1.42	0.90	1.55	1.57	0.14
Micro							
Savings	70.40	80.87	74.59	77.41	80.83	86.85	81.41
Friends or relatives	7.90	10.23	19.12	7.93	13.20	3.79	7.43
Foreign bank or Donor	0.71	4.48	0.86	1.15	0.85	4.55	1.09
Local bank	4.60	0.26	1.00	9.20	2.05	2.27	1.35
Money lender	1.11	0.74	0.00	1.15	0.00	0.00	2.30
Supplier	5.26	2.22	1.33	1.15	1.14	0.73	0.00
Small							
Savings	61.35	88.00	75.00	67.76	73.82	84.52	82.21
Friends or relatives	3.89	8.05	13.91	5.00	5.51	4.52	0.00
Foreign bank or Donor	2.35	1.89	0.00	1.09	5.88	2.12	0.00
Local bank	11.25	0.00	4.22	19.50	6.35	6.44	6.92
Money lender	1.78	0.00	1.56	0.00	0.00	0.00	0.00
Supplier	4.80	0.00	2.19	1.65	0.92	1.15	0.00
Medium–Large							
Savings	63.65	84.82	88.75	64.92	79.19	77.66	73.24
Friends or relatives	0.00	0.00	0.00	3.23	1.90	3.68	6.89
Foreign bank or Donor	13.07	1.58	0.00	4.35	5.95	6.58	1.86
Local bank	15.48	12.29	11.25	23.47	4.05	7.82	11.99
Money lender	0.00	0.00	0.00	0.48	0.00	0.66	1.06
Supplier	0.00	0.00	0.00	0.00	4.76	3.61	0.29

Note: The size is as defined before and refers to the current size of the firm.

It is also worth noting that the size used in the table is the current size. However, even when the initial size is used the medium and large firms still appear to be financing most of their start-ups through internal sources. In general, when the initial size is used medium and large firms appear to finance 60% of their start-up through internal sources versus 73% when the current size is used. Furthermore, the reliance on friends and relatives to finance the start-up activities decreases rather significantly with the increase in the firm size. In fact, the medium and large firms appear to use these sources minimally.

Among formal sources of start-up finance, bank loans are the most important. Borrowing from local banks constitutes between 3% and 16% of total start-up finance. Ghana and Côte d'Ivoire have the lowest exposure to local bank loans with less than 3% of their total start-up finance funded through local banks, whereas Kenyan entrepreneurial firms finance around 16% of their start-up through bank loans. Table 4.3 also reveals the fact that the micro firms have little if any access to formal bank loans as the percentage of total start-up funds provided by the local banks is significantly lower than that of larger firms.

Foreign banks also play a small role in the start-up finance as around 3% of total finance is funded through foreign bank loans. Here, again medium and larger firms appear to have a better chance of attracting foreign funds. Other sources of finance are negligible except for supplier-credit, which constitutes more than 4% of total start-up finance in Cameroon.

Characteristics of Entrepreneur

We now turn to the personal characteristics of the entrepreneur, including the background from which they emerged. Table 4.4 presents the distribution of occupation of father. It is clear that the great majority of entrepreneurs came from families that owned businesses of one kind or another. Fathers who were employees are a more important group for micro or small enterprises, but they never exceeded the number of owners of businesses in any country. The highest percentage of this group among micro enterprises was in Zambia – about 17%. It is also interesting to note that a good many of these manufacturing entrepreneurs came from families who owned farms.

Table 4.4: Occupation of Father, Number of Responses (Percentage)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All							
Own, Trading	14 (11.2)	9 (7.7)	24 (17.9)	67 (37.0)	28 (17.5)	27 (18.5)	32 (25.8)
Own, Manu.	26 (20.8)	26 (22.2)	16 (12.0)	40 (22.1)	31 (19.4)	28 (19.2)	24 (19.4)
Own, Farming	41 (32.8)	33 (28.2)	53 (39.6)	36 (19.9)	62 (38.8)	32 (21.9)	22 (17.7)
Employee	26 (20.8)	25 (21.4)	27 (20.2)	12 (6.6)	26 (16.3)	46 (31.5)	33 (26.6)
Other	18 (14.4)	24 (20.5)	14 (10.5)	26 (14.4)	13 (8.20	13 (8.9)	13 (10.5)
Micro							
Own, Trading	2	4	17	31	14	7	5
Own, Manu.	13	13	11	9	13	9	4
Own, Farming	29	26	36	25	43	15	12
Employee	13	18	18	14	17	25	16
Other	7	17	12	8	8	10	7
Small							
Own, Trading	5	4	6	16	11	11	6
Own, Manu.	8	6	2	14	9	15	4
Own, Farming	12	6	13	4	16	14	6
Employee	12	5	7	6	6	13	9
Other	9	5	2	2	4	2	3
Medium–Large							
Own, Trading	7	1	1	20	3	9	21
Own, Manu.	5	7	3	17	9	4	16
Own, Farming	1	1	4	7	3	3	4
Employee	2	2	2	6	3	8	8
Other		2		2	1	1	3
Total Observations	125	117	134	181	160	146	124

Note: Numbers in parentheses are percentages. Also see Table 4.3.

Table 4.5 presents the highest level of education achieved by the entrepreneur. Overall, most entrepreneurs have at least completed secondary education with some of them having university degree. As might be expected, the level of education increases with the size of the enterprise, with more than 30% of entrepreneurs of the medium and large firms having university degrees.

Special interest attaches to the educational attainment of entrepreneurs in micro and small firms. Are they significantly better educated than the general population? A relevant statistic to consider in this connection is the enrollment rate in secondary education in the countries covered. Furthermore, since some of these firms were established some years ago, and continued to exist at the date of the survey, it might be useful to check on the enrollment ratio at an earlier date as well. Table 4.6 gives the data for 1980 and 1993. It is seen that only Côte d'Ivoire and Ghana had a proportion of entrepreneurs in micro or small firms with secondary education that remotely reflected the proportion in the general population. Since the enrollment rate in tertiary education, even in these countries, as in others, did not exceed 5%, we can certainly conclude that the micro and small firms in our sample had entrepreneurs who were much better educated than the population.

Table 4.5: Highest Level of Education Achieved by Owner (Percentage)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Education							
None	0.8	22	11.1	3.2	4.8	3.3	2.3
Primary	15.5	20.3	5.2	28.2	34.9	15.9	13.3
Secondary	35.7	32.2	48.9	45.2	30.1	45	25.8
University	34.1	8.5	13.3	23.4	13.3	17.2	25
Vocational	14	16.9	21.5		16.9	18.5	33.6
Micro							
None	1.5	28.9	12.6	4.3	4.1	7.5	4.3
Primary	16.4	23.7	4.2	43.0	48.5	26.9	23.9
Secondary	35.8	30.3	52.6	40.9	32.0	44.8	19.6
University	31.3	6.6	11.6	11.8	6.2	7.5	10.9
Vocational	14.9	10.5	18.9	0	9.3	13.4	41.3
Small							
None	0	14.3	10	4.8	6.5	0	3.6
Primary	12.8	10.7	6.7	14.3	15.2	7.1	14.3
Secondary	36.2	39.3	46.7	47.6	28.3	50	14.3
University	34	10.7	10	33.3	17.4	16.1	25
Vocational	17	25	26.7		32.6	26.8	42.9
Medium–Large							
None	0	0	0	0	4.3	0	0
Primary	20	21.4	10	0	17.4	7.1	3.7
Secondary	33.3	28.6	20	13.2	26.1	35.7	37
University	46.7	14.3	40	50.9	34.8	42.9	37
Vocational	0	35.7	30	35.8	17.4	14.3	22.2
Observations	125	117	134	181	160	146	124

Note: See Table 4.3.

Table 4.6: Percentage of Age Group Enrolled in Secondary Education, Males

Year	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
1980	24	27	51	23	4	22	8
1993	n.a.	33	44	28	6	n.a.	51

Source: World Development Report 1996.

Table 4.7: Origin of the Business (Percentages of each group)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All							
Own Established	90.8	78.3	91.2	74.9	85	74.3	61.9
Bought	6.2	10.8	0.7	9.5	2.6	13.5	22.9
Inherited	3.1	6.7	5.1	11.2	7.2	10.1	11.9
Other	0	4.2	2.9	4.5	5.2	2	3.4
Micro							
Own Established	97	84.6	91.6	77	89.1	85.3	88.4
Bought	1.5	6.4	0	4.6	3.3	2.9	2.3
Inherited	1.5	3.8	5.3	11.5	5.4	10.3	7
Other	0	5.1	3.2	6.9	2.2	1.5	2.3
Small							
Own Established	83.3	65.5	90.3	76.2	81.4	66.7	63
Bought	12.5	20.7	0	11.9	0	18.5	22.2
Inherited	4.2	10.3	6.5	7.1	7	13	11.1
Other	0	3.4	3.2	4.8	11.6	1.9	3.7
Medium–Large							
Own Established	86.7	69.2	90	70	72.2	61.5	37.5
Bought	6.7	15.4	10	16	5.6	30.8	41.7
Inherited	6.7	15.4	0	14	16.7	3.8	16.7
Other	0	0	0	0	5.6	3.8	4.2
Observations	125	117	134	181	160	146	124

Note: Numbers in parentheses are percentages. Also see Table 4.3.

Table 4.7 summarizes the distribution of the origin of the firm. It appears that the vast majority of the firms have been established by the owner. The percentage of *own established* firms ranges from over 90% for Cameroon and Ghana to 62% for Zimbabwe. Almost 23% of entrepreneurial firms in Zimbabwe were bought, and 14% in Zambia, while the proportion of firms that were established by purchase were quite small in the other countries, the lowest being in Ghana (0.7%). This difference reflects the fact that the larger firms in Zimbabwe are more likely to be acquired through purchase than established outright as is the case in the other countries, and in Zambia the proportion of medium–large firms which were bought was also quite high in the sample.

Experience and Training

Table 4.8 provides the level of past experience of the entrepreneur. On average, entrepreneurs have between 7 and 10 years of prior experience with Côte d'Ivoire and Ghana falling at the lower end of the range and Zambia and Kenya at the upper end. Interestingly enough, entrepreneurs of larger firms are on average more experienced than smaller firms, although this difference is not noticeable for several countries. The managers are also asked to specify their prior experience in three main categories, employee, parents in business, or self-employed. Over 40% of the respondents have been employees before starting their own business. This percentage is highest in Cameroon, Côte d'Ivoire, and Ghana for which over 65% of entrepreneurs are prior employees. This percentage, however, falls as the firm size increases which is consistent with the fact that prior employees are most likely to start a smaller prototype of the business they are working for.

Table 4.9 summarizes the exposure of entrepreneurs to prior training and apprenticeship. The incidence of some training as revealed by these figures is quite high. Except for Côte d'Ivoire, between 24 and 44% of all managers have been trained before. As Table 4.9 reveals, entrepreneurs in Zimbabwe and Tanzania are more likely to be trained. Apprenticeship, on the other hand, is more common in Ghana and Côte d'Ivoire, but as is to be expected falls off sharply in the medium–large size groups. Between 56 and 59% of entrepreneurs in these two countries have been apprentices versus only 9.4% for Zimbabwe. It is possible that there is a trade-off between training and apprenticeship. The two Francophone countries are peculiar in reporting that very few of the entrepreneurs of the medium–large firms had previous training.

Table 4.8: Percentage of Entrepreneurs with Prior Experience in the Industry by Type of Experience and Average Experience in Years

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All firms							
Prior Experience as:							
Employee	52.8	69.4	65.7	46.8	46.8	42.8	43.8
Parents in Business	7.8	9.9	11.0	18.6	7.2	13.8	18.0
Self-employed	20.2	12.4	..	8.0	13.9	18.4	12.5
Prior Experience in Years	8.97	7.07	7.89	9.58	9.12	10.3	8.09
Micro							
Employee	57.6	76.9	64.3	51.6	54.6	52.9	47.8
Parents in Business	3.0	7.7	11.3	11.8	7.2	11,8	8.5
Self-employed	25.8	14.1	..	8.6	16.5	8.8	17.4
Prior Experience in Years	8.45	6.64	7.74	9.31	7.78	10.67	6.82
Small							
Employee	45.8	58.6	76.7	35.7	39.1	35.7	39.3
Parents in Business	12.5	10.3	10.0	23.8	6.5	19.6	28.6
Self-employed	18.8	10.3	..	7.1	10.9	25.0	8.3
Prior Experience in Years	10.0	8.72	7.63	8.25	11.48	8.89	8.57
Medium–Large							
Employee	46.7	50.0	44.4	47.2	16.1	32.1	42.6
Parents in Business	13.3	21.4	11.1	26.4	8.7	7.1	22.2
Self-employed	0	7.1	0	7.5	8.7	28.6	9.3
Prior Experience in Years	8.11	6.00	12.0	11.0	13.56	12.5	9.21

Note: Also see Table 4.3.

Table 4.9: Percentage of Entrepreneurs who received Training or Apprenticeship

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Apprenticeship	18.4	59.1	55.6	21.9	31.3	13.9	9.4
Training	30.5	6.8	27.2	23.9	35.0	26.7	44.4
Micro							
Apprenticeship	25.8	75.1	57.9	30.8	46.2	17.6	6.5
Training	36.9	6.7	23.1	24.1	29.5	24.6	47.7
Small							
Apprenticeship	11.4	33.3	62.1	17.5	2.7	16.1	14.3
Training	19.8	10.3	33.3	29.3	47.8	30.9	42.9
Medium–Large							
Apprenticeship	6.2	16.7	11.1	9.6	12.5	0	9.3
Training	6.3	0	57.1	19.2	31.6	23.1	42.3

Note: Also see Table 4.3.

Determinants of Entrepreneurship

Who are the entrepreneurs? Presumably if they were not managing their own businesses, their alternative occupation would be to join the labor market for wage employment. Pursuing this line of argument, Sleuwaegen and Goedhuys use the RPED data set to set up a choice model using the data on personal characteristics of 133 entrepreneurs and more than 800 employees. Their data set is confined to Côte d'Ivoire. The expected wage of the sample of entrepreneurs can be estimated from a wage function run on the sample of employees. A logit model is then estimated which relates the probability of being an entrepreneur to the personal characteristics of the individual, his managerial and working skills and his expected wage. Managerial abilities are proxied by variables on formal education, professional experience and apprenticeship.

Sleuwaegen and Goedhuys (1996, 1998) found that the coefficients of the variables that capture the different aspects of managerial ability, such as experience and education, are all positive and significant. In their analysis, Sleuwaegen and Goedhuys conclude that an individual is more likely to be an entrepreneur if he/she has previously acquired experience in the same sector, if he/she has been an apprentice or if he/she has received higher formal education. Calculated at the sample mean values, they found the probability of being an entrepreneur increases by 18% if the individual has prior experience in the same sector. They also found this probability to increase by 27% for the individual with higher formal education. This evidence is consistent with our findings and supports the result found in most studies that there is a higher level of experience and formal education among entrepreneurs than for the population as a whole.

The analysis made it clear that entrepreneurs can be found mainly among two relatively different group of individuals: those who have followed an apprenticeship on the one hand and those who have obtained an academic degree on the other. By using an interaction term, the authors obtained the result that, estimated at sample means, apprenticeship increases the probability of being an entrepreneur for individuals without former education by 21%.

These effect are *in addition to* the significant positive effect that they have on the wage level – which is included in the expected wage variable appearing in the logit model. The authors conclude that these results underline the importance of learning effects and human capital formation as a condition for survival of entrepreneurial firms in an industry.

The authors also address the important question of ethnicity of the entrepreneurs. A binary variable for non-African was included in the logit model and turned out to be highly significant, and of large value. Sleuwaegen and Goedhuys (1996) also found that the dummy variable for African has a very large significant and negative coefficient. They calculate that at the sample mean, the mere effect of being African reduces by 98% the probability that an individual is an entrepreneur. Consistent with our analysis, Sleuwaegen and Goedhuys (1996, 1998) attribute this finding partly to the existence of liquidity constraints for Africans for the financing of the start-up of a business. This hypothesis is supported by the finding reported below that African entrepreneurs are more likely to use internal sources to finance the start-up. The authors also found that the wage effect, which was negative overall, is far less strong for Africans. They attribute this finding to the fact that if capital constraints are binding for the start-up of the firm, only wealthier Africans or those who have an expected wage high enough to have some savings, are able to start up a business.

But other explanations are possible, supplementing the hypothesis of credit constraint. The authors point to the fact that few foreigners come to work in Africa at less favorable conditions than they would find in their country, and hence most non-African immigrants are motivated by the many opportunities to develop new business in Africa. The higher propensity for entrepreneurship for non-Africans, holding human capital attainments and alternative wage constant, partly reflects the fact that foreigners who came and stayed in Côte d'Ivoire have been responsive to and captured the rents associated with business opportunities. The topic is important enough to probe further the issue of African entrepreneurs, and including additional countries in our analysis.

Determinants of African Entrepreneur

The empirical analysis in this section considers various aspects of the distinction between African and other ethnic entrepreneurs. The distinction between the two does not coincide with that between natives and migrant entrepreneurs. The role of migrant African entrepreneurs is small except perhaps in Côte d'Ivoire. Also a relevant point to remember is that in the African context many political boundaries cut across cultural boundaries. Thus distinguishing culturally different African entrepreneurs from culturally native Africans would be difficult.

Table 4.10 summarizes the distribution of the entrepreneurs by their ethnicity. We have grouped the entrepreneurs into three categories, African, European, and Asian. As one might expect, overall more than half of the entrepreneurs are African versus 17% European and 21% Asian.

However, these percentages vary significantly from one country to another. Zimbabwe and Côte d'Ivoire are distinguished for their high concentration of European entrepreneurs; the ratio for the former is close to 45% and the latter is around 30%. Furthermore, the Asian entrepreneurs comprise more than 50% of the sampled firms in Kenya. Zambia and Tanzania also show a high proportion of Asian entrepreneurs, around 20%.

The ethnic distribution of entrepreneurs also varies significantly among different size groups. As one might expect, most (83%) of the micro firms are managed by African entrepreneurs. This ratio varies only slightly among countries, with Kenya at 73% showing the smallest percentage for African entrepreneurs and Cameroon with 92% having the largest. For the large size firms, however, only 24% are owned by African entrepreneurs. Here, however, the percentage differs considerably among our sample countries, with Zimbabwe having the smallest ratio of African entrepreneurs in large firms (only 7%) as against Cameroon with almost 56%. It is also interesting to note that, with the exception of Cameroon, for all other countries of our sample the distribution of entrepreneurs for small firms are closer to the distribution for the large firms than that for the micro firms. This is a significant finding as it reveals that even the small size firms (10–49 employees) are more likely to have non-African entrepreneurs.

Table 4.10: Distribution of Entrepreneurs by Ethnicity (Percentage)

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*Total*
Total							
African	82.3	59.9	43.8	75.8	57.1	34.1	58.6
European	12.2	30.2	1.0	0	14.3	44.9	17.0
Asian	2.8	7.9	52.6	23.2	26.2	13.2	21.1
By Size							
Micro							
African	91.6	79.6	73.3	87.5	83.3	83.3	82.9
European	6.0	14.6	0	0	5.6	8.3	5.7
Asian	1.2	4.9	24.4	10.4	11.1	8.8	10.2
Small							
African	86.4	46.5	25.0	64.7	44.6	35.5	53.2
European	8.5	39.5	4.5	0	17.9	48.4	17.3
Asian	3.4	11.6	68.2	33.3	32.1	16.1	27.1
Med+Large							
African	56.4	44.9	13.3	33.3	30.0	6.8	24.3
European	30.8	51.8	0	0	25.0	63.6	35.3
Asian	5.1	10.7	83.3	57.1	45.0	14.8	33.2

Table 4.11 demonstrates the characteristics of the entrepreneurs by their ethnicity.

Table 4.11: Characteristics of Entrepreneurs by Ethnicity

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*Total*
African							
Age	40.73	38.65	42.87	40.34	44.98	44.01	41.67
Education	11.46	6.73	8.68	8.67	10.11	9.78	9.32
Experience	8.85	5.43	8.64	8.84	7.93	6.83	7.62
European							
Age	54.29	53.6		53.0	51.22	50.32	51.64
Education	13.0	11.77		11.47	11.42	12.52	12.15
Experience	11.5	12.89		16.0	20.18	8.85	12.12
Asian							
Age	66.0	44.43	53.0	44.98	47.08	43.86	48.61
Education	12.0	11.76	11.47	10.11	11.70	13.10	11.68
Experience	5.0	5.0	16.0	7.93	10.17	7.55	10.67

Both European and Asian entrepreneurs are on average significantly more experienced and more educated than their African counterparts. This result, specifically with respect to education, holds with various degrees of significance for all the sampled countries. This result might also be attributed to the fact that the African entrepreneurs are most likely to own smaller firms which require less education and experience of its managers. Thus, we need to control for firm size in a multivariate model. This is the exercise to which we now turn.

A Probit model was used to evaluate the factors determining the probability of an entrepreneur being African. The entire sample was pooled, and country dummies were included (with Zimbabwe as the base or omitted category). Note that Ghana is missing from this data set. We use different variables to proxy managerial ability, and other firm characteristics. Managerial ability is proxied by education, past experience, training and apprenticeship. Firm characteristics are proxied by the firm size, and sector. We have also added other variables such as father's occupation, sources of start-up finance, and origin of business to account for factors affecting the initial investment decision. Here, the variable *Existing Business* indicates that the entrepreneur either inherited the firm or bought it and did not start it himself. The variable *Internal* refers to the percentage of start-up funds financed through internal sources including savings and borrowing from friends and family. The results are reported in Table 4.12.

Table 4.12: The Probability of the Entrepreneur being African

	Pooled 1	*Size <10*	*Size >=10*
Constant	0.41 (0.30)	0.83 (0.56)	0.33 (0.66)
Ln(Size)	−0.35 (0.05)	−0.35 (0.05)	−0.29 (0.09)
Past Experience	−0.02 (0.007)	−0.02 (0.007)	−0.01 (0.01)
Education			
1. Primary	0.73 (0.24)	0.76 (0.31)	0.23 (0.48)
2. Secondary	−0.06 (0.22)	−0.05 (0.28)	−0.35 (0.42)
3. University	−0.23 (0.27)	−0.53 (0.42)	−0.39 (0.46)
4. Vocational	0.10 (0.25)	0.38 (0.36)	−0.28 (0.44)
Father's Occupation			
1. Own Business, Trading	−0.51 (0.22)	−0.38 (0.34)	−0.60 (0.35)
2. Own Business, Manu	−0.47 (0.21)	−0.90 (0.31)	−0.28 (0.31)
3. Own Business, Farming	0.19 (0.20)	0.13 (0.28)	0.19 (0.21)
4. Employee	0.18 (0.20)	0.26 (0.29)	0.01 (0.31)
Internal Sources of Start-up Finance (% savings or friends/relatives)	−0.24 (0.20)	−0.64 (0.37)	−0.22 (0.26)
Existing Business	−0.33 (0.15)	−0.16 (0.26)	−0.39 (0.19)
Training	0.54 (0.14)	0.69 (0.24)	0.56 (0.19)
Apprenticeship	−0.52 (0.14)	−0.78 (0.21)	−0.19 (0.24)
Sector			
1. Food	−0.02 (0.15)	0.06 (0.24)	−0.06 (0.20)
2. Metal	0.03 (0.16)	0.23 (0.29)	0.10 (0.23)
3. Wood	−0.17 (0.16)	−0.52 (0.31)	0.04 (0.22)
Country			
1. Cameroon	2.20 (0.23)	3.27 (0.54)	2.01 (0.31)
2. Côte d'Ivoire	1.03 (0.20)	1.30 (0.27)	1.05 (0.31)
4. Kenya	2.66 (0.21)	2.61 (0.36)	2.66 (0.29)
5. Tanzania	1.55 (0.20)	1.96 (0.29)	1.36 (0.30)
6. Zambia	1.27 (0.18)	1.80 (0.29)	1.07 (0.20)
Observations	848	456	392
Log-Likelihood	−336.82	−142.74	−176.29

Note: Standard errors are given in parentheses.

It is interesting to note that for both the sub-groups of firms (of < and >=10 employees) African entrepreneurs are more likely to manage significantly smaller firms. Furthermore, the results also reveal that, controlling for size, African entrepreneurs are more likely to have primary education as against no education; but for higher levels of education there is no significant difference between African and non-African entrepreneurs.

This should not be interpreted to mean that post-primary education does not help African entrepreneurship in the long run. Rather in the socio-economic situation as it existed at the time of the survey, Africans who managed or owned firms had more defining characteristics than higher education. It is clear from the last two columns that the significance of the primary education dummy stems from the importance of micro enterprises managed/owned by Africans with primary education. African entrepreneurs also had significantly *less* experience than the non-Africans, but had significantly *more* training. The former result depends on the importance of micro firms owned by the Africans, but the latter does not. It is also interesting to note that, as evident by the negative value of the *Existing Business* variable, the African entrepreneurs are more likely to start their own business, rather than inherit or buy the firm. Furthermore, although just statistically significant for the micro firms, it appears that African entrepreneurs rely less on their own savings or borrowing from their relatives/friends to finance the establishment of the firm. Rather, the majority of them use other sources such as formal bank loans for this purpose.

The importance of the last result induced us to look specifically at the determinants of the two variables – continuing existing business and using internal sources of finance – in terms of the ethnicity of entrepreneurs and other controls. The results of the multivariate models for the key variables are given in Table 4.13.

Table 4.13: Origin of the Firm and Internal Financing of the Start-up, Ethnic Differences

	Existing	*Use of Internal Sources*	*% financed by Internal Sources*
Constant	−1.12 (0.18)	2.27 (0.28)	0.98 (0.04)
Ln(Size)	0.17 (0.04)	−0.24 (0.05)	−0.06 (0.01)
Asian	0.47 (0.14)	0.50 (0.28)	0.06 (0.03)
European	0.44 (0.18)	0.55 (0.21)	0.15 (0.04)
Country			
Cameroon	−0.79 (0.21)	−0.33 (0.29)	−0.13 (0.03)
Côte d'Ivoire	−0.25 (0.19)	0.08 (0.28)	0.05 (0.04)
Ghana			
Kenya	−0.40 (0.18)	−0.58 (0.28)	−0.08 (0.03)
Tanzania	−0.26 (0.19)	−0.14 (0.30)	0.02 (0.04)
Zambia	−0.24 (0.17)	−0.04 (0.29)	0.04 (0.04)
Observations	820	879	879
Log-Likelihood	−392.48	−184.50	−298.30

Note: Standard errors are given in parentheses.

Column 1 demonstrates that, while businesses which were not newly established, whether inherited or bought, are likely to be larger in size, controlling for size, non-Africans are much more likely to operate such businesses. Column 2 of the table clearly demonstrates that non-African entrepreneurs are more likely to use internal sources. Column 3 shows a stronger result, that non-African entrepreneurs utilize a greater percentage of internal finance to start-up their firm. This finding is crucial to the analysis of the entrepreneurship in Africa as it strongly reinforces the hypothesis that the non-African entrepreneurs are less financially constrained. They are wealthier and hence can rely more on their savings to finance the start-up.

Putting all these results together, one may conclude that after holding other things constant, in particular size of firm, African entrepreneurs are likely to have no more than primary education and less experience. This might appear unexpected as one would guess that to achieve a given firm size an African entrepreneur would need more education and/or experience or some other strong human capital attribute than a non-African. However, it can explained by the "structuralist" view of migration, which predicts that the difficulties of a new and underdeveloped market force non-locals to have better humans capital characteristics and/or better access to finance to succeed in a foreign environment. Furthermore, armed with better access to capital and more saving, non-African entrepreneurs are more likely to acquire domestic firms in an effort to establish their manufacturing capability. These differences among different groups of entrepreneurs raise an important question; do these different groups of entrepreneurs perform differently in the operation of the firms? The next section attempts to answer this question.

Performance of Entrepreneurial Firms

The characteristics of non-African entrepreneurs as discussed in the previous section would lead us to expect that their firms are more efficient. More educated, and more experienced "foreign" entrepreneurs are presumably more likely to run their firms more efficiently. Furthermore, the wealthier non-African entrepreneurs that have better access to bank loans are more likely to optimize their factor allocation, which leads to higher production efficiency.

However, before we turn to the performance of different entrepreneur firms, it is of interest to discuss how entrepreneur firms perform *vis-à-vis* their non-entrepreneur counterparts. As noted before, the entrepreneur firms are mostly concentrated among smaller, locally operated firms. These initial characteristics may lead the observer to expect that such firms might on average be less efficient as they have yet to benefit from scale efficiency and further access to bigger, more vibrant, markets. However, one may also argue that the entrepreneur firms benefit from being more focused and managed better. These two forces theoretically pull in opposite directions and hence the final outcome of whether entrepreneur firms are more efficient or not, remain uncertain. In order to address this issue we estimate a frontier function using the technical efficiency method for all firms including both entrepreneur and non-entrepreneur firms.

This method is explained in detail in Chapter 10, Part IV, and the reader is referred to this chapter for a full elucidation of the econometric model. Here it is sufficient to say that the results presented in Table 4.14 are obtained by estimating simultaneously the stochastic frontier production function and the determinants of the inefficiency term, as developed in the work of Battese and Coelli (1992). The production function is defined in terms of three variables, *K* (capital), *L* (labor) and *T* (time dummied for the three years of the RPED surveys), and the interaction terms between them. One may then write the frontier function as follows:

$$y_i = f(x_i;\beta)\exp(v_i - u_i) \tag{1}$$

where y represents output, $f(x)$ is the deterministic core of the frontier production function, v is some symmetrical random error with zero mean and a variance equal to σ_v^2, and the one-sided error term, $u \geq 0$ captures technical inefficiency and has a variance equal to σ^2. The total variance in this case will be the sum of two variances, i.e. $\sigma_s^2 = \sigma^2 + \sigma_v^2$. The Battise–Coelli model allows for the determinants of inefficiency to be incorporated directly in the inefficiency term. In this model, the inefficiency term (u_{it}) is formulated as follows:

$$u_{it} = Z_{it}\delta + \varpi_{it} \tag{2}$$

Where Z (1, z_1, z_2,…, z_m) is a matrix of variables that includes variable unity, time trend/or time dummies, and other variables such as the firm and/or entrepreneur characteristics that may affect the efficiency of the firm. ώ is assumed to be the truncation around $-Z\delta$ of a normal distribution with a mean equal to zero and a variance equal to σ^2. This truncation process necessarily leads to $\acute{\omega}_{it} > -Z_{it}\delta$. In other words, one may say that the inefficiency term (u_{it}) is a non-negative truncation of a normal distribution $N(\mu_{it}=Z_{it}\delta,\sigma^2)$.

To address the difference between efficiency of entrepreneur firms and non-entrepreneur firms, we use the sample of all firms, but add a dummy variable, which takes a value of one for entrepreneur firms and zero otherwise. The results are summarized in the first two columns of Table 4.14. It is very interesting to note that when we do not consider the size of the firms as in Model All(I), and consistent with our earlier analysis, we find that the entrepreneur firms appear to be significantly less efficient. However, when we add the size variable in the model All(II), we find that these two types of firms are not significantly different in terms of their performance. Hence, one may conclude that the two different sources of efficiency gain that each group may gain cancel each other out. This is an important conclusion as it provides some support to both sides of the debate in the size-ownership impact on performance.

To understand how ethnicity may affect the performance, we repeat the same efficiency analysis for the entrepreneur firms. We augment our efficiency analysis by adding dummy variables for ethnic entrepreneurs, namely the Asian and the European. We further repeat the efficiency analysis with and without controlling for the size effect. The results are summarized in column four and three of the table respectively. The results demonstrate that both ethnic entrepreneur groups tend to be more efficient than their African counterparts. In facts, the results also reveal that European entrepreneurs on average tend to be more efficient than both African and Asian entrepreneurs while Asian entrepreneurs are more likely to be more efficient than African entrepreneurs. These results are further strengthened when we control for firm size. The addition of the size variable to the determinants of firm *inefficiency* leads to a stronger negative sign for both Europeans and Asian entrepreneur dummies. This, in turn, implies that irrespective of the size effect, the European followed by the Asian managed firms are more likely to exhibit greater technical efficiency.

Table 4.14: African Frontier, All Firms and Entrepreneur Firms

	All (I)	*All (II)*	*Entrepreneur (I)*	*Entrepreneur (II)*
Constant	4.88 90.59)	5.08 (0.66)	5.02 (0.69)	5.99 (0.88)
Ln(K)	0.67 (0.12)	0.68 (0.13)	0.65 (0.14)	0.60 (0.16)
Ln(L)	0.03 (0.17)	−0.09 (0.18)	−0.04 (0.20)	−0.08 (0.24)
T	−0.89 (0.25)	−0.96 (0.34)	−0.69 (0.35)	−0.46 (0.46)
Ln(K)*Ln(K)	−0.03 (0.01)	−0.03 (0.01)	−0.03 (0.01)	−0.02 (0.01)
Ln(L)*Ln(L)	−0.04 (0.02)	−0.05 (0.02)	−0.03 (0.02)	−0.02 (0.02)
T*T	0.20 (0.05)	0.21 (0.07)	0.16 (0.07)	0.13 (0.08)
Ln(K)*Ln(L)	0.08 (0.02)	0.007 (0.02)	0.07 (0.02)	0.05 (0.03)
Ln(K)*T	0.004 (0.02)	0.004 (0.02)	0.01 (0.02)	0.005 (0.03)
Ln(L)*T	0.03 (0.03)	0.03 (0.03)	0.06 (0.04)	0.03 (0.04)
Determinants of Inefficiency				
Constant	−2.46 (0.66)	−5.27 (2.28)	5.77 (3.98)	1.16 (0.42)
D_{1994}	−2.96 (0.87)	−0.97 (0.33)	−1.03 (0.69)	−1.42 (0.26)
D_{1995}	−1.67 (0.51)	−0.62 (0.32)	−1.26 (0.86)	−1.65 (0.33)
Kenya	10.59 (2.78)	2.21 (0.75)	1.55 (0.85)	0.34 (0.19)
Tanzania	9.09 (2.43)	1.78 (0.63)	1.93 (0.93)	0.38 (0.20)
Zambia	14.98 (3.94)	3.29 (1.16)	0.91 (0.41)	0.39 (0.19)
Ln(L)		1.34 (0.16)		0.46 (0.19)
Ln(L)*Ln(L)		−0.29 (0.02		−0.17 (0.03)
Entrepreneur Firm	0.90 (0.21)	0.33 (0.27)		
European			−1.23 (0.44)	−0.97 (0.28)
Asian			−0.47 (0.22)	−0.53 (0.17)
Variance Parameters				
$\sigma^2_s = \sigma^2 + \sigma_v^2$	11.23 (2.60)	4.67 (1.26)	6.28 (2.81)	1.79 (0.13)
$\gamma = \sigma^2/(\sigma^2+\sigma_v^2)$	0.93 (0.02)	0.86 (0.04)	0.88 (0.06)	0.71 (0.04)
Log-likelihood	−2890.87	−2885.54	−2104.28	−2073.40
Mean TE	0.609	0.540	0.619	0.544

Note: The values in parentheses are standard errors.

To summarize, the analysis of the relative technical efficiency of different group of firms does not yield a general conclusion as to whether or not entrepreneur firms are more efficient. It appears that scale efficiency of the large firms is not enough to outweigh inherent management efficiency of the smaller entrepreneur firms. However, one may safely conclude that ethnic entrepreneurs are more efficient than the local entrepreneurs; a result that hold irrespective of size of the firms. One need not go far in an attempt to explain these differences. As our earlier section demonstrates, ethnic entrepreneurs not only possess a larger stock of embodied human capital, they also enjoy a much better access to capital both internally and externally. In fact, one may argue that any other result other than the one reached in our empirical analysis would have been a surprise.

5 Capital Markets – Finance

Finance occupies a central position in the study of development. Manufacturing firms of our sample have complained vigorously about the inadequacy of the financial market. Furthermore, there is compelling evidence that the financial structure of developing countries can significantly impact the performance of the firms. It is also known that the financial structure of sub-Saharan countries differs materially not only from developed countries, but also from other developing countries. For instance, in a recent study, Demirgue-Kunt and Levine (1999) demonstrates how financial systems differ across more than 150 countries. The following table summarizes selected financial variables for US, three selected developing countries, and three sub-Saharan countries.

Table 5.1: Financial Intermediary for Selected Countries (1990)

	Liquid Liabilities / GDP	*Bank Asset / GDP*	*Bank Net Interest Margin*	*Bank Concentration Index*	*Market Capitalization / GDP*	*Turnover Ratio*
US	0.60	0.73	0.04	0.44	0.14	1.04
India	0.44	0.34	0.03	0.47	0.28	0.36
Malaysia	0.97	0.82	0.03	0.49	2.01	0.50
Thailand	0.77	0.82	0.03	0.53	0.57	0.77
Ghana	0.16	0.06	0.08	0.89	0.15	0.03
Kenya	0.46	0.29	0.07	0.74	0.16	0.03
Zimbabwe	0.35	0.56	0.04	0.65	0.39	0.36
Mean*	0.59	0.58	0.04	0.65	0.39	0.35

Source: Demirquc-Kunt and Levine (1999). See text for the definition of variables. *Simple average of the entire sample of 150 countries covered.

Table 5.1 clearly demonstrates the underdevelopment of the financial sector in three sub-Saharan countries, namely Ghana, Kenya, and Zimbabwe. The ratio of liquid liabilities to GDP, which measures the ratio of bank and non-bank financial intermediaries to GDP and is frequently used in the literature to measure the strength of the financial sector, is significantly lower in sub-Saharan Africa. Furthermore, judging by the ratio of bank assets to GDP, the banking sector is significantly underdeveloped in both Ghana and Kenya, compared even to developing countries such as India and Thailand. Furthermore, while the banking sector in Zimbabwe is much more developed, it still lags behind the US and the recently industrialized developing countries.

Another aspect of the financial sector is its efficiency and competitiveness. Judging by the Bank Net Interest Margin, which equals the bank interest income minus interest expense over total assets, Ghana and Kenya represent countries with much less competition and efficiency. In fact, the bank net interest margin in both Ghana and Kenya is more than twice that of developing countries like India or Thailand and is double the average of 150 countries. This finding is further reinforced if one compares the bank concentration indices, which is measured by the ratio of share of the assets of the three largest banks in total banking sector assets. Here again, Ghana and Kenya exhibit very strong market concentration of 0.89 and 0.74 respectively and while at 0.65 the index is smaller for Zimbabwe, it is much higher than that of the United States at 0.44 and the three selected developing countries. Hence, one may conclude that the banking sector in sub-Saharan Africa is dominated by a few large banks with strong market power evident in the form of higher real interest rate.

The viability of the equity market can also be considered as a measure of efficiency of the financial market since firms can rely on the equity market to raise funds. To this end, the Market Capitalization Ratio, which is the ratio of the value of domestic equities to GDP, and the Turnover Ratio, which equals the value of trades of domestic equities as a share of the value of such equities, are used. As Table 5.1 reveals, it appears that the equity markets in Ghana and Kenya are much less developed that most developed or developing countries, further reinforcing the notion that the financial market in these countries is much less developed and vibrant.

Demand for Finance

There are three different elements in the firm's demand for finance. First, there is the question of finding investible funds for the start-up of the enterprise. Second, there is the problem of finance related to fixed investment in the process of expansion or adjustment to changes in market conditions. Third, firms face cash-flow problems in their day-to-day operations if they do not have adequate liquid reserves.

The problems of start-up finance, and our evidence on the behavior of privately owned firms in our sample have been dealt with in the preceding chapter on entrepreneurship. With regard to the other two aspects of finance, it is often difficult to distinguish between sources which take care of fixed capital requirements, and those that answer more to the needs of working capital. The role of credit constraint in the investment behavior of our sample is explicitly dealt with in the chapter on Investment in Part III. In this chapter we will discuss the different sources of finance used by our firms, remembering that the distinction between finance for fixed and working capital is at best hazy.

Apart from data collected from the firms in an elaborate questionnaire on this topic, the RPED also undertook intensive case studies of a limited number of firms, in which managers were interviewed on the financial experience of the firms with more detailed questions. We shall use both sources of data in the analysis reported in this chapter. It is also worth noting that since the state and foreign owned firms might have access to funds that are not commonly available to a typical firm, and in order to avoid any bias, our analysis of the RPED surveys excludes both the state owned and foreign majority owned firms.

Level of Debt

Table 5.2 gives the distribution of the ratio of debt to annual sales of the sample of firms in the panel surveys. The first point to note is that a large proportion of firms has no debt at all. This is true of all countries, and particularly striking in Zambia, Tanzania and Côte d'Ivoire. In the survey data we have difficulty distinguishing missing values from genuine "no debt" situations since some of the firms with zero debt figures might have been actually entered for missing values. But even the case study material does suggest that firms with no debt are a sizable proportion of firms in African manufacturing. Thus the Ghana study reports: "Perhaps the first remarkable finding in the analysis of enterprise debt is that one-fourth of the manufacturing firms had no debt of any kind. The proportion shows little variation across industries, but vary substantially across firm sizes. Only one of the 15 small firms (<10 employees) had zero debt, while one-half of the medium size (10–49 employees), and about one-fifth of the large firms (>=50) reported no outstanding balances. An interpretation of this result is that a good proportion of relatively successful firms in all industries manage to finance their operations solely with their own revenues."

Table 5.2: Distribution of Total Debt

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Number of Firms							
total debt/sale=0	60	129	68	75	140	137	50
0<total debt/sales<=0.1	62	46	76	46	25	51	69
0.1<total debt/sales<=0.2	34	23	12	38	15	13	34
0.2<total debt/sales<=0.4	20	25	18	35	19	8	28
0.4<total debt/sales<=0.6	12	5	3	10	6	1	12
0.6<total debt/sales<=0.8	3	7	1	10	2	1	5
total debt/sales>0.8	19	3	8	12	10	6	16
Total No. of Firms	210	238	186	226	217	217	214
% Total Debt							
0<total debt/sales<=0.1	0.193	0.136	0.058	0.034	0.028	0.198	0.042
0.1<total debt/sales<=0.2	0.202	0.215	0.195	0.112	0.012	0.287	0.135
0.2<total debt/sales<=0.4	0.132	0.502	0.307	0.422	0.250	0.027	0.299
0.4<total debt/sales<=0.6	0.061	0.012	0.150	0.227	0.030	0.019	0.253
0.6<total debt/sales<=0.8	0.005	0.127	0.091	0.080	0.475	0.000	0.063
total debt/sales>0.8	0.407	0.008	0.199	0.125	0.206	0.469	0.208

Table 5.2 also reports the distribution of the number of firms and of the total enterprise debt by groupings of debt–sales ratio in the enterprise. The countries can be divided into two groups. Cameroon, Tanzania, Zambia and to a lesser extent Zimbabwe have a skewed distribution with a concentration of debt in the group with a high debt-sales ratio in excess of 0.8. The other three countries have a more normal distribution with a strong mode at the debt-sales ratio of 0.2–0.4.

Sources of Finance

Table 5.3 gives the proportions of firms in the panel surveys which made use of the different sources in each country, while Table 5.4 gives the share of each source of borrowing relative to total debt of each group (i.e. weighted share) for the firms *which had reported debt.* The access of different classes of firms to the various sources of finance, as well as the importance of each source for the borrowing firms can be read from these tables. Table 5.3 also includes information on the proportions of firms that lend either in the informal market, or through customer credit.

Table 5.3: Use of Formal and Informal Borrowing and Lending

	Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Proportion of Firms making use of:								
Overdraft	0.44	0.52	0.33	0.23	0.62	0.25	0.45	0.69
Bank Loan	0.16	0.30	0.06	0.06	0.21	0.07	0.07	0.22
Non-Bank Loan	0.07	0.12	0.05	0.05	0.01	0.06	0.06	0.10
Informal Loan	0.09	..	0.03	0.03	0.04	0.06	0.06	0.16
Supplier Credit	0.39	0.60	0.38	0.47	0.37	0.16	0.27	0.71
Informal Loan Given	0.34	0.28	0.26	..	0.34	0.42	0.47	0.56
Customer Credit	0.68	0.85	0.66	..	0.54	0.34	0.70	0.84
Micro Firms								
Overdraft	0.23	0.29	0.12	0.18	0.34	0.13	0.30	0.32
Bank Loan	0.09	0.17	0.02	0.16	0.11	0.04	0.06	0.10
Non-Bank Loan	0.04	0.11	0.02	0.03	0.01	0.03	0.08	0.04
Informal Loan	0.10	..	0.05	0.30	0.06	0.05	0.05	0.14
Supplier Credit	0.27	0.65	0.22	0.47	0.17	0.08	0.21	0.32
Informal Loan Given	0.21	0.24	0.22	..	0.25	0.21	0.36	0.31
Customer Credit	0.56	0.81	0.52	..	0.2	0.21	0.69	0.63
Small Firms								
Overdraft	0.45	0.57	0.48	0.20	0.82	0.19	0.36	0.63
Bank Loan	0.16	0.40	0.07	0.16	0.22	0.07	0.05	0.13
Non-Bank Loan	0.04	0.06	0.02	0.03	..	0.07	0.04	0.10
Informal Loan	0.08	..	..	0.35	0.04	0.10	0.05	0.13
Supplier Credit	0.37	0.41	0.40	0.64	0.44	0.12	0.17	0.74
Informal Loan Given	0.37	0.29	0.33	..	0.40	0.57	0.41	0.48
Customer Credit	0.70	0.92	0.79	..	0.79	0.40	0.54	0.77
Medium Firms								
Overdraft	0.72	0.28	0.59	0.63	0.91	0.30	0.69	0.83
Bank Loan	0.24	0.39	0.12	0.63	0.34	0.12	0.10	0.20
Non-Bank Loan	0.09	0.11	..	0.13	..	..	0.10	0.23
Informal Loan	0.07	..	..	0.25	0.03	0.12	0.04	0.17
Supplier Credit	0.50	0.78	0.65	0.38	0.63	0.12	0.52	0.97
Informal Loan Given	0.51	0.39	0.24	..	0.54	0.65	0.09	0.60
Customer Credit	0.80	0.88	0.93	..	0.72	0.35	0.89	0.90
Large Firms								
Overdraft	0.87	0.97	0.82	0.64	0.90	0.79	0.90	0.90
Bank Loan	0.31	0.47	0.18	0.64	0.33	0.18	0.10	0.37
Non-Bank Loan	0.18	0.27	0.18	0.18	0.03	0.18	0.10	0.26
Informal Loan	0.07	..	..	..	0.03	0	0.10	0.18
Supplier Credit	0.62	0.90	0.67	0.63	0.54	0.47	0.37	0.96
Informal Loan Given	0.56	0.33	0.33	..	0.36	0.75	0.73	0.78
Customer Credit	0.88	0.83	0.86	..	0.81	0.70	0.90	0.98

Note: Size groups are defined as before.

Table 5.4: Proportion of Sources of Finance to Total Outstanding Debt

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
***All Firms*:**							
Overdraft	0.21	0.23	0.39	0.36	0.45	0.37	0.22
Bank Loan	0.29	0.05	0.32	0.26	0.36	0.04	0.13
Non-Bank Loan	0.17	0.15	0.07	0.00	0.05	0.34	0.32
Informal Loan	0.00	0.00	0.03	0.00	0.00	0.01	0.05
Supplier Credit	0.33	0.57	0.19	0.35	0.14	0.25	0.28
Micro Firms							
Overdraft	0.35	0.09	0.06	0.81	0.80	0.24	0.26
Bank Loan	0.15	0.00	0.06	0.09	0.07	0.04	0.51
Non-Bank Loan	0.10	0.00	0.00	0.00	0.08	0.59	0.00
Informal Loan	0.00	0.03	0.34	0.01	0.04	0.00	0.05
Supplier Credit	0.40	0.89	0.55	0.10	0.01	0.13	0.18
Small Firms							
Overdraft	0.17	0.27	0.27	0.48	0.36	0.14	0.15
Bank Loan	0.49	0.01	0.27	0.12	0.08	0.04	0.08
Non-Bank Loan	0.01	0.01	0.00	0.00	0.23	0.07	0.05
Informal Loan	0.00	0.00	0.18	0.05	0.08	0.00	0.42
Supplier Credit	0.34	0.71	0.28	0.26	0.25	0.74	0.30
Medium Firms							
Overdraft	0.17	0.41	0.40	0.40	0.55	0.48	0.26
Bank Loan	0.31	0.02	0.36	0.23	0.11	0.13	0.51
Non-Bank Loan	0.14	0.02	0.04	0.00	0.00	0.03	0.00
Informal Loan	0.00	0.00	0.03	0.00	0.18	0.01	0.05
Supplier Credit	0.38	0.55	0.17	0.32	0.16	0.34	0.18
Large Firms							
Overdraft	0.21	0.21	0.40	0.34	0.45	0.56	0.22
Bank Loan	0.27	0.05	0.30	0.27	0.36	0.04	0.13
Non-Bank Loan	0.19	0.17	0.10	0.00	0.05	0.04	0.32
Informal Loan	0.00	0.00	0.01	0.00	0.00	0.01	0.04
Supplier Credit	0.33	0.57	0.19	0.36	0.14	0.35	0.28

Note: Size groups are defined as before.

Formal Finance

The first three categories – overdraft, bank loans and loans from non-bank financial institutions – constitute the formal sector of the credit market. While overdraft is sometimes linked with working capital requirements, and bank loans with longer-term requirements, the distinction is not really significant from the point of view of the firm manager. If the finances are in good standing overdraft facilities are renewed every year, they contribute to the banks' long-term financing as much as loans, which generally mature in three years. Loans from non-bank financial institutions (e.g., finance houses, building companies pension funds and credit programs of government or international agencies) are important for some firms, but they are very unevenly distributed. They appear to be sizable only because a few firms – typically large ones – benefit from this source. It is seen from Table 5.3 that the availability of overdraft facilities increases monotonically with firm size, although it is important even for micro firms (23% of the total in this group in the pooled sample). It is interesting to note that in terms of accessibility to the source of finance, bank loans come far below that of overdraft facilities, although its importance also increases with firm size.

Informal Finance

The most important source of non-formal finance is trade credit. Supplier credit is – like overdraft – available only for a short period, but if it a permanent feature of the firm's operation it is clearly available on a long-term basis. On the lending side customer credit also seems to be fairly common among the firms surveyed. *Informal finance, however, is uncommon as a borrowing device; even in the sample of micro-enterprises only 10% of the firms make use of informal loans.*

Proportion of Debt from Different Sources

Looking at the figures presented in Table 5.4, it is seen that supplier credit and overdraft are the two most important sources of finance in most countries. Taking all firms together supplier credit is more important of the two in Cameroon and Côte d'Ivoire, while they are of equal importance in Kenya and Zimbabwe. Tanzanian firms have a relatively small part of their debt originating in supplier credit

While the access to overdraft facilities was found to be a monotonically increasing function of firm size, no such general relationship exists for the share of overdraft in total debt. Overdraft, along with trade credit are the two sources which account for the larger part of the debt of micro and small enterprises in several of the countries, not because the amount of finance obtained this way is large, but simply because bank and non-bank loans are limited for this class of firms. But the data make the important point, that even if bank and non-bank loans, are more easily available to *large* firms, overdraft and trade credit still remain their main source of inflow of funds – fully one-half in Zambia and Zimbabwe, and well above this proportion in the other countries.

Bank Loans

Some information was obtained from both the panel surveys and the case studies on the conditions of Bank loans that were recently obtained by the respondents. Generally, only about a quarter of the firms in the Surveys provided information on this issue. The data obtained are presented in Table 5.5: here we divided the respondents into two groups – those employing less or more than 100 workers.

Table 5.5: Most Recent Formal and Semi Formal Credit

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Maturity	1372	610	821	884	..	754	1368
Collateral	2.72	2.75	2.58	3.44	4.73	6.40	3.51
Interest Rate	16.93	14.25	22.72	18.60	29.17	62.07	20.00
Small Firms							
Maturity	1163	502	..	888	..	807	1018
Collateral	2.58	4.05	..	3.0	5.21	7.40	4.85
Interest Rate	17.24	13.45	..	18.6	31.0	63.17	24.72
Large Firms							
Maturity	20.18	735	821	870	..	610	17.18
Collateral	3.18	1.78	2.52	4.41	3.80	4.25	2.40
Interest Rate	15.68	15.19	22.7	18.62	20.0	58.0	16.12

Note: Small firms group here is defined as firms that employ <100 versus large firms that employ >=100.

In all countries the mean period of maturity of formal Bank loans is in excess of 20 months and is more like 3–4 years in countries like Cameroon and Zimbabwe. The most striking aspect of these long-term loans is the high value of collateral to loan in all countries – ranging from a low of 2.58 in Ghana to as high as 6.40 in Zambia. The case study in Zimbabwe found that the most common forms of collateral used for loans were mortgage on the firm's land and buildings, and a notarial bond on equipment and movable objects. Of the 33 firms investigated only four had taken loans without explicit collateral, and these were all large and well-established corporations which had been in business at least 20 years.[8] Another striking feature of Table 5.5 is that in keeping with the inflationary conditions in African economies the interest rates are very high by international standards. In general, both collateral requirements and interest rates are higher for small firms in Table 5.5.

[8] RPED (1995), p. 52.

Problem of Collateral

The case studies on finance noted extensive evidence to suggest that banks had clear preference for fixed property as collateral. The value of the collateral demanded, even from prosperous firms, is also very high, often there or four times the value of the loan. But in most of sub-Saharan Africa the problems surrounding the supply of such collateral are immense. The Ghana case study in particular laid out the problems in some detail. The major points emphasized are the following:

(i) Due to lack of clear title to much usable land in Ghana, there is a limited amount of real property that can be put up as collateral. A major reason for this is the prevalence of the tradition of communal property. The rights to various claimants are complex and unclear. Even when, as in some countries and areas, the government has initiated schemes for titles to land, the small number of qualified surveyors available, and the high cost of registering title deeds add to the difficulty of the issue.

(ii) Both competing claims and lack of clear authority to alienate property has led to much litigation. In an effort to stem the increasingly unstable real estate market, Ghana had to impose an embargo on transferring interests in stool and family property in 1989. While such embargoes lasted mortgages could not be taken on the land, restricting their use for obtaining finance.

(iii) Where title or leasehold interests are clear and alienable, transfer regulations needlessly delay the formalizing of mortgages, and consequently, access to borrowed capital. In Ghana control over most land is highly centralized in the Lands Commission. Under Ghanaian law, a mortgage is not fully secured until the government consent is obtained: thus lenders tend not to release borrowed funds until they have this consent. It is reported that the process could take up to one year.

(iv) The sale of collaterals has few legal restraints, based as they are on the laws of the ex-colonial powers. But the process is a long one and increases the transaction costs of loans.

Limitations of Formal Loans from Banks

Another problem with long-term loans brought out by the case studies was that the banks monitored the use of funds after disbursement, reducing the flexibility of such loans. The Zimbabwe report stated that almost all the firms interviewed in their case study stated that the money from their most recent bank loan had to be used for a specific purpose, in most cases the purchase of equipment. There seemed to be a real concern on the part of the bank that formal loans would be misused to serve personal needs. By contrast, respondents indicated that overdrafts were rarely earmarked for a particular purpose. They are more likely to meet the general need for working capital for the firms concerned. This fact, and the presumption that most overdrafts are automatically renewed at the end of the year, unless something goes wrong with the firm's operation, ensures that there is a good deal of flexibility for managers in using overdrafts rather than loans.

We have seen in the discussion above that loans from formal sector banks constitute a relatively small proportion of the funds used by African manufacturing institutions.

Analysis of the Constraints on Receiving Formal Loans

In this section we present a detailed analysis of the significant factors affecting the ability of enterprises to obtain formal sector loan. The RPED surveys asked a series of questions which need to be combined to pinpoint the firms which can be considered to be credit constrained. First is the question: Has the firm ever applied for a loan? It was followed by the question: has the firm ever received a loan from an institution? At one level the answers to these two questions give us an indication of credit constraint in the sense of application to and rejection by the lending agencies. But this is not the end of the story, because there will be some firms which never applied for loans, either because they did not need debt-financing or alternatively they were "discouraged borrowers" in the sense that they felt that there was no point in applying because they were not likely to get a loan. Clearly, the latter group of non-applicants is also credit-constraint. Fortunately, the RPED surveys allow us to include this latter group by reference to another group of questions asked of entrepreneurs: why has the firm never applied for a loan? The possible answers to this question were (i) inadequate collateral or process was too difficult; (ii) unwilling to incur debt; (iii) interest rate too high; (iv) did not need a loan; and (v) would not get a loan. The definition generally accepted for a discouraged borrower includes those under (i) and (v). Those who are deterred from applying because the interest rate was too high, clearly did not have demand for loans at the going price. They join the category of not wanting loans in our classification, presented in Table 5.6. The credit-constrained firms are then the sum of those who applied for a loan and were rejected and those who "cannot get a loan."

Table 5.6: Access to Funds from Formal and Semi Formal Financial Institutions (Percentages)

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*All*
Applied and received	34.2	32.9	71.3	40.9	58.8	62.2	49.9
Applied and rejected	30.3	21.9	11.0	13.0	24.2	16.2	25.3
Cannot get loan	10.5	27.1	8.1	22.6	7.3	6.8	11.6
Did not want loan	25.0	18.1	9.0	23.5	9.7	14.9	13.2
Credit Constrained	40.8	49.8	19.1	35.7	31.5	23.0	36.8
Non-Constrained	59.2	50.2	80.9	64.3	68.5	77.0	63.2
Debt/Capital	0.28	0.24	0.17	0.21	0.14	0.24	0.21
	(0.22)	(0.26)	(0.23)	(0.22)	(0.20)	(0.23)	(0.22)

Note: The numbers in parentheses are standard deviations.

The proportion of credit-constrained firms seems to be unusually high in Cameroon and Côte d'Ivoire, and unusually low in Kenya and Zimbabwe. It is clear from the bottom line of Table 5.6 that these differences do not seem to be associated with the levels of the debt–capital ratio of the sample firms in these countries.

The focus of our analysis is the determinants of credit-constrained firms. It has often been hypothesized that black-owned firms are discriminated in the formal credit market. It has been difficult to distinguish this possible discrimination from a size effect since many black-owned firms are small in size – and there are many good economic reasons for smaller firms having less access to formal loans. In what follows we will try to see if the black ownership factor plays a role in the granting of loans, independent of firm size.

Quite apart from the difficulty of separating the discrimination effect from that of the size effect, the analysis of credit-constraint without reference to demand for loans is not likely to be complete. A particular group, for example, blacks or small firms, might have a larger proportion of their applications rejected, but this proportion may be high simply because they have a stronger demand for loans, and hence there are a lot more applications than can meet the standards of the lending institution. Raturi and Swamy give the following example:

> Imagine, for simplicity, an economy in which all entrepreneurs are equally talented and have projects of equal quality. Banks are color-blind; any application has a 20% chance of being rejected. However, whites are much more likely to be able to obtain loans from their families: therefore only 10% of them apply for bank loans, whereas 80% of blacks apply. In the population of blacks, 16% will apply for loans and be denied, that is, they will be credit-constrained, whereas only 2% of whites will face the same problem.

Formally, Raturi and Swamy formulate the issue in terms of probabilities. Define: *W*=firm wants a loan, A=firm applies for a loan, *NA*=firm does not apply for a loan, *D*=firm is denied a loan, firm is credit constrained. Then it can be shown, and should be intuitively obvious, that the relationship between the various probabilities can be stated as in equation (1):

$$P(R) = P(W)\ \{1 - P(A/W)\ [1 - P(D/A)]\} \qquad (1)$$

The probability of being credit-constrained – a higher value of *P(R)* among blacks may be due to a combination of three reasons: (i) black owned firms may have, other things being equal, a higher demand for loans, *P(W)* is higher; (ii) given that they want loans, they are less likely to apply, *P(A/W)* is lower; and (iii) they are more likely to be denied loans when they apply, *P(D/A)* is higher. Only the last, factor (iii) can be considered to be pure discrimination on the part of lending institutions, provided we can satisfactorily control for other determinants of a successful loan application, like firm size etc. The other two are undoubtedly products of historical discrimination, but cannot be identified with the discriminatory practice of lending agencies in the present. In any case, different readers will have different purposes in mind in interpreting the values of the three probabilities. But this type of distinction between the different streams of relationship affecting the probability of credit constraint is useful, and throws additional light on the enterprise use of formal finance.

In our analysis we have pooled the RPED survey data for the first round together for all seven countries,[9] and estimated Probit models for the three sets of probabilities analyzed above.

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[9] Many of the firms are repeated in the three waves, and since we are concerned with long-term debt issues, and in the interest of economizing on the length of the analysis, it was decided to consider only the first wave.

Determinants of Credit Constraint P(R)

Table 5.7 gives the results for the Probit model in which the dependent variable is the probability of being credit-constrained. MEXP is the entrepreneur's years of experience; MEDUC is an index of the entrepreneur's education level, measured in years. The other independent variables are self-explanatory.

Table 5.7: Probit Model for Constrained Access to Formal and Semi Formal Bank Credit

	Pooled 1	*Pooled 2*	*Size <10*	*Size >=10–<50*	*Size >=50*
Constant	0.16 (0.29)	0.40 (0.30)	0.18 (0.56)	0.72 90.93)	0.11 (0.96)
Ln(Size)		−0.18 (0.04)	−0.38 (0.14)	−0.22 (0.23)	−0.24 (0.11)
Ln(Firm Age)	−0.22 (0.05)	−0.11 (0.06)	0.04 (0.09)	−0.36 (0.12)	−0.06 (0.13)
Ln(MEXP)	−0.13 (0.07)	−0.10 (0.07)	−0.19 (0.11)	0.02 (0.13)	0.11 (0.19)
Ln(MEDUC)	−0.23 (0.12)	−0.09 (0.12)	0.27 (0.20)	−0.23 (0.21)	−0.14 (0.36)
Africa	0.39 (0.12)	0.20 (0.13)	0.39 (0.30)	−0.04 (0.24)	0.32 (0.23)
Cameroon	0.14 (0.23)	0.07 (0.23)	−1.12 (0.48)	0.25 (0.46)	1.01 (0.41)
Côte d'Ivoire	0.34 (0.19)	0.36 (0.19)	0.62 (0.44)	0.54 (0.42)	0.36 (0.30)
Ghana	0.53 (0.21)	0.29 (0.21)	0.62 (0.43)	0.18 (0.45)	0.02 (0.45)
Kenya	−0.47 (0.20)	−0.49 (0.20)	−0.80 (0.35)	−0.31 (0.48)	−0.31 (0.33)
Tanzania	−0.13 (0.19)	−0.23 (0.20)	−0.30 (0.33)	−0.52 (0.47)	0.25 (0.33)
Zambia	0.27 (0.18)	0.15 (0.18)	0.14 90.33)	0.54 (0.40)	−0.37 (0.33)
Observations	787	787	233	104	318
Log-Likelihood	−404.67	−393.80	−141.24	−107.68	−120.34

Note: The numbers in parentheses are standard errors.

For the pooled sample of firms of all sizes we note that African (black) ownership increases the probability of being credit-constrained in a strong way, but this variable loses quite a lot of its significance when we add log(size) to the explanatory variable. The latter is clearly the dominant effect. Controlling for size, the African ownership is weakly significant and the value of its coefficient is halved. When we cut up the sample into three size categories, the size effect remains significant in the small and large groups, but not the race of the owner. The range of firm-sizes in the large (>=50) group is wider than for the middle group. Thus it is not surprising that the size effect is stronger in the former. But the fact that size remains a significant explanatory variable in the narrow range of small firms (<10) is very interesting. It points to size being an important predictor of credit-constraint even among very small firms. (It should be remembered at this point that micro and household-based firms have been excluded from the RPED survey.)

It is also seen from the pooled sample that among the country dummies only Côte d'Ivoire and Kenya are significant – in opposite ways. Côte d'Ivoire firms suffer from a larger credit constraint than the firms in the base country, Zimbabwe, while the firms in Kenya have a less severe problem of access to formal loans. Of the other variables, the age of the firm is significant, confirming the expected negative relationship between age and credit-constraint. The entrepreneur's education or experience does not seem to matter that much.

The Demand for Loan

As explained above small firms may be more credit constrained simply because their demand for credit is greater. The next Probit model used the same variables to estimate the determinants of *revealed* demand as manifested by the firm's decision to apply for a loan. The results are given in Table 5.8. It is seen that the relationship goes the opposite way as far as firm size is concerned. The demand for loan increases strongly with firm size while we had seen that credit-constraint *fell* with increase in firm size. The two propositions are reconcilable only if the probability of having a loan approved *increases* with firm size. This is indeed what we find from the next Probit model reported in Table 5.9 where the probability of receiving a loan is estimated as a function of the same explanatory variables. The probability of getting a loan increases with firm size somewhat more strongly than the decision to apply for a loan for the model covering the whole sample, and much more strongly for the sub-groups of less than 10 and more than 50 employees.

We conclude that, controlling for other factors, the enterprise size is the single most determinant of formal loans. The revealed demand for loan increases strongly with firm size but the rate of approval of the loan application increases even more strongly. Taking into account those who are "discouraged borrowers" the incidence of credit constraint falls at a substantial rate with increase in firm size.

Table 5.8: Probit Model for the Decision to Apply for a Formal and Semi Formal Loan

	Pooled 1	*Pooled 2*	*Size <10*	*Size >=10–<50*	*Size >=50*
Constant	−1.26 (0.26)	−1.73 (0.28)	−1.90 (0.57)	−1.39 (0.75)	−0.29 (0.75)
Ln(Size)		0.29 (0.03)	0.35 (0.13)	0.22 (0.19)	0.16 (0.08)
Ln(Firm Age)	0.27 (0.05)	0.11 (0.05)	0.18 (0.09)	0.06 (0.10)	0.09 (0.11)
Ln(MEXP)	0.10 (0.06)	0.05 (0.06)	0.03 (0.16)	0.08 (0.11)	−0.02 (0.14)
Ln(MEDUC)	0.47 (0.11)	0.27 (0.11)	0.30 (0.19)	0.36 (0.18)	−0.23 (0.31)
Africa	0.08 (0.11)	0.43 (0.12)	0.63 (0.29)	0.23 (0.20)	0.55 (0.21)
Cameroon	0.11 (0.17)	0.19 (0.18)	−0.64 (0.33)	0.07 (0.36)	0.47 (0.31)
Côte d'Ivoire	−0.30 (0.17)	−0.31 (0.17)	−0.64 (0.42)	−0.26 (0.35)	−0.28 (0.24)
Ghana	−0.19 (0.19)	0.23 (0.20)	−0.03 (0.42)	0.15 (0.37)	0.57 (0.40)
Kenya	−0.04 (0.16)	−0.02 (0.16)	−0.40 (0.31)	−0.04 (0.36)	0.03 (0.26)
Tanzania	−0.70 (0.16)	−0.55 (0.16)	−0.57 (0.31)	−0.78 (0.35)	−0.40 (0.26)
Zambia	0.18 (0.16)	0.39 (0.16)	−0.06 (0.30)	0.24 (0.33)	0.79 (0.28)
Observations	922	922	285	272	365
Log-Likelihood	−577.45	−539.86	−164.38	−174.64	−190.54

Note: The numbers in parentheses are standard errors.

Table 5.9: Probit Model for the Receiving Loan from Formal and Semi Formal Institutions

	Pooled 1	*Pooled 2*	*Size <10*	*Size >=10–<50*	*Size >=50*
Constant	−1.71 (0.30)	−2.77 (0.32)	−3.27 (0.83)	−1.76 (0.85)	−1.04 (0.71)
Ln(Size)		0.32 (0.04)	0.44 (0.19)	0.10 (0.20)	0.25 (0.08)
Ln(Firm Age)	0.24 (0.06)	0.06 (0.06)	0.07 (0.12)	0.16 (0.11)	−0.01 (0.10)
Ln(MEXP)	0.15 (0.07)	0.09 (0.07)	0.15 (0.15)	0.13 (0.12)	−0.08 (0.14)
Ln(MEDUC)	0.58 (0.13)	0.37 (0.14)	0.45 (0.29)	0.48 (0.22)	0.09 (0.28)
Africa	−0.14 90.11)	0.24 (0.12)	0.72 (0.44)	0.26 (0.21)	0.20 (0.19)
Cameroon	−0.13 (0.25)	−0.11 (0.26)	0.25 (0.33)	−0.41 (0.44)	−0.71 (0.41)
Côte d'Ivoire	−0.41 (0.17)	−0.48 (0.18)	−0.81 (0.38)	−0.94 (0.39)	−0.34 (0.23)
Ghana	−1.47 (0.24)	−1.12 (0.25)	−0.59 (0.45)	−1.02 (0.41)	−1.41 (0.42)
Kenya	0.10 (0.16)	0.13 (0.16)	0.31 (0.36)	−0.16 (0.36)	0.05 (0.24)
Tanzania	−0.73 (0.16)	−0.56 (0.17)	−0.17 (0.36)	−0.99 (0.35)	−0.61 (0.25)
Zambia	−0.13 (0.15)	0.10 (0.16)	−0.38 (0.39)	−0.33 (0.33)	0.71 (0.25)
Observations	896	896	276	264	350
Log-Likelihood	−560.50	−460.70	−80.50	−143.06	−211.39

Note: The numbers in parentheses are standard errors.

The results for the race of owners come out in a rather unexpected way in the models of Tables 5.8 and 5.9. We had seen earlier in Table 5.7 that the incidence of credit constraint was higher for African-owned businesses. This was partly because of the small size of these firms, but seemed to persist even after we included firm size in the explanatory variables. It is now seen from Table 5.8 and Table 5.9 that this is because the demand for loans, as revealed in the decision to apply, is so much more for this group – higher by as much as 43% relative to the other racial groups. It is interesting to see that the approval of loans is also higher for the Africans, but less so than applications for loans. There is then no evidence of discrimination against African businesses. Their higher credit constraint is really a function of the much stronger demand for loans from them, presumably because they are constrained by lack of family wealth and personal savings.

We should, however, be clear about the interpretation of this result. The problem we are looking at is the narrow issue of applicants for credit of firms who are in business. We have seen in the last chapter that African firms, unlike non-African firms were much more likely to have been established with borrowed funds, because their supply of savings is at a substantially lower level. They can establish businesses largely through the programs of assisted finance available from government or international agencies. They are established small, and stay small. Again, because of limited internal sources of finance, such firms have large demand for formal loans, and, as we have seen, the probability of success of such applications is not less than, and might be even higher than those of non-African firms. But it should be remembered that the demand for credit from non-African businesses comes largely from a different class of firms – the small proportion of firms who do not fully meet their needs from internal sources or trade credit. The conclusion from the empirical analysis of credit made here does not have anything to say about the larger aspects of discrimination in the capital market – which has reduced the internal financial resources of black entrepreneurs.

Other variables in the models of loan application and their approval are of minor significance. The most important of these variables is the entrepreneur's education which increases the probability of loan application, and, at an even higher rate the probability of acceptance by the lending agency.

As for country differences, few of the dummies included are significant. Compared to the base Zimbabwe, the sample firms in Côte d'Ivoire and Tanzania make less use of formal loans: their rate of application is lower and so is the rate of acceptance. Zambian firms seem to have a higher revealed demand for such loans.

In conclusion we should refer to the strong size effect on credit constraint. The reasons for the more severe constraint on small firms have been traced to the limitation of acceptable collateral and also the higher transaction costs of small loans which such firms need. Our results have revealed an extra dimension to this issue which should be emphasized. The size-related problem of credit is not confined to very small firms only – those employing 10 or less workers. It is also strongly present in the sub-sample of larger firms with more than 50 workers. Evidently size stands for some other aspects of the relationship of potential borrowers to lending institutions. The most important which can be suggested are market presence and the social prestige which large firms enjoy, and which most likely facilitates the social relationship of these entrepreneurs with lenders.

How Does Credit Constraint in Africa Differ from that in the US?

The two important variables determining credit constraints in African countries studied above – race of the owner and the firm size – have also been in the center of discussion on the market for finance in developed countries, notably in the United States. We can take as an example a recent study by Cavalluzzo *et al.* (1999), using data from the National Survey of Small Business Finances (1993). The universe of firms surveyed in this data set is rather different from the RPED surveys in so far as they concentrate on businesses outside the corporate sector (those employing less than 500 employees). But in the context of the United States, small businesses thus defined would have a coverage of a range of firms not all that different from the sample in the RPED surveys in so far as the mean size of firms in Africa is so much smaller. In any case the issues tackled in the analysis are very similar to the ones discussed above in this chapter, and invite comparison of the major findings.

The survey revealed that, as in the African countries studied, firms owned by African-Americans displayed a substantially higher demand for credit. Over the past three years about 50% of all firms in the survey demonstrated a need for credit, either by applying for a loan or reporting that that they did not apply because they thought they would not get a loan. This percentage was 70 for African-American males and 79% for African-American females. There was, however, a basic difference with the RPED results reported above. Estimating a model similar in structure to that of Table 5.8 above, Cavalluzzo *et al.* found that there was no significant difference between African-American and White firms in the probability of applying for a loan. Unlike in the RPED countries, the higher black entrepreneurs' demand for credit in the US was not translated into revealed demand through the decision to apply. Evidently, African-American entrepreneurs have a much larger proportion of "discouraged" borrowers.

This was indeed confirmed by a separate analysis of the decision not to apply which revealed that African-American owners were almost 55% more likely to have avoided applying for a loan due to fear of denial than were white-owned businesses. Inclusion of credit history controls and the credit score variable reduced this higher probability somewhat but only to about 37%. The rather surprising conclusion emerges that the financial institutions in sub-Saharan Africa encourage black entrepreneurs to seek formal loans more actively than the relevant institutions in the United States.

The other major conclusion of our analysis of the RPED data, the dominance of firm size in the formal loan transactions, is found to be similar in the US study. Cavalluzzo *et al.* used both the value of fixed assets and employment as measures of firm size in their regression models. Both variables were strongly significant in showing that the probability of applying for a loan increases with firm size, whether measured by assets or employment, and the probability of denial of credit decreases strongly with asset size (but not with employment size).

Overdrafts

We have seen that overdrafts are a major source of finance for the African enterprises, more so than formal bank loans. A Probit model for access to overdrafts, similar to that for bank loans, is estimated from the survey data and reported in Table 5.10. The access to overdraft facilities increases strongly with firm size, and *the coefficient with respect to size is much larger than the accessibility to bank loans.* It is interesting to note that the size effect is significant even for enterprises *within* the three size groups of firms which have been distinguished in the table. Also the race element, which was significant when introduced by itself, loses significance when the enterprise-size is used along with it. The point confirms the conclusion from the analysis of bank loans that race is not a determining element in credit rationing. But because black firms are primarily small, and small firms find it harder to get bank finance (loans or, even more so, overdrafts), black entrepreneurs may nevertheless feel discriminated against.

Further evidence on overdrafts *versus* bank loans is provided from the case studies. The Zimbabwe report makes the useful point that one way to ascertain whether certain categories of firms are rationed in the provision of credit is to see if firms desired more credit than they received. Of the 23 case study firms which had received a formal bank loan in the past, only two indicated that the loan was much smaller than they wanted. Thus for firms that receive bank loans, few appeared to be credit constrained. The two firms reporting to be constrained were both large, non-African firms. By contrast, firms appeared to be much more constrained as far as overdraft was concerned. Of the 45 firms which had overdraft at the time of the case-study, 22 had borrowed up to or over the ceiling in the previous twelve months, and 10 had attempted to increase their ceiling but were unable to do so. Indeed 6 of these 10 had their ceiling *reduced.* Repayment performance and "misuse of the facility" were the commonly cited reasons by bank staff for reducing the ceiling.

Table 5.10: Probit Model for the Access to Overdraft Facility

	Pooled 1	*Pooled 2*	*Size <10*	*Size >=10–<50*	*Size >=50*
Constant	−1.97 (0.28)	−2.66 (0.31)	−4.05 (0.90)	−2.71 (0.79)	−0.31 (0.65)
Ln(Size)		0.39 (0.04)	0.46 (0.21)	0.40 (0.18)	0.28 (0.07)
Ln(Firm Age)	0.29 (0.05)	0.05 (0.06)	0.16 (0.12)	0.06 (0.10)	−0.06 (0.09)
Ln(MEXP)	0.18 (0.07)	0.12 (0.07)	0.26 (0.16)	0.17 (0.12)	−0.20 (0.13)
Ln(MEDUC)	0.57 (0.11)	0.34 (0.12)	0.57 (0.27)	0.49 (0.20)	−0.30 (0.26)
Africa	−0.35 (0.10)	0.02 (0.11)	0.49 (0.41)	0.05 (0.19)	−0.02 (0.17)
Cameroon	0.09 (0.17)	0.23 (0.18)	−0.03 (0.45)	−0.02 (0.34)	0.37 (0.27)
Côte d'Ivoire	0.13 (0.16)	0.16 (0.18)	−0.07 (0.19)	0.15 (0.35)	0.15 (0.23)
Ghana	−0.61 (0.19)	−0.13 (0.20)	0.16 (0.60)	−0.60 (0.38)	0.37 (0.35)
Kenya	0.65 (0.16)	0.79 (0.17)	0.73 (0.40)	0.79 (0.36)	0.54 (0.24)
Tanzania	−0.43 (0.16)	−0.17 (0.17)	−0.27 (0.43)	−0.69 (0.35)	0.15 (0.25)
Zambia	−0.33 (0.15)	−0.66 (0.16)	−0.19 (0.44)	−0.55 (0.33)	0.21 (0.22)
Observations	1017	1017	323	308	386
Log-Likelihood	−585.61	−518.62	−82.28	171.63	−244.13

Note: The numbers in parentheses are standard errors.

The picture which emerges is that despite the fact that overdrafts are more commonly used than bank loans, credit constraints are binding more often for overdrafts. The reason is probably that demand for overdraft facilities is greater than demand for loans. Mumbengegwi and ter Wengel (1994) suggest several reasons why this might be the case. The first is flexibility in the use of funds. An overdraft is in fact a united loan. It could be used to finance either working or fixed capital requirements. Secondly, and tied to the last point, is that the transaction costs of loan application, processing and delays in approval are substantial. The fact that the application for overdrafts has to be made once and are generally renewed, unless problems with repayments arise, saves firms the trouble of going through the elaborate process each time financing is required. Third, interest *costs* on overdrafts might be lower, even if the interest *rate* is higher than bank loans, because interest on overdrafts accrues only on amounts withdrawn, whereas interest on loans accumulates on the entire amount from the date of disbursement.[10]

Turning to the supply side, the case studies found that qualification for an overdraft required a high level of collateralization. The Kenya study reported that the total value of the collateral amounted on average to six times the line of credit. Banks seemed to base the collateral requirement on book values – allowing 75% of such values of assets for the overdraft ceiling. Since prices of land and buildings had increased enormously in these countries, the replacement value of collaterals was unusually high. On the other hand, personal relationships with a particular bank are often crucial in the approval for overdrafts, and their subsequent renewals. Taken together the last two points suggest that the difficulty of new and small firms of getting access to overdrafts might be substantial. This, together with the demand factors, explains the strong positive relationship between firm size and access to overdrafts found in our regression model.

Trade Credit

An important alternative source of working capital finance in African economies is trade credit. For an individual firm, trade credit includes four elements: (a) the reception of goods and services from suppliers, on the understanding that payments have to be made later "accounts payable"; (b) the shipments of goods and services to clients, on the understanding that payments are to be made later "accounts receivable"; (c) the prepayment to suppliers for goods and services to be supplied later 'advance to suppliers"; and, (d) the receipt of prepayments from clients for goods and services to be supplied later "advances from customers." The last is an important source of finance, but only for micro-enterprises and then again for certain lines of activity, e.g., tailoring. Thus in the following discussion of producers' finances, attention is concentrated on the first type – "accounts payable."

It will be seen from Table 5.5 above that, in most of the countries under study, supplier credit is a very significant proportion of total outstanding debt at the time of the survey. Zambia, Tanzania and Ghana have a smaller

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[10] The Kenya case study showed that (in September 1993), the average interest rate charged on overdrafts was 30% – much higher than on bank loans reported earlier in March in the Survey. Nevertheless respondents, when asked to compare overdrafts with loans, praised overdrafts as being cheaper.

amount of outstanding balances in the form of supplier credit than overdrafts, in the other four countries the ratio of trade credit to total debt is at least as much, and more often exceeds significantly the proportion of overdraft or bank loans.

Trade credit, as already mentioned, includes not only supplier credit but also credit advanced by producers to customers "customer credit." It might be argued that we should, strictly speaking, only include net balances consisting of the excess of supplier credit over customer credit as contributing to the finances of the company. But, apart from the fact that the duration of the two types of credit might be different, this argument is fallacious. The need for consumer credit is part of the working capital requirements of the firm; it is part of the finances needed to support the period of production – the time interval extending from the receipt of raw materials for manufacture to the selling of the finished product. Every firm has to make provision for this finance in the same way that it must finance investment in machinery and building. The availability of supplier credit is one of the sources of the firm's required finance.

Table 5.11: Duration of Supplier Credits and Client Credits (in Days)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*Pooled*
Supplier Credit	64.2	69.1	43.3	55.5	43.2	49.7	45.3	53.1
Client Credit	71.2	56.2	49.3	42.2	51.0	45.2	50.7	52.1
Micro Firms								
Supplier Credit	55.7	49.5	32.3	49.3	31.1	55.3	29.7	42.3
Client Credit	70.6	51.5	50.7	26.3	31.8	45.8	41.6	56.1
Small Firms								
Supplier Credit	69.4	62.1	54.9	51.6	54	46.7	47.1	56.9
Client Credit	76.8	55.8	32.2	49.3	29	41.8	49.5	51.3
Medium Firms								
Supplier Credit	63.8	95.6	54.7	52.6	..	34.3	41.7	54.5
Client Credit	84.0	39.7	80.9	51.7	..	51.7	61.0	64.1
Large Firms								
Supplier Credit	66.7	82.8	98.5	67.7	42.6	73	49.0	59.7
Client Credit	47.5	77.2	34.0	39.6	50.2	43	50.7	49.6

Note: Small firms group here is defined as firms that employ <100 versus large firms that employ >=100.

Duration and Interest Rate

The RPED surveys produced data on the duration of supplier credit. Table 5.11 reproduces the data. The data collected for customer credit is also given for comparison.

The distribution of firms with respect to duration of trade credit as reported in Table 5.12 is skewed to the left, with a majority reporting duration of 30 days or less. There is a clear suggestion in the above table that smaller firms have a shorter duration of trade credit granted. This conclusion is of importance in so far as it shows that this source of finance in the African context seems to favor larger firms, unlike what has been expected to be the case in developed countries. We return to this topic in more detail later.

Table 5.12: Distribution of Duration of Supplier Credits and Client Credits (Percentage)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*Pooled*
< 30 days								
Supplier Credit	35.2	76.2	65.3	44.8	54.5	57.5	49.7	57.7
Client Credit	36.2	85.1	72.5	45.7	70.6	54.2	49.7	63.6
> 30<60 days								
Supplier Credit	30.7	9.9	9.3	28.7	27.3	30.0	37,8	23.0
Client Credit	36.2	8.4	16.3	41.3	17.6	32.2	35.8	24.0
> 60 days								
Supplier Credit	34.1	13.9	25.3	26.4	18.2	12.5	12.6	19.3
Client Credit	27.6	6.4	11.3	13.0	11.8	13.0	14.5	12.4
Small Firms								
< 30 days								
Supplier Credit	36.2	80.1	69.6	46.2	60.0	60.0	54.7	62.3
Client Credit	37.0	86.1	73.3	48.5	70	53.2	58.2	67.2
> 30<60 days								
Supplier Credit	30.4	9.0	8.7	30.8	20.0	31.4	35.9	20.5
Client Credit	33.3	8.4	14.7	33.3	20.0	34.0	27.8	20.3
> 60 days								
Supplier Credit	33.3	16.8	21.7	23.1	20.0	8.6	9.4	17.2
Client Credit	29.6	5.4	12.0	18.2	10.0	12.8	13.9	12.5
Large Firms								
< 30 days								
Supplier Credit	31.76	58.3	16.7	40.7	42.9	40.0	45.6	44.8
Client Credit	25.0	88.6	60.0	38.5	71.4	58.3	41.3	52.9
> 30 < 60 days								
Supplier Credit	31.6	13.9	16.7	22.7	42.9	20.0	39.2	29.9
Client Credit	75.0	8.3	40.0	61.5	14.3	25.0	43.8	35.0
>60 days								
Supplier Credit	36.8	27.8	66.7	36.4	14.3	40.0	15.2	25.3
Client Credit	..	11.1	..	..	14.3	16.7	15.0	12.0

Note: Small firms group here is defined as firms that employ <100 versus large firms that employ >=100.

Whatever the agreement about the duration of credit firms could and usually delay repayment. In Zimbabwe, for example, one third of the firms in the case study sample delayed payments after the term, in most cases within a month of the due date. Over 80% reported that they had delayed payment at least once. Fewer micro-enterprises normally pay after term, partly because they often do not receive trade credit, and when they do they are afraid to lose it (Fafchamps *et al.* 1995, pp. 56–7). Penalties are paid but not always. Table 5.13 gives the percentages of the survey firms who specified the type of penalties for delay in repayment, for all countries pooled together.

Table 5.13: Penalty for Repayment Delay (Percentage of Firms)

	Interest penalty	*Legal action*	*Rescheduling*	*Interruption*
Small firms	13	19	42	26
Large firms	13	16	33	38

Note: Small firms group here is defined as firms that employ <100 versus large firms that employ >=100.

It has been reported that trade credit contracts in industrialized countries are highly standardized within sectors, although varying across industry and product types. For example, a common formula in the US is 2/10, net 30, meaning that the buyer gets a 2% discount on payment within 10 days, failing which payment must be made in full within 30 days. Contrasted with this scenario, trade credit contracts in Africa are much more flexible, depending on economic conditions and the particular relationship between lender and borrower (Biggs, Ratini, and Srivastava 1996, p. 6).

Table 5.14: Implicit Interest Rate on Supplier Credits and Client Credits (Percentage)

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Zambia*	*Zimbabwe*	*Pooled*
<30 days						
Supplier Credit	9.9	..	12.6	52.2	24.2	19.3
Client Credit	10.9	23.7	24.2	17.8	31.1	21.9
>30–<60 days						
Supplier Credit	16.3	16.6	19.1	16.3	18.0	16.5
Client Credit	25.9	17.1	18.1	9.8	26.7	21.9
>60 days						
Supplier Credit	24.2	16.2	12.6	9.0	16.7	16.7
Client Credit	15.8	..	28.7	36.0	9.8	19.1

The same flexibility applies to effective interest rates. Explicit interest rates in trade credits are very rare. Cash discounts – implying an implicit interest rate – are found in rather less than half the cases. The survey material allowed us to calculate the effective interest rate for trade credit in the different countries. This is given in Table 5.14. It is seen that the margin of interest rates on trade credit above overdraft rates is not nearly as great in Africa as in developed countries, where trade credit interest rates are commonly three times those of Bank overdraft rates. The most likely reason for this is that trade credit is much more restricted in African economies. While collaterals are not involved in this type of transaction, in Africa as in developed countries, the importance of trust and moral means of enforcement is critical. We discuss these issues at greater length in the following section.

A Theory of Trade Credit in Developed Countries

We are now in a position to consider the crucial factors affecting the availability of trade credit to African manufacturing firms. It will help to motivate the analysis to present what has been advanced in the literature as the role of trade credit in developed economies. The peculiarities of the African scene will come out more strongly in this perspective.

It has been well known that trade credit has formed a substantial part of short-term financing in developed countries. Data available for the United States in 1983 show that trade debt was the single largest source of credit for US non-financial corporations:

Table 5.15: Short-term Liabilities of US Non-financial Corporations (1983)

Type	*Amount ($ billion)*
Bank loans	402
Commercial Paper	38
Banker's acceptances	9
Financial company loans	101
Trade debt	428
Profits payable	8
Total	985

Source: Bench (1987), p. 21. Quoted in Cuevas *et al.* (RPED undated, p. 38).

In a more recent and comprehensive article, Rajan and Zingales (1995) used a sample of 8,000 non-financial firms to study determinants of their capital structure. This sample covers between 30% to 70% of the firms listed in every country, and represents more than 50% of the market capitalization in each country and hence provides a very good indication of the capital structure of firms in G7 countries. The following table provides a summary of relative share of selected balance sheet entries. In all G7 countries, trade credit remains very significant ranging from 25% to 45% of the book value. The table also reveals that "account payable" is more than twice the debt in current liabilities in US and remains much higher for all other countries. Hence, one may positively conclude that trade credit is the single most important source of short-term external finance for firms in the United State and all other G7 countries.

Table 5.16: Selected Balance Sheet Items for Non-financial Firms in G7 Countries (1991) (Percentage, Relative to Book Value of Total Asset)

	US	*Japan*	*Germany*	*France*	*Italy*	*UK*	*Canada*
Account Payable	15.0	15.4	11.5	17.0	14.7	13.7	13.3
Long Term Debt	23.3	18.9	9.8	15.7	12.1	12.4	28.1
Debt in Current Liabilities	7.4	16.4	9.9	11.6	16.2	9.6	7.3
Account Receivable	17.8	22.5	26.9	28.9	29.0	22.1	13.0

Source: Rajan and Zingales (1995).

An important stylized fact about trade credit in developed countries is that it is much more important for small-medium firms than for the larger corporations. Cuevas *et al.* quote data from Goodell (1952) to show that the "accounts payable" as a percentage of total company assets fell monotonically with size group – from 18% of the smallest firms with less than \$50k in assets to less than 4% for firms with more than \$100m. (Figure 1, p. 38). The same authors also use another source, Andrews and Eisemann (1984), to report the following result for US manufacturing firms.

> The contrast between small and large firms can also be seen in Table 3 (p. 40), which summarizes the financial situation in USA manufacturing firms in 1958 and 1978. Trade credit provided some 17–18 percent of all funds to small and medium-size manufacturing firms, as compared to 7–10 percent for all manufacturers. During the period 1958–78, while the debt–equity ratio increased substantially for all firms, these percentages changed only marginally. The larger utilization of trade credit in SMEs partly reflected the fact that short-term liabilities represented a larger part of their total financing than for the entire universe (37.2 percent as against 25.5 percent in 1978), and also that equities financed a smaller part of their requirements (44.8 percent against 51.7 percent).

The inverse relationship between the prevalence of trade credit and firm size could be due to many causes – most important of which would seem to be availability of collateral and the cost of information gathering and enforcement. Smaller firms may have a smaller portion of their assets in the form of collateral against which loans by formal institutions can be made. Supplier credit, on the other hand, uses in effect the output flow as a guarantee against repayment. Collateral reduces the need for information about the borrower which may be costly to acquire. If the supplier of materials and inputs is able to develop a long-term relationship with the manufacturer, his need for information and supervision of the loan is reduced, and with it the need for collateral.

If the inverse size–trade credit relationship is generally true, it can lead to the hypothesis of the credit multiplier which some authors have advanced. If formal lending institutions have difficulty in lending direct to small firms, they might do it indirectly through making credit available to larger firms. Trade credit facilitates the flow of funds to small firms. Large firms, in this hypothesis, would act as intermediaries and suppliers of inputs and credit to smaller firms. This hypothesis, if true, has profound implications for policy. The limited availability of formal finance is known to have been a major problem of SMEs in developing countries. Policy makers have often tried to ease this problem by direct intervention with the banking system, making special provisions for funds to be lent to SMEs only. This type of targeting has, however, had limited success since the fundamental problems of the cost of information gathering and cost of administration of the bank loan are left untouched. If trade credits play a significant role for SMEs – more than for large firms – then the easing of credit flow to the latter could be expected to percolate to the former. This idea is, of course, a particular case of the general one of financially constrained firms being able to benefit from easy credit to firms whose asset structures are more acceptable to formal lending institutions.

Our first task is then to see if the inverse relationship of trade credit with size, observed for developed countries like the USA, is valid for our sample of African countries.

Evidence on the Relationship of Firm Size to Trade Credit

Accessibility to Trade Credit: The Probit models on the use of both supplier credit and client credit by our sample firms are presented in Table 5.17 and Table 5.18. It is clear that the developed country relationship is contradicted for *the access to* both types of credit. The coefficients of the log(size) variable are *positive and strongly significant in both equations.* In fact the coefficient for client credit is slightly higher than that for supplier credit. It is, however worth noting that the coefficients are less than for a similar equation showing the accessibility of overdrafts to firm size. At 0.39 the log(size) coefficient in the overdraft equation is way above the respective coefficients in the trade credit equations.

Table 5.17: Probit Model for Supplier Credit

	Pooled 1	*Pooled 2*	*Size <10*	*Size >=10–<50*	*Size >=50*
Constant	−0.75 (0.27)	−0.91 (0.28)	−1.60 (0.51)	−0.73 (0.78)	0.42 (0.75)
Ln(Size)		0.27 (0.04)	0.20 (0.14)	0.10(0.19)	0.14 (0.08)
Ln(Firm Age)	0.31 (0.05)	0.12 (0.05)	0.10 (0.09)	0.09 (0.10)	0.20 (0.11)
Ln(MEXP)	0.11 (0.06)	0.04 (0.07)	−0.01 (0.11)	0.19 (0.11)	−0.18 (0.15)
Ln(MEDUC)	0.50 (0.11)	0.28 (0.12)	0.21 (0.20)	0.46 (0.19)	0.24 (0.27)
Africa	−0.42 (0.10)	−0.29 (0.11)	−0.20 (0.25)	−0.50 (0.19)	−0.16 (0.18)
Cameroon	−0.30 (0.15)	−0.24 (0.19)	−0.81 (0.31)	−0.22 (0.38)	−0.57 (0.35)
Côte d'Ivoire	−0.73 (0.15)	−0.93 (0.20)	0.07 (0.38)	−0.95 (0.29)	−1.32 (0.31)
Ghana	−0.75 (0.16)	−0.52 (0.20)	−0.16 (0.37)	−1.08 (0.40)	−1.62 (0.38)
Kenya	−0.84 (0.14)	−0.80 (0.17)	−0.91 (0.36)	−0.71 (0.38)	−1.20 (0.30)
Tanzania	−1.81 (0.15)	−1.71 (0.19)	−0.20 (0.37)	−2.06 (0.40)	−2.11 (0.31)
Zambia	−1.52 (0.17)	−1.42 (0.18)	−0.80 (0.38)	−1.81 (0.39)	−1.68 (0.29)
Observations	1017	1017	323	308	386
Log-Likelihood	−546.13	−510.01	−122.01	−163.19	−194.39

Table 5.18: Probit Model for Client Credit

	Pooled 1	*Pooled 2*	*Size <10*	*Size >=10–<50*	*Size >=50*
Constant	−0.01 (0.26)	−0.22 (0.27)	−0.47 (0.48)	−0.96 (0.77)	1.40 (0.78)
Ln(Size)		0.20 (0.03)	0.17 (0.12)	0.27 (0.19)	0.09 (0.09)
Ln(Firm Age)	0.10 (0.05)	−0.02 (0.05)	−0.13 (0.08)	0.06 (0.10)	0.08 (0.11)
Ln(MEXP)	0.20 (0.06)	0.16 (0.06)	0.19 (0.09)	0.25 (0.11)	−0.19 (0.17)
Ln(MEDUC)	0.38 (0.10)	0.23 (0.10)	0.25 (0.17)	0.19 (0.18)	0.09 (0.27)
Africa	−0.34 (0.10)	−0.13 (0.11)	−0.07 (0.25)	−0.20 (0.20)	0.01 (0.19)
Cameroon	−0.04 (0.19)	−0.01 (0.20)	0.47 (0.33)	0.66 (0.40)	−0.48 (0.35)
Côte d'Ivoire	−0.38 (0.19)	−0.40 (0.19)	−0.14 (0.35)	0.06 (0.39)	−1.06 (0.34)
Ghana	−1.12 (0.19)	−0.92 (0.20)	−0.15 (0.30)	−1.09 (0.39)	−1.49 (0.33)
Kenya	−0.64 (0.17)	−0.67 (0.20)	−0.61 (0.30)	−0.05 (0.40)	−1.26 (0.33)
Tanzania	−1.43 (0.17)	−1.34 (0.17)	−1.24 (0.31)	−0.99 (0.36)	−1.69 (0.33)
Zambia	−0.57 (0.19)	−0.46 (0.18)	0.14 (0.29)	0.66 (0.35)	−0.61 (0.32)
Observations	1017	1017	323	368	386
Log-Likelihood	−572.60	−554.87	−186.59	−169.62	−170.91

Note: The numbers in parentheses are standard errors.

In fact, more recent studies of trade credit in the US, such as that of Petersen and Rejan (1997), suggest that even developed countries demonstrate the *positive* relationship between firm size and trade credit, contrary to the suggestion made in the hypothesis of the trade credit multiplier. Petersen and Rajan (1997) compare the use of trade credit in a sample of 3,404 small firms (mostly manufacturing) conducted by the National Survey of the Small Business Finances in 1988–89 to the use of trade credit by larger firms in the much more widely used Compustat data-set. This study also reveals significant differences between small and large firms in their access to trade credit. Overall, the account payable to sales ratio for large firms has been found to be 11.6 while the same ratio is only 4.4 for small firms. For manufacturing, however, this ratio stands at 9.8 for large firms while it is still significantly less for small countries at 6.5. Petersen and Rajan (1997) also found that small firms tend to have a much smaller receivable to sales ratio in all industries. For instance, for the manufacturing small firms account receivable to sales ratio stands at 11.8 for small firms versus 19.1 for large manufacturing firms. Therefore, Petersen and Rajan (1997) conclude that not only small firms borrow less through trade credit, they also extend less trade credit. Petersen and Rajan (1997) argue that if small firms are more capital constrained one would expect them to extend less trade credit (smaller account receivable), but also borrow more through trade credit (have higher account payable). However, their desire to borrow through trade credit may not be matched by suppliers' willingness to lend.

Several points other than the size effect in the equations of Table 5.17 and Table 5.18 are worth emphasizing. The first is the behavior of the "race of owner" variable relative to that of firm size. It will be recalled that in the overdraft equation, we found that the race of the entrepreneur was significant when we estimated the equation without log (size), showing that Africans were at a disadvantage in access to overdrafts. But this coefficient lost significance when firm size was introduced into the equation. The important factor was firm size. Race turned out to be significant on its own because black firms were small. In the trade credit equations, however, we get a quite different result. Turning to the equation for supplier credit, the regression without firm size but including a dummy for race, shows that the availability of supplier credit to black firms is significantly less by a substantial margin, other things being equal. When we include firm size, along with race, the negative coefficient of race falls somewhat, but it is still large and strongly significant – even as the firm size variable turns out to be significant and positive. In other words, even if smaller firms have less access to supplier credit, controlling for firm black-owned firms have still less access to this type of finance. This result, however, is not replicated in the case of client credit. Like in the overdraft case, the race dummy loses significance when firm size is introduced into the Probit model. We conclude that there is something peculiar to the availability of supplier credit which distinguishes it from both bank overdraft, and indeed bank loans generally, and client credit. This difference has already been noticed in earlier work by Biggs *et al.* on the Kenyan RPED data (Biggs, Raturi and Srivastava, June 1996). The authors in this paper ascribed the difference in the methods of enforcement of contracts in the two types of lending. This point is discussed in more detail in the next sub-section.

Looking at the regression results in sub-groups of firms, it is very interesting to note that both the size and owner's race are significant *within* the small firm category of <10 workers, and also for larger firms of >=50 workers.

A second point of note in the models of Tables 5.17 and 5.18 is the big difference between the countries pooled together in the analysis. Almost for all six countries the coefficient is significantly negative – supplier credits and client credits are less available in these countries than the base case of Zimbabwe. This result is due to inherent difference in the availability of credits within different countries, irrespective of the ownership or industry structure, as industry dummies are included but not reported in all the models and when we included ownership dummies the results did not show significant change.

Of the other variables in the model of Table 5.17 and Table 5.18, it is interesting to note that older firms and those with more educated entrepreneurs, have better access, to particularly supplier credit. This is, of course consistent with the hypothesis that the availability of supplier credit is heavily influenced by long relationships of trust between lender and borrower.

Ratio of Trade Credit to Volume of Transaction

The models discussed so far have dealt with the accessibility of firms to trade credit. We now turn to models dealing with the determinants of the amount of trade credit used by the firms in the sample – and this is done by regression equations in which the dependent variables are the ratios of supplier credit to total sales, and those of client credit to total purchases (of the firm's output by customers).

Table 5.19: Determinants of the Ratio of Supplier Credit to Total Sales: Tobit Model

	Pooled 1	*Pooled 2*	*Size<10*	*Size >=10–<50*	*Size>=50*
Constant	−0.40 (0.08)	−0.46 (0.08)	−0.34 (0.10)	−0.58 (0.20)	−0.07 (0.08)
Ln(Size)		0.06 (0.01)	0.05 (0.02)	0.14 (0.10)	0.04 (0.01)
Ln(Firm Age)	0.09 (0.02)	0.04 (0.02)	0.01 (0.02)	0.11 (0.05)	−0.00 (0.01)
Ln(MEXP)	−0.00 (0.02)	−0.01 (0.02)	0.01 (0.02)	0.01 (0.06)	−0.06 (0.02)
Ln(MEDUC)	0.13 (0.04)	0.09 (0.04)	0.04 (0.03)	0.15 (0.10)	0.02 (0.03)
Africa	−0.10 (0.03)	−0.07 (0.03)	−0.10 (0.04)	−0.20 (0.11)	−0.03 (0.02)
Cameroon	0.03 (0.05)	0.05 (0.05)	0.12 (0.05)	0.10 (0.17)	0.07 (0.02)
Côte d'Ivoire	−0.03 (0.05)	−0.01 (0.05)	0.11 (0.06)	−0.12 (0.18)	0.06 (0.03)
Ghana	−0.06 (0.04)	0.01 (0.05)	0.14 (0.05)	−0.19 (0.16)	−0.01 (0.04)
Kenya	−0.06 (0.03)	−0.03 (0.04)	0.12 90.06)	−0.11 (0.15)	0.05 (0.02)
Tanzania	−0.33 (0.06)	−0.30 (0.05)	−0.02 (0.04)	−0.64 (0.16)	−0.08 (0.03)
Zambia	−0.17 (0.04)	−0.13 (0.05)	−0.11 (0.06)	−0.35 (0.18)	−0.05 (0.03)
Observations	1017	1017	323	368	386
Log-Likelihood	−414.36	−396.55	−44.11	−192.71	−21.3

Note: The numbers in parentheses are standard errors.

Table 5.20: Determinants of the Ratio of Client Credit to Total Purchases: Tobit Model

	Pooled 1	*Pooled 2*	*Size<10*	*Size >=10–<50*	*Size>=50*
Constant	−0.08 (0.21)	−0.78 (0.21)	−0.56 (0.23)	0.26 (0.14)	−2.59 (1.02)
Ln(Size)		0.07 (0.03)	0.08 (0.06)	−0.02 (0.02)	0.34 (0.24)
Ln(Firm Age)	0.09 (0.04)	0.04 (0.04)	0.02 (0.04)	−0.00 (0.02)	0.23 (0.14)
Ln(MEXP)	0.16 (0.05)	0.15 (0.05)	0.00 (0.04)	−0.01 (0.03)	0.40 (0.15)
Ln(MEDUC)	0.16 (0.09)	0.04 (0.09)	0.19 (0.08)	0.02 (0.06)	−0.24 (0.24)
Africa	−0.05 (0.07)	0.03 (0.08)	−0.01 (0.11)	−0.09 (0.04)	0.24 (0.25)
Cameroon	0.24 (0.13)	0.27 (0.13)	0.32 (0.14)	0.05 (0.05)	0.70 (0.45)
Côte d'Ivoire	0.22 (0.13)	0.24 (0.12)	0.08 (0.17)	−0.01 (0.05)	0.88 (0.46)
Ghana	0.12 (0.16)	0.22 (0.11)	0.18 (0.18)	−0.04 (0.08)	0.73 (0.59)
Kenya	−0.10 (0.12)	−0.09 (0.12)	−0.13 (0.14)	0.00 (0.05)	0.14 (0.47)
Tanzania	−0.59 (0.13)	−0.54 (0.13)	0.44 (0.15)	−0.18 (0.03)	−0.53 (0.45)
Zambia	−0.16 (0.12)	−0.11 (0.12)	0.04 (0.13)	0.06 (0.05)	−0.40 (0.43)
Observations	1017	1017	323	368	386
Log-Likelihood	−1035.10	−1030.73	−170.66	−74.18	−405.05

Note: The numbers in parentheses are standard errors.

Most of the points made about availability of supplier credit are confirmed when our dependent variable is the credit–sales ratio. In particular, accessibility to credit increases with firm size, and African entrepreneurs still suffer from denial of such credit independent of firm size. Age of firm and entrepreneur's educational level is positively related to availability of credit. One curious difference with the earlier models of access to trade credit is, however, found when we consider the determinants of credit–sales ratio. It was seen in the results of Table 5.17 that all countries with various degrees reported strongly negative coefficients for accessibility compared to the base Zimbabwe. In the model of Table 5.19, however, these differences become much weaker and almost disappear. This result indicates that although significant differences in trade credit accessibility can be found across these countries, these differences are more concentrated in the access to the trade credit and not the corresponding magnitude. In other words, we may have a situation that a smaller proportion of the firms in the countries concerned have access to supplier credit, but those who do have access, use proportionally the same amounts of such credit.

The Issues of Enforcement: Overdrafts versus Trade Credit

In some earlier work on finance in Kenya Biggs *et al.* (1996) draw attention to the distinction in the enforceability of contracts of the two types of working capital discussed above – bank overdrafts and supplier credit.

Hypotheses

The authors make the point that theoretical analysis of the market for bank credit has dealt extensively with barriers to trade arising from asymmetric information between the borrower and lender, so that the borrower has greater information about his project attributes or his actions and abilities than the lender. The resulting problems of adverse selection and moral hazard help to explain the determinate patterns of financing found in the market for formal bank credit. For example, since banks in general have found it difficult to screen and monitor borrowers directly, they tend to rely heavily on the use of collateral as an "information substitute." Similarly, asymmetric information also explains why access to bank loans tends to be prevalent relatively more amongst larger firms than small ones. Banks can acquire information on borrower/project attributes more easily in case of larger firms; consequently, the unit costs of both screening and monitoring tend to be lower for credit extended to larger firms relative to that for small ones.

The most important potential barrier to transactions in informal credit markets, on the other hand, lies in the problem of incomplete contract enforcement. Unlike formal bank credit, informational asymmetries are relatively unimportant in informal transactions which are generally found in environments characterized by individuals with cheap access to high levels of information about the other parties. The major preoccupation of lenders in informal credit transactions is whether or not they will be repaid: even if they can screen and monitor projects/borrowers at no cost, they have to be concerned about the possibility of *malafide* default on part of the borrower. While, in principle, recourse to the legal system is possible in Kenya, creditors seldom use it to enforce contracts for several reasons. First the legal system is costly to use in terms of legal fees and transaction costs, and, given that many trade credit transactions are relatively small, recovery via the courts would simply not be cost effective. Second, the legal system involves long delays, and, in some cases, uncertain outcomes. Simple cases can take years to get a judgment and then one is still left with the problem of collecting. Kenyan–Asian businessmen complain that one can take a Kenyan–African businessman to court, but intervening "political" factors may make the final outcome uncertain. Third, and possibly most important, the last thing a supplier wants to do is take a customer to court. Doing so generally means loss of that customer forever. Suppliers would much rather negotiate some kind of private settlement and deal with the debtor on a cash basis, than completely give up future sales.

The extensive presence of informal trade credit transactions in Kenyan manufacturing implies the existence of alternative, private enforcement mechanisms. In principle, private "coercion" or "trust" can function as informal enforcement mechanisms. Because of factors such as foreign exchange scarcity, transportation problems and delays in shipping and operation at ports, specific raw materials and spare parts are often in short supply. Customers who have fallen out of favor with suppliers may not even be able to place an order for such items, being turned down politely on the pretext of lack of a crucial item in stock. In the worst case, inability to obtain needed production inputs may result in complete shutdown of the debtor's plant during a critical production period.

This suggests that a considerable amount of information flows between debtors and creditors. Many firms in the survey have long term, stable relationships with their major suppliers, particularly when the relationships involve credit arrangements. The average length of relationship in the sample is about nine years. In many cases, these repeated interactions over long periods appear to result in "relational contracts" wherein the reference-point is, in Williamson's (1975) words, "the entire relation as it has developed through time."

But not all relationships can be bilateral in the sense of the parties having detailed knowledge of each other. Thus the extension of trade credit as a pervasive mode of financing depends crucially on the emergence of *communal* or *multilateral enforcement* mechanisms wherein agents change partners over time but dishonest behavior against one partner causes sanctions by other members in the society (such as, for example, refusal to interact on the basis of credit). Under public observability, each agent has as strong an incentive to cooperate as if he faced the same partner in each period. In small communities, therefore, where members can observe each other's behavior, community enforcement works in much the same way as personal enforcement: public observability is a substitute for having a long-term relationship with a fixed partner.

Clearly, therefore, the level of information transmission among community members is critical to the emergence of communal enforcement mechanisms. However, full observability is not a prerequisite: Kandori (1992) shows that such communal-enforcement mechanisms can exist under less than perfect observability also. Specifically, community enforcement can prevail under decentralized information transmission mechanisms which embody the characteristics that each agent in the community has a "label" which is observable prior to each trade, and that an agent's label tomorrow depends only upon his label and action today. Reputation, credit cards and social status are potential examples of such information transmission mechanisms.

This framework can provide useful insights into the organization of trade credit transactions amongst Kenyan manufacturing firms; in particular, it highlights an important role for entrepreneurial ethnicity in explaining access to trade credit. This importance stems from the possibility that the information networks for transmission of "labels" or "reputation" are affected by ethnicity.

Empirical Results

Biggs *et al.* considered the determinants of access to bank overdraft and to trade credit separately. Apart from the explanatory variables – like size, ethnicity etc. – they were able to include a variable denting whether the firm had any collateralizable asset (i.e. title deeds to business premises). This variable was not available in a useful form for all countries in our sample and hence could not be included in the multi-country analysis reported above. In the first Probit model for overdraft they adopted an unrestricted specification that allowed the intercept and slope coefficient for firm size to vary across firms in the two entrepreneurial groups Asian and others (mostly African). As might be expected, both firm size and ownership of collateralizable asset were statistically significant explanatory variables. Furthermore, again in accordance with the theoretical considerations presented above, entrepreneurial ethnicity was completely irrelevant in explaining firm access to formal bank overdrafts: both the coefficients for entrepreneur ethnicity and for its interactive term with size were insignificant. Since the hypothesis of identical slope and intercept for firms in the two ethnic groups cannot be rejected, the same Probit was re-estimated excluding ASIAN and ASIZE (an interactive term of ethnicity and size). The results were quite similar (Biggs *et al.*, table 2, p. 19).

The marginal effect of firm size on the likelihood of access to overdraft is, for example, 0.06 for firms of either entrepreneurial group in the food sector (that own collateral) when evaluated at the sample mean for employment. At the same time, the marginal effect of collateral availability on the likelihood of access to bank overdrafts, at almost 0.40, was larger by a factor of at least six. Clearly, therefore, ownership of collateral was by far the most important variable explaining overdraft access for this sample of firms.

Turning to supplier credit, the length of relationship with the suppliers also varies with the number of suppliers the firm deals with. For the Probit models of access to trade credit, Biggs *et al.* chose the longest reported relationship amongst the primary suppliers of the three main raw materials of the firm. In addition, the frequency of purchases (FREQ) reported by firms also varied among the different suppliers. The regressions used the highest frequency of purchase reported by the firms. The specification used for the Probit for supplier credit was identical to that for bank overdrafts except for the inclusion of FREQ.

The results of the model showed that, unlike bank overdrafts, ownership of collateral had no effect on trade credit access (*ibid.*, Table 3, p. 23). Instead, firm size and entrepreneurial ethnicity were the two important characteristics explaining the likelihood of firm access to trade credit. For example, for firms with no collateral, the difference in likelihood of trade credit access attributable to entrepreneurial ethnicity was 0.11 in the food sector and 0.13 for firms in the textile sector. By comparison, the marginal effect of firm size on the likelihood of trade credit access was much larger, at least for the Kenyan African-owned firms: calculated at the sample mean for employment, the impact coefficient for firm size varied from 0.16 to 0.21 across the different sectors (again for firms without collateral assets).

An important point, however, emerging from the analysis was that the statistical significance of the interactive term (size × ethnicity) implied different slope coefficients for firm size depending upon the ethnicity of the entrepreneur. In particular, using the relative magnitudes of the coefficients of SIZE and the interactive term in the estimated model clearly show that firm size had relatively little impact on the likelihood of trade credit for Asian-owned firms. For example, for such firms of mean size without collateral, a unit increase in firm size yields an increase in the likelihood of trade credit access by only 0.04 to 0.07 across different sectors. Thus, the marginal impact of firm size was almost three to four times larger for Kenyan–African firms compared to Kenyan–Asian firms.

We can then deduce that ethnicity is a determining factor in trade credit. Most suppliers of materials and other inputs were Asians, and thus belonging to the community was a powerful enforcement factor for the credit extended by suppliers, substituting for collateral in the more formal bank loans. This factor did not work for African owned firms presumably because suppliers and producers belonged to different communities. Thus the access to supplier credit is limited for African firms, and whatever signaling device is available for the credit worthiness of these firms, it is provided by the size of the firm.

The analysis for Kenya thus confirms and clarifies the contrast in the determinants of the access to overdrafts and trade credit, found in the analysis above for the pooled sample of seven countries.

Are Overdrafts and Supplier Credit Substitutes?

The idea that working capital requirements might be alternatively financed by bank overdrafts and supplier credit carry with it the suggestion that firms might be using these sources as alternatives. The result of the last section, pointing to the critical importance of ethnicity in supplier credit, suggests that the test of this hypothesis can only be done properly if we separate the sample of firm by the race of the owner. However, before we pursue this issue we intend to demonstrate the relation between different sources of debt including, supplier credit, overdrafts, and bank loans. To this end, we provide in Table 5.21 the determinants of overdrafts and bank loans. Apart from the explanatory variables used earlier like size, age, ethnicity etc., we have added to the determinants in these models supplier credit in the case of overdraft, and working capital (defined as the sum of supplier credit and overdrafts) in the case of bank loans. Models (I) in the two equations refer to the access to the loan category, while models (II) use the relative value of the relevant variable to sales as the dependent variable.

As Table 5.21 reveals, access to overdraft and supplier credits appear to be complementary, as those with access to overdrafts are significantly more likely to have access to supplier credit. The value of the supplier credit variable in the estimation of access to overdrafts is 0.29 with a standard error of 0.11. Furthermore, those with access to bank credits are more likely to have access to working capital, as the coefficient of working capital in the Probit estimation of bank loans is positive (0.51) and significant. It is interesting to note that these results also hold for the case when the relative value of overdrafts and bank loans are used as dependent variables. It should also be emphasized that the addition of the additional variables, like supplier credit in the case of the Probit model for overdrafts, or working capital in the case of the model of bank loans, does not in any way modify the importance of the other determinants of bank credit analyzed earlier. For example, the earlier result that access and use of overdraft increase with firm size remains unchanged in the expanded model. The larger the firm size the more is its ability to make use of overdraft, and so is its ability to use bank loans. But the interesting point is that those firms which have greater access to overdraft or bank loans are also those with better access to supplier credit and the sources of working capital irrespective of firm size.

Table 5.21: Are Supplier Credit, Overdraft Facility, and Bank Loans Complementary or Substitute?

	Overdraft (I)	*Bank Credit (I)*	*Overdraft (II)*	*Bank Credit (II)*
Constant	−0.70 (0.31)	−3.20 (0.37)	−0.73 (0.10)	−0.12 (0.02)
Ln(Size)	0.21 (0.04)	0.28 (0.04)	0.10 (0.01)	0.01 (0.002)
Ln(Firm Age)	0.12 (0.06)	−0.06 (0.06)	0.01 (0.02)	−0.003 (0.004)
Ln(MEXP)	0.05 (0.07)	0.18 (0.08)	0.02 (0.02)	0.01 (0.004)
Ln(MEDUC)	0.23 (0.12)	0.60 (0.15)	0.05 (0.04)	0.03 (0.01)
Africa	−0.43 (0.13)	0.30 (0.13)	0.02 (0.04)	0.01 (0.006)
Supplier Credit	0.29 (0.11)		0.35 (0.11)	
Working capital		0.51 (0.13)		0.003 (0.001)
Observations	1017	1017	1017	1017
Log-Likelihood	−426.01	−431.17	−326.10	−164.29

Note: The numbers in parentheses are standard errors. Model (I) refers to *access* to overdrafts or bank credits whereas, model (II) refers to the relative value of overdraft or bank credit. Industry and country dummies are used in all the regressions but not reported.

Does this proposition hold if we separate the samples by ethnic groups particularly by African and non-African ownership? It has been hypothesized in the earlier discussion that the threat of community sanctions in case of default is an important factor in the availability of trade credit. Communities with a longer history of business dealings would be more likely to find suppliers within their own community for material inputs and enforceability of trade credit contracts would be stronger.

African managed firms have generally less ability to tap this source of funds and hence would tend to work harder for trade credit the less the availability of bank overdraft. It can be hypothesized that such firms would show more substitution as between different sources of working capital. If this hypothesis holds, the re-estimation of the model of Table 5.21 for African and non-African firms should yield qualitatively different results.

In Table 5.22, we re-estimates the models for overdrafts, both access and value as the independent variable, for African and non-African firms separately. Interestingly, the coefficient of supplier credit in both estimations of access to overdrafts and value of overdrafts is positive and significant for non-African firms. However, these corresponding coefficients albeit positive are much smaller and non-significant in both cases for African firms. These results, to a very good extent, confirm the earlier hypothesis that the African firms are more likely to use different sources of working capital as alternatives whereas the non-African firms are not obliged to do so and hence these sources are found to be complementary.

Table 5.22: Are Supplier Credit, Overdraft Facility, and Bank Loans Complementary or Substitute? African versus Non-African Owners

	Overdraft (I) African Owner	*Overdraft (I) Non-African*	*Overdraft (II) African Owner*	*Overdraft (II) Non-African*
Constant	−2.22 (0.43)	−2.97 (0.61)	−5.49 (1.86)	−1.53 (0.36)
Ln(Size)	0.38 (0.06)	0.38 (0.06)	0.58 (0.22)	0.10 (0.03)
Ln(Firm Age)	0.06 (0.09)	−0.03 (0.10)	0.78 (0.36)	0.08 (0.06)
Ln(MEXP)	0.21 (0.10)	−0.10 (0.15)	0.75 (0.44)	0.14 (0.09)
Ln(MEDUC)	0.20 (0.17)	0.51 (0.26)	1.27 (0.71)	0.08 (0.15)
Supplier Credit	0.15 (0.17)	0.72 (0.21)	0.09 (0.78)	0.98 (0.39)
Observations	503	514	503	514
Log-Likelihood	−180.31	−206.68	−518.28	−243.8

Note: The numbers in parentheses are standard errors. Model (I) refers to access to overdrafts or bank credits whereas, model (II) refers to the magnitude of overdraft or bank credit. Industry and country dummies are used in all the regressions but not reported.

Summary and Conclusions

Firms with no Outstanding Debt

The first major and surprising finding is that a large number of firms had no debt at all or low debt-sales ratios. In fact, overall, about 43.7% of all firms reported no debt at all, a ratio that is as high as 64% in Tanzania and as low as 24% in Zimbabwe. Furthermore, a large majority of the firms with positive debt in all seven countries had low debt-sales ratios of less than 0.4, and except in the case of Cameroon and Zambia, the larger part of the *amount* of debt was also held by firms with debt-sales ratio below 0.4. This scenario contrasts with that found in developed countries, e.g., the United States. For example, Cavalluzzo (1999), using National Survey of Small Business Finances for the US in 1993, found that even excluding all other sources such as suppliers credit, more than 62% of 4,570 surveyed firms reported outstanding loans with more than 80% of the loan owed to the commercial banks.

The finding is reinforced by the result that the proportion of firms in the sample that were *not* credit constrained was over 60% for the whole sample, and as high as around 80% in Kenya and Zimbabwe (even when we included some of the "discouraged borrowers" in the credit-constrained group). This proportion, however, decreases to about 50% for micro firms and increases to more than 80% for large firms.

These results are surprising when they are set against the responses of managers who were asked to score the relative importance of different classes of factors which affected their firm's operations adversely. When asked to rank the factors which were obstacles to firm expansion, credit constraint clearly and emphatically came out to be the most important in all countries, and in all size groups of firms separately (see Chapter 7). With reference to current performance, "lack of working capital" was scored as one of the two most important obstacles to capacity utilization, the other factor being "lack of demand," which scored only slightly higher. Again the result held across countries and across size groups.

One explanation for this apparent discrepancy is that, in responding to the questions on credit, firms had the existing institutional structure in mind. Thus when they replied that they did not need a loan, they probably thought of the conditions under which they might be able to obtain a bank loan. It does not mean that their demand for credit was satisfied, or that such demand would not become "effective" with a more extensive set of sources of finance.

There is evidence, in fact, particularly in the case studies of firms that the financial structure is inadequate to serve the needs of even formal structure firms. In the sample of the RPED studies, Zimbabwe is probably better off in terms of financial development than many of the other countries. Yet the case studies on Zimbabwe concluded:

> Zimbabwe commercial banks are hardly involved in lending to manufacturing firms other than on short-terms. To access medium to long-term finance, firms must turn to other sources i.e. finance houses, merchant banks, and development banks. Many of them typically economize on screening and monetary costs by focusing on a few, large-scale investment projects. As a result, medium and long-term loans tend to go disproportionately to large firms who can justify large enough investments. Smaller long-term investments typically fall by the wayside and have to be financed out of retained profits or short-term credit.[11]

Relative Importance of Loans, Overdrafts and Trade Credit

Bank loans are typically given for five years and as we saw only 16% of all the sampled firms in the seven countries made use of such loans, and another 7% availed of loans from non-bank institutions. As a proportion of total debt (of all maturities) bank loans ranged from a low of 5–6% in Côte d'Ivoire and Zambia to around 30% in Cameroon, Ghana and Tanzania.

Bank overdrafts and trade credit – which meet the need for working capital – together account for a much larger share of total debt. In contrast to the evidence from Asian economies informal loans constitute a very small part of the total debt, even for micro and small firms.

The evidence surveyed in this chapter suggests that the flexibility in the use of overdrafts and trade credits make them a more desirable form of financing than long-term loans. The value of collaterals needed for bank loans is often very high and the fixed assets needed for the collateral are not often available for small or medium sized firms.

We analyzed the determinants of the probability of obtaining different types of financing in the sample surveyed. The size of the firm as measured by employment and the race of the owner are the most interesting variables which had pervasive effects on the ability to borrow.

Firm Size as the Determinant of the Ability to Borrow

The size elasticities of the probability of receiving bank loans, overdrafts and trade credit were 0.32, 0.39 and 0.27 respectively for the pooled sample. The strong positive value of all three elasticities contradict any hypothesis about different types of credit being substitutable for one another in different size classes of firms. In fact we tested specifically the possibility that short-term borrowing (overdrafts and trade credit together) might be a substitute for bank loans, or, alternatively, trade credit might be

[11] RPED: *Enterprise Finance in Zimbabwe,* April 1995, pp. 76–77.

a substitute for overdrafts, by including this variable in our Probit equations for bank loans and overdrafts. The interesting result was obtained that, while the size elasticity remained positive in all cases, the additional variables were also significant. That is to say, even after controlling for firm size, those firms which were able to access bank loans were also more able to access short-term funds, and those who were able to access overdrafts also had greater probability of using trade credit. Furthermore, this complementary relationship between different types of credit was revealed not just with respect to the ability to access the loan type, but also with respect to the relative value of the different types of loans utilized. Again the relationship was significant irrespective of the firm size (Table 5.21). Evidently there are some other characteristics of firms which make them favorable borrowers for all types of credit, over and above the dominant effect of size.

The positive relationship between firm size and trade credit found in the analysis unfortunately discredits the optimistic views embodied in the trade credit multiplier. The hypothesis based on some scattered evidence on data from industrialized countries suggested that while formal financial institutions found it difficult to lend to small firms for a variety of reasons, the deprivation of small firms is probably exaggerated. Large firms do get the bulk of the credit available, but then financial resources are transferred disproportionately to small firms in the form of trade credit granted. Our results suggest that this is not so. In fact more recent and complete data on the finance of small businesses (quoted on p. 133) suggests that the positive relationship between firm size and trade credit is also observed in a major industrialized country like the United States.

Race as a Determinant of the Ability to Borrow

It has often been hypothesized on the basis of superficial evidence that minority-owned firms, black Africans in Africa, and African-Americans along with Hispanics and females, are discriminated against in the credit market. One problem with the testing of this hypothesis is that minority-owned firms are often small, and hence the apparent discrimination is really the size effect summarized in the previous sub-section. The analysis of the access to bank credit in this chapter showed that the introduction of the size variable in the Probit equation, reduced the importance of the race factor by half, but that it still remained significant at a 5% level of probability (Table 5.7). There is, however, another point mentioned in the literature which has to do with the demand for loans. If the minority firms' demand for loan is greater, and if they are not discouraged enough to apply, we can normally expect a larger proportion of the applications to be rejected for such firms. This is indeed what we find in the pooled sample of RPED countries. It is seen that even after controlling for size, the probability of the decision to apply for a loan is higher for African-owned firms by as much as 43%. The probability of approval of loan is also higher for such firms, but not by as much as the decision to apply. This factor, together with a somewhat higher incidence of "discouraged borrowers" in the African sub-sample gives the result that African firms are more credit constrained – after controlling for size. We conclude that the basis for discrimination in the credit market for Black Africans in the RPED countries is *not* due to overt discrimination on the part of banks or other financial institutions. It has to be sought in other aspects of the capital market which have reduced the internal financial resources of potential entrepreneurs. Black firms are born small and stay small and are generally outside the domain where the credit market could play a positive role. An interesting distinction with the case in the US is observed. Analysis of the data set from the Survey of Small Businesses shows that the demand for loans is much higher for black-owned small firms, but that this demand is not translated into the decision to apply. Evidently the incidence of discouraged borrowers is much higher among African-American entrepreneurs in the US.

Turning to short-term loans, black firms in the RPED countries have substantially lower probability of obtaining both overdrafts and trade credit. But while the race impact on overdrafts is seen to be entirely a firm size effect (its significance is wiped out when we include the size variable), it remains significant and strongly negative for the trade credit equation even after the inclusion of firm size (Tables 5.10 and 5.17). The discussion in the last section of this chapter focuses on the critical variables that affect access to overdraft versus trade credit. In particular contract enforcement for overdrafts and trade credit is different. While banks providing overdrafts can and do use collaterals of various kinds, it emerges that communal enforcement mechanisms are of critical importance in trade credit transactions, particularly in societies where enforcement of contracts through legal processes is underdeveloped and time consuming. Africans have a much shorter history in the growth of businesses than Asians in East Africa, for example. Thus African firms are most likely to depend on their supplies from Asian businesses. The threat of community sanctions which exist in the case of default will be important for Asian firms but much less so for African ones. In the last model in Table 5.22 we investigated the complementary nature of the two sources of short-term finance – overdrafts and trade credit. A clear racial difference emerges in the estimated model. For non-African firms those more likely to get overdrafts were also likely to get trade credit. But for the African firms this complementarity was absent. African managed firms have generally less ability to tap trade credit, and hence would work harder for it the less the availability of overdrafts.

6 Labor as a Factor of Production

There has been a myth established in the literature of sub-Saharan economic development that the artificially high price of labor in the formal sector of its economies has been a major problem for the development of industry and other productive activities located in this sector. A supplementary complaint has been that labor legislation has not only helped to maintain high wage levels for the “labor aristocracy” in this sector, but has introduced rigidity in the use of labor by rigid rules protecting the security of tenure of labor.

An extensive discussion of this issue, together with other relevant aspects of labor in the African formal sector, is to be found in a recent book published by the authors *Wages and Employment in Africa* (2002). This chapter will present some salient results from the research reported in this book to highlight the more important aspects of labor as a factor of production on formal manufacturing in sub-Saharan Africa.

The stereotype of African economies with large and growing rural–urban income differentials was established early in the development literature soon after these countries gained independence. In fact the two different aspects of this stereotype – often confused – ought to be kept separate because they refer to different responses to the political economy of post-colonial Africa.[12] The first is the large disparity in the levels of income or GDP per capita generated in the urban and rural economies, and the second, is the high urban wage relative to the alternative earnings of labor in the rural areas. The former is the direct outcome of decisions affecting investment, public expenditure and taxation, which impinge differentially on the urban and rural sectors. The latter has to do more specifically with the functioning of labor markets, and institutional influences affecting the wage structure in the urban, more specifically, the urban formal sector. The existence of the first phenomenon might be a necessary condition for the second, but certainly is not a sufficient

[12] This is one of the reasons for the confusing parts of the argument in Jamal and Weeks (1993) in their otherwise excellent effort.

condition. At the same time the non-existence of the second does not imply the absence of the first condition.

Although these are separate issues, a great deal of writing and policy analysis have veered towards the rural–urban wage gap issue even when ostensibly discussing the wider problems of development in the urban and rural sectors. As Jamal and Weeks wrote:

> The crucial "price distortion" in sub-Saharan African countries was the unskilled urban wage. If not the cause of all imbalances in the economy, it came to be viewed as at least the most fundamental distortion. On the production side it induced capital-intensive techniques, which were inefficient in and of themselves and retarded the growth of employment, while on the other side of the labor market it was the main cause of rural-to-urban migration, which provoked a variety of ills (Jamal and Weeks, p. 48).

Trends in Wages in African Manufacturing

The myth of high wages was clearly established during the period of rising wages in the first two decades of the post-colonial era. The resultant increase of wages was popularly considered to be a costly "distortion" because the causes of the wage increase were imperfectly understood. Wages, however, have been on a declining trend for the best part of the last three decades, but the perception of high wages in the formal sector persists because of the apparent large gap in earnings between the former and the rural sector, between the formal and the informal sector within the urban labor market, and even between small and large firms within the formal sector. Again the myth of high wages has been sustained by less than adequate research into the causes of these differentials.

The Era of Rising Wages

The decade or two after independence there was an attempt to push up wages in the formal sector in many African countries. The instrument of ensuring the wage push was the minimum wage which was revised upward at regular intervals.

In 1967, A.D. Smith, using available ILO data, reviewed the trends in real wage levels in developing countries during the period 1956–64. His analysis was confined to the manufacturing sector "to cover as many countries as possible on a comparable basis" (Smith, p. 3). Smith summarized his results as follows:

> The most striking feature of the wage league given in Table 1 is the tendency of the thirty-one countries to fall into regional groupings. Four of the first fourteen countries at the head of the table are African, and as many as five of the following six countries are in Central America and the Caribbean. At the other end of the table, Far Eastern countries occupy the last four places; while four of the next five places are occupied by countries of South America (Smith, pp. 6–7).

Smith also included available statistics on the annual growth rate of consumer prices in addition to the real GDP per capita in the tables for individual countries. The experience of the African countries (Tanzania, Nigeria, Southern Rhodesia, Zambia, and Kenya – with the annual percentage real wage increase ranging from a low of 3.8% for Kenya to 12.3 for Tanzania – stood at as being altogether different from that of the countries in other regions. In the first four of the five countries mentioned real wage growth was 4 to 5 times higher than their GDP per capita. In other regions, only two countries – Colombia and the Dominican Republic – had a similarly high rate of increase in real wages, which actually exceeded their GDP per capita. All the other countries in America and Asia witnessed a real wage increase close to or even below their per capita GDP growth rate. Smith further noted: "Whilst both the country and time coverage is limited, observers of the African scene believe that large increases in real wages are not confined to a small number of African countries nor to the periods for which changes are measured in the table" (Smith, p. 31).

The high wage policy was misunderstood by casual commentators as being a purely political decision of the young post-colonial administration wanting to curry favor with urban trade unionists. There was a major economic objective behind the state-supported policies of raising wages. This was the desire to change the labor system from one dependent on the migrant labor system to one making use of stabilized labor, settled in the urban location. Observers of Africa had long argued that the wage level in towns was high enough to attract only temporary migrants who considered their rural farm as the principal source of their life-time income. Therefore, families were left in the rural areas to carry out agricultural work in the absence of the single individuals (usually males) who were hired to work in towns for short spans of time. This type of labor system was judged to have been responsible for the low productivity of African labor in industry. Several high level official Commissions, appointed by the Colonial government, had endorsed this conclusion even before the dawn of independence (see Mazumdar and Mazaheri 2002, Chapter 7 for further details). Since the impact of high wages on productivity would only be felt after a time lapse, and furthermore would be forthcoming only if all employees had to pay higher wages in order to attract stable migrants, a strong case could be made for the state to implement a high wage policy through minimum wage legislation.

Apart from the productivity augmentation factor, there were serious discussions based on equity in favor of the high wage policy. Migrant labor, working only in urban industry in a temporary capacity, was not in a position to acquire the skills necessary to move up in the occupation hierarchy. As a result, skilled labor was recruited largely from expatriates and non-African sources and it benefited from monopoly rents, which led to a highly skewed distribution of earnings in the industrial sector. The political realities of this Colonial system of administration no doubt exaggerated this phenomenon. It would be reasonable to assume that the newly independent governments were induced to change this labor system.[13]

It should be clear that in so far as the wage increase achieved its purpose of raising efficiency proportionately, it could not be considered a distortion, inflating labor costs above alternative occupations. Of course, an important implication of promoting higher efficiency per worker through higher wages was that the rate of growth of employment in terms of numbers of workers would be reduced, since the immediate impact on output growth was likely to be limited. This is indeed what we find in terms of the limited job creation in the formal sector in this period.

Evidence on increase in labor efficiency in response to the high wage policy is not directly available for this period. It is clear, however, that the policy did achieve its purpose in stabilizing the labor force. The rate of turnover fell drastically. In fact, it is possible to argue from the evidence in Kenya that the increase in wages might have overshot the mark. Data produced by Collier and Lal (1980, p. 180) show that the incredibly high turnover rates of the early 1950s might have been reduced drastically by the end of the decade. The high wage policy was not, however, abandoned until later in the 1960s.

The Era of Falling Wages

The era of high wage policies came to an end in most countries in the late

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[13] Indeed in a well-known text on development, Professor Hla Myint described this maldistribution of the surplus created by modern technology as the crucial problem of "underdevelopment."

1960s or early 1970s. In Kenya, for instance, the "income policies" introduced in the late 1960s were most concerned with Industrial Courts setting guidelines for containing wage increases. With the removal of state support for high wages, market forces exerted a serious downward pressure on the wage structure, which had quite likely been elevated significantly above the level required to change the migratory labor system and achieve a stable labor force for urban industry. Thus in spite of average GDP growth rate being in excess of 4% per annum, real average earnings in the 1970s declined in Kenyan manufacturing at the rate of 3.8% per annum, slowing down to a decline at 2.2% in the 1980s.[14] The rate of wage decline was much more pronounced in some other countries which entered a phase of GDP decline. Ghana, Tanzania, Zambia and Sierra Leone are examples of drastic fall in formal sector real wage.

Although international organizations like the International Labor Organization (ILO) and the United Nations Industrial Development Organization (UNIDO) have been trying to put together wage series for a number of years the sample is not large enough to give a statistically accurate idea of the time-trend in wages and the dispersion round it for sub-Saharan Africa. The evidence, admittedly based on a limited sample for the SSA, has been analyzed in Mazumdar and Mazaheri (2002), chapters 4 and 5.

The wage decline seemed to have been fairly widespread among the countries of the SSA region. The only exceptions are Mauritius and Botswana (in the 1970s and 1980s) – the two countries with a record of vigorous growth, and Zimbabwe in the 1970s (before wages started a downward trend beginning in the early 1980s).

The declining trend seems to have continued in more recent years into the 1990s. The following table gives a flavor of the more recent wage movements, and sets the African experience in the context of other regions of the world. It is seen that the Africa region is unique in having an experience of widespread declining wages in manufacturing – a phenomenon that has continued since the early 1970s.

The wage decline was not due to actual cuts in nominal wages. Rather, as suggested by the figures in Table 6.1 the real wage decline was due to nominal wage increase not keeping up with the rate of inflation.

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[14] All the statistics referred to here are from Mazumdar and Mazaheri (2002), particularly chapters 4–5 and 8–10. The original sources are given in this volume.

Table 6.1: Growth in Real Wages in Manufacturing since 1988 (Annual Percentage)

	Growth in nominal wage	*Growth in CPI*	*Real wage growth*	*Data available*
Africa				
Botswana	8	11	−4	88–97
Egypt	9	12	−3	88–95
Ghana	16	22	−6	88–91
Kenya	9	17	−8	88–91, 97
Malawi	7	27	−20	88–95
Mauritius	13	8	5	88–97
South Africa	14	13	1	88–93
Zambia	17	24	−7	88–90
Average			−5	
Latin America				
Argentina	23	18	5	90–96
Chile	15	13	2	88–92
Columbia	24	23	1	88–95
Costa Rica	19	17	2	88–97
Dominican Rep.	18	19	−2	88–95
El Salvador	12	13	−1	88–96
Guatemala	16	15	0	88–97
Mexico	16	18	−2	88–92
Panama	6	1	5	88–94
Puerto Rico	4	4	0	
Average			0.6	
Asia				
India	3	10	−7	88–95
South Korea	13	6	7	88–97
Pakistan	7	5	1	88–90
Philippines	11	11	1	88–95
Sri Lanka	12	11	1	88–97
Thailand	8	5	3	89–97
Average			1.5	

Source: International Labor Office (ILO), *Yearbook of Labor Statistics*, various years.

Wage Flexibility and Labor Market Institutions

The history of wage decline clearly suggests that real wages in sub-Saharan Africa are not rigid, as might have been concluded from the era of wage fixing by minimum wages and other government machinery. There is a more fundamental reason for thinking of the African model as one of flexible wages. Labor market analysis has come to recognize that the greater the power of "insiders" (i.e., those already in employment in the existing firms in the sector), the more the wage level is divorced from the alternative earnings of labor of those not employed in the sector (the "outsiders"), and more is the rigidity of wages observed in the sector. Research reported elsewhere suggests that the Africa region, compared to other regions of the world, has in recent decades shown very little power of the insiders in the formal manufacturing sector.[15]

A decomposition model has been developed and applied to the time series of average wages, value added, employment and the relative prices of producer and consumer goods in the manufacturing sector of different regions of the model. Briefly, the argument of the model is as follows.[16] Given the rate of growth of value added in manufacturing, and the trend in the share of wages (which is technologically determined to some extent), the growth in wage bill gives us an increase in output which can be divided between employment increase and wage increase. Since in developing countries, trends in producer prices in manufacturing could diverge substantially from those of consumer prices, a correction has to be made to determine the growth of the wage bill in real terms. Thus if consumer prices increase faster than producer prices, the real wage bill growth from the workers' point of view will be lower than that calculated at constant producers' prices. Countries and regions differ in the way labor market institutions work to allocate the growth rate of real wage bill between employment growth and wage growth. If the insider power is strong much of the increase in the wage bill is taken in the form of rising real wage. This seems to have been the case of many of the OECD countries in the 1970s and the 1980s. The South-East Asian countries, which had the highest rate of growth of output (value added) in manufacturing generally divided the growing cake equally between employment growth and wage increase. In our sample of SSA countries, for which sufficient data was available, the output growth was not particularly low, exceeding that in the Latin American and Caribbean (LAC) region in both the 1970s and the 1980s.[17] However, SSA suffered from an adverse trend in the ratio of consumer

[15] See Mazumdar and Mazaheri, Chapter 5. For further discussion of comparative international experience, and of relevant labor market theories see Mazumdar (2002).

[16] See Mazumdar and Mazaheri (2002) Chapter 5. For more details, and a discussion of relevant labor marker theories, see Mazumdar (2002).

[17] The need to have adequate time-series of all the relevant variables meant that only eight SSA countries could be included in our sample: Botswana, Ethiopia, Kenya, Mauritius, Swaziland, Tanzania, Zambia and Zimbabwe.

prices to producer prices, thereby reducing the real wage growth in *real terms* below the output growth. The trade off between employment and real wages in the two decades was exactly the opposite of the OECD experience. In both decades the region leaned towards supporting a positive employment growth. Given the limited growth of real output this could only be done at the cost of a significant *negative* trend in real earnings per worker. Thus the African experience suggests a labor market experience which favored expansion of new jobs rather than the protection of the wage levels of those already in employment.

What explains the shift to an "outsider"-oriented employment policy, moving away from the high-wage policy of the 1960s? Clearly the stage was set by the basic revision of public sector wage policy. In the first decade after independence African governments raised wages in the public sector for native workers partly in response to mitigate the inequities of the colonial wage structure. This was done even as employment was expanded rapidly in the public sector. Governments, as a result, came rapidly against budget constraints which have to be relieved by slowing down employment and/or wage growth. The political realities of the situation dictated that employment should get priority, even if it meant a negative trend in wages. The public sector's presence in manufacturing, of course, was limited in SSA countries. Parastatals accounted for a sizable but small part of total manufacturing employment in most countries. Nevertheless, the change in the wage policies affecting public employment affected the approach to the employment–wage trade off throughout the economy, especially when there was such a sharp reversal of the policies of wage setting institutions.

The private sector was induced to go along with the new direction of the public sector presumably because the wage hikes of the previous decade had resulted in wage levels set well above the levels needed to achieve a stabilized labor force. Firms were obviously operating in that part of the wage–efficiency curve, when they could save in net wage costs by reducing the real wage of the existing workers and compensate for any small reduction in efficiency by hiring more workers.

Inter-sectoral Differences in Wages

The question arises: if the persistent fall in wages over the last two or three decades in the formal manufacturing sector had brought wages down to competitive levels, what explains the large inter-sector differentials which were still to be seen after the wage decline? There are three key differentials that are relevant here. First, the rural–urban earnings gap. Second is the differential in earnings between the formal and the informal sectors in the urban labor market. Third is the wage differential by firm size, which we shall see, is such an important part of the labor market scene in the manufacturing sector.

The Rural–Urban Earnings Gap

In many countries of SSA, particularly in East and Southern Africa, the level of earnings in the urban areas appear to be at a much higher level, even after the prolonged decline in wages in the urban formal sector. Data gathered by the ILO show that in 1991 the ratio of average earnings of full-time wage employees in manufacturing relative to agriculture ranged from 2.65 in Botswana to 2.71 in Kenya, 3.51 in Malawi and 4.66 in Zimbabwe. Can we then say that wage levels in the urban economy are still well above the alternative earnings of labor, many of whom come as migrants from the rural sector? Detailed work has been done on Kenya (*op. cit.,* Chapter 7). Since the wage sector is only a small part of the labor market, it is better to compare the incomes of all households in the rural and the urban sector.

The predominant form of employment in the rural economy is own-account workers in farms. Since the income accruing to the family farm is most likely pooled together, it is difficult to separate out the individual earnings of each household member contributing to the earning strength of the family. The only way of getting at the earnings level of this large segment of the labor force is to consider the total family income – a statistic, which can be only collected by household surveys. We can, then, consider the *average* income per earner or per capita of rural households, as seems relevant in terms of the discussion below.

An added difficulty is that rural family income is not strictly labor income, but includes income accruing to capital and land owned by the family. Conceptually, economists would argue, comparison needs to be made between the labor earnings of rural and urban workers, since it is always possible for the former to sell off the land and capital they own if they are contemplating moving to wage employment in the urban areas. This textbook argument, of course, loses its significance if the market for land is limited in rural economies, as indeed is the case in much of Africa. This is specially so in the smallholder sector of the rural economy as distinguished from plantations.

The comparison of household incomes in terms of the various possible measures are given in Table 6.2 as calculated from Household Surveys in urban and rural Kenya during 1986–88. Allowing for a cost-of-living adjustment of 15% to bring the urban figure of 1986 to the level of the rural figure of 1988, and also allowing for a higher cost-of-living in town to the extent of 60% (Collier and Lal), we can attribute 45% of the difference in favor of the urban sector to be due to cost-of-living differences. Thus there is still a considerable amount of difference to be explained. Most important, we have to decide if we should accept the much larger difference in terms of income *per capita* or *per Adult Equivalent Unit* than the lower *per earner* difference in coming to an assessment of the real economic gap between the two sectors.

Table 6.2: Ratios of Household Income in Urban and Rural Areas, Kenya (1988)

	Nairobi/Rural			*Other Towns/Rural*			*All Urban/Rural*		
	Mean	Median	Q1	Mean	Median	Q1	Mean	Median	Q1
Household Income	3.32	2.33	3.17	2.43	2.02	2.67	2.78	2.18	2.83
Per Capita Income	5.29	5.25	5.41	3.69	4.30	3.78	4.33	4.73	4.54
Per Earner Income	2.48	2.08	3.22	1.86	1.83	2.63	2.11	1.97	3.00
Per AEU Income	3.64	3.16	3.81	2.63	2.77	2.85	3.04	2.96	3.21

Notes: (1) All households with zero income have been excluded. They are 8.90% of surveyed households in Nairobi and other towns, and 31.76% of households in rural area.
(2) Earners are defined as positive income household members in urban or rural areas. Their income sources are paid employment or self-employment or family business. Unpaid family worker is not considered as an earner.
(3) Adult equivalent unit for each household is calculate in the scale of 0.25 for below 6 years old, 0.5 for between 6 and 15 years old, and 1.0 for over 15 years old for urban area. The AEU of rural households is derived from the scale of 0.1 for below 10 years, 0.5 for between 10 and 15 years old, and 1.0 for ages over 15 years.

That the per capita income difference is larger than the per-earner difference is obviously because the dependent–earner ratio is larger in the rural areas. The dependent–earner ratio, of course, should vary with the age of the household. At younger ages as the principal earner establishes a family the dependency ratio is low, but increases as non-working mothers and children are added to the household. Thus one reason why the dependency ratio in urban Kenya is lower might be because of the greater prevalence of young migrants in the city. However, the data given in Table 6.3 clearly demonstrates that this is not the only reason for the rural–urban difference. The table tabulates the dependency ratio by the age of the principal earner in the household for three sectors: the capital Nairobi, other towns and the rural areas. The dependency ratio in the rural households increases with age as anticipated, but it increases only slightly in other towns, and hardly at all in Nairobi. Even for mature households the dependency ratio is substantially lower in the urban areas.

Table 6.3: Average Dependent/Earner Ratio of Households by Age Group of the Principal Earners

	Nairobi Dep/Earner Ratio Mean	*Other Towns Dept/Earner Ratio Mean*	*Rural Area Dep/Earner Ratio Mean*	*All Dep/Earner Ratio Mean*
20 <= AGE < 25	1.09	1.18	1.32	1.24
25 <= AGE < 30	1.06	1.03	1.51	1.31
30 <= AGE < 35	1.02	1.08	1.74	1.54
35 <= AGE < 40	1.04	1.11	2.21	1.95
40 <= AGE < 45	1.01	1.14	2.65	2.33
45 <= AGE < 50	1.04	1.25	2.59	2.34
50 <= AGE < 55	1.25	1.16	2.67	2.45
55 <= AGE	1.26	1.47	2.41	2.36
ALL	1.06	1.14	2.28	2.03

Note: Data for Nairobi and other towns are from 1986, for rural areas from 1988.

This situation existed in urban Kenya at the end of the 1980s clearly because the income levels were not high enough to attract a substantial number of migrants who could settle in town and form a mature family. The urban earnings were sufficient to attract either temporary or circulatory migrants who spent only a limited amount of time or their working life in town, or those who had split the family between town and city. In fact a comparison of household size in the 1978 and the 1986 surveys showed that the median household size in both Nairobi and other towns had declined from 5 to 3 over the period of the two surveys. The household surveys did not probe the issue of households straddling both the rural and the urban areas. But it should be clear that in any meaningful comparison of the rural–urban wage gap the cost of maintaining dependents in the rural areas must be deducted from the urban income of households with a seemingly higher per capita income.

The crux of the argument is that from the point of view of a potential rural migrant hoping to form a stable family in town, it is the differential in the income per earner which is relevant – not the higher differential generated by a lower dependency ratio of town due to the inability of migrants to settle permanently in town. Income per earner was around 100% higher in town. As already explained, perhaps 45% of this could be explained by cost-of-living difference. The remaining part of the differential could be explained by differences in labor skills and cost of migration. We conclude that if we take the nature of rural–urban migration and the adjustment of households into account, the apparent large urban–rural difference at the end of the 1980s disappears.

Intra-urban Wage Differentials: Effect of Enterprise Size

We have so far discussed the level of earnings in the urban economy as a whole relative to that in the rural sector. There are, however, wide differentials in earnings within the urban sector, even after we allow for observable differences in the quality of labor, i.e., education, experience and any other measures of skill. Even if we confine ourselves to manufacturing, there is, first, a gap in earnings between the informal and the formal sectors, the demarcation between the two being drawn at the level of enterprises employing a minimum of wage workers, typically 5 or 10. The informal sector comprises mostly self-employed working in craft shops, helped by a few, often casual, workers. But even within the formal sector, wages go up with the size of enterprise.

Detailed analysis of the RPED data sets showed that the size of the enterprise was an important determinant of the level of earnings in African manufacturing in seven countries, after controlling for measurable human capital factors (*op. cit*., Chapter 14) This result is in keeping with other studies of wage labor markets in developing countries. The positive relationship between enterprise size and wage levels has also been noted to have been a feature of labor markets in advanced industrialized countries; but the quantitative dimensions of the size related difference are altogether different in developing countries. Idson and Feaster (1990) arranged the US census of Population data into fives size groups: 1–24 workers, 25–99, 100–499, 500–999, 1000 and more. The size effect of earnings for the four larger groups relative to the smallest was (in percentages) 7.9, 16.4, 19.8, 23.8 respectively. In the analysis of earnings from the RPED data set, the size groups were slightly different: Micro 1–9, small 10–49, medium 50–199, large 200–499, very large 500 and more. However, even a cursory look at the magnitudes is enough to convince anyone that the wage differentials found in African countries is several times that reported for the United States. The log difference in earnings of the very large compared to the micro ranged from a low of 0.41 or 0.42 for Tanzania and Kenya to a high of 1.20 for Zimbabwe and 0.92 for Cameroon. It should also be remembered that the earnings-differences for the African countries quoted, unlike the US example, was net of human capital factors (sex, education, experience, industry and location). Similarly, very large differentials in earnings by size groups have been found in other parts of the developing world. The Bombay labor market study reported by Mazumdar (1984) found the spread of earnings from the smallest to the largest size-groups, with roughly the same type of categories, to be 0.67 for manual male workers, after controlling for the human capital differences. (Cf. also Manning for Indonesia 1979; Schaffner for Peru 1994.)[18] The size-related differential has also been of markedly large magnitude in Japan during its process of industrialization (Yosuba 1976).

In the African economies studied, as in developed countries, wages and labor productivity increase with firm size, but in keeping with the evidence sighted above, both wages and labor productivity increase much more with firm size in Africa. This can be seen from data assembled together in table 6.4. In the United States, both wage and output elasticities with respect to plant size seem to have doubled in the 1980s, but are generally nowhere near the magnitudes observed in the African economies.

Table 6.4: The Elasticity of Earnings and Productivity in African Countries and in the United States

Elasticity	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*US*		
								77	*87*	*92*
Earnings	0.27	0.24	0.20	0.17	0.14	0.23	0.25	0.035	0.078	0.075
Productivity	0.36	0.54	0.33	0.32	0.09	0.20	0.25	0.086	0.144	0.172

Source: The elasticities for the African countries are calculated from the RPED data set, regressing the log of average monthly earnings and value added per worker on log size. The United States statistics are taken from Oi (1999). The original sources are from the Censuses of Manufacture. Earnings are payroll per hour productivity is output (shipments) per hour (See Oi, p. 106).

The Impact of Institutional Factors

The conventional view of the pattern of increase in wages and labor productivity with firm size would be that institutional factors, e.g., unionization, become stronger as the size of the enterprise increases. The upward pressure on wages induces greater capital intensity in larger firms, leading to higher labor productivity.

The RPED data contain information on the degree of unionization in the firms surveyed. The information is given at two places. First, in the questionnaire administered to management, the respondents were asked if

[18] Valenchik (1997) gives a convenient summary of the results from some of these studies (p. 313). Note that these wage differences exist for different classes of establishments *within* the formal sector. The difference in earnings between the formal and *the informal* sectors are even larger.

the enterprise had unions. Secondly, the sample of workers who were interviewed were asked if they belonged to unions. The data obtained on these points are given in the following two tables. Unionism is clearly more important in Zimbabwe than in any of the other countries of the Survey. This is true whether we look at the management data responding to unionization in their firms, or workers' indication whether or not they belonged to a union. Again, the Francophone countries seem to be not what the popular image about them is. The incidence of unionism seems to be lower in these countries than in the Anglophone ones.

Table 6.5: Percent of Firms Unionized

	Cameroon	*Côte d' Iv.*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Overall	31.4	23.4	29.7	43.6	39.3	41.2	67.5
By firm size							
Micro	5.3	2.8	2.3	4.5	10.6	2.4	89.7
Small	24.8	22.7	24.5	51.9	42.2	39.3	46.5
Medium	66.1	40.5	81.4	77.0	80.3	82.4	92.0
Large	87.2	43.8	87.9	88.1	93.88	93.9	96.0
Very Large	80.0	58.0	66.7	94.4	100.0	96.2	93.2

Table 6.6: Percent of Workers Unionized

	Cameroon	*Côte d' Iv.*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Overall	19.9	20.5	26.7	31.5	35.1	33.1	41.8
By firm size							
Micro	2.7	2.8	1.7	3.1	9.1	1.9	16.1
Small	18.0	20.8	21.5	41.3	35.8	32.4	31.2
Medium	43.8	34.2	74.3	55.7	71.9	63.8	58.8
Large	49.2	40.0	80.7	60.1	91.3	70.9	53.1
Very Large	32.5	48.3	49.4	71.9	98.5	65.7	57.4

There is a clear correlation between unionism and firm size in all countries. A very large proportion of large and very large firms are unionized, according to the managers, and this is true also of medium firms in all the Anglophone countries. However, if the workers' responses are to be believed, unionism is by no means universal even in the largest firms, except perhaps in Tanzania. The sets of information provided by the managers and the workers are not necessarily inconsistent. In the manager's response, a unionized firm is one in which some, not all workers belong to unions.

The presence of unions need not necessarily augment earnings. In advanced countries it has been maintained that much depends on the welfare function of unions – if they are interested more in the "insiders" who are already in the workforce than in the interest of potential job-seekers. In any event, the presence of unions is expected to ensure a more effective collective bargaining within the firm or enterprise. In many African countries, however, collective bargaining involving only workers and their employers is rather rare, particularly at the firm level. Boards in which the government participates along with representatives of workers and employers more generally take wage decisions. Valenchik confirms this for Zimbabwe, but suggests that "union firms participate in different collective bargaining institutions from non-union firms, so the presence of a union indicates a different institutional environment, and may generate different wage agreements" (1997, p. 320). Whether or not there are clearly distinguished collective bargaining authorities, if there are compensation decisions taken by tripartite bodies at all, the presence of unions can be expected to provide a more articulate and effective case for wage bargaining on behalf of those firms in which unions have a strong presence. While the *potential* for a union effect on wages exists, it is another thing to maintain that this effect is significant. Empirical examination of this effect is rendered difficult because of the close relation already noted between enterprise size and unionism. It is, however clear that unionism is *not* the driving factor behind the phenomenon of wages increasing with size. If this were so, we would find a much stronger size–earnings relationship in unionized firms. Valenchik, however, looking at the first wave of the Zimbabwe survey found that "if we restrict our attention to the 1,265 workers in union firms, the coefficient of ln(size) is 0.147 with a standard error of 0.025, which is slightly smaller than that estimated for the whole sample" (p. 322). At the same time, the union dummy was insignificant when it was introduced into the earnings function along with size. The author also tried to see if the introduction of interaction factors between unions and firm size in the earnings function suggested any effect of unions on particular size groups. The result showed "that unionization does generate some of the size effect in the medium size class, but this effect is not large."

Institutional factors other than unions have sometimes been suggested for the existence of the strong size–wage relationships in African manufacturing. Large firms undoubtedly have a larger representation of foreign-owned or parastatals. To check on the quantitative importance of this factor we estimated earnings functions for the RPED data set, adding enterprise size to the standard control variables like education, experience industry etc. and subsequently adding the ownership variables. The changes in the coefficients of the size-group dummies were in the expected direction when ownership dummies were introduced, reducing the extent of the size related differential. But the effect, although quite perceptible, was not substantial. The net difference in the level of earnings between micro (<10 employees) and very large (>250 employees) firms was reduced by around a fifth (*op. cit.*, Table 14.11, p. 267).

The Importance of Economic Factors

The evidence that the size-wage relationship is so much stronger in Africa, and in other developing countries, suggests that there are important differences in the economic landscape of developed and less developed economies. We think immediately of the less homogeneous quality of labor (not captured by measurable human capital factors) and the larger dispersion of techniques of production in the less developed countries, which causes a much larger increase in labor productivity in bigger establishments with more modern technologies. These two sets of factors interact and it will be argued that the processes of determination of wages and of production are best viewed as part of a simultaneous, joint decision.

The Wage–Efficiency Relationship and Firm Size

The *efficiency–wage* hypothesis argues that a higher wage induces greater efficiency from the worker. Hence, as long as the increase in the supply of units of labor, measured in standard efficiency units, increases proportionately more than the wage per worker, it would reduce wage costs for the employer if he meets his demand for labor units by increasing wages rather than hiring extra labor at the going wage rate. In effect, if this mechanism holds, a profit maximizing employer would set the wage at the point where the cost of a standard efficiency unit of labor is minimized.

The basis for the postulated relationship between wages and the worker's efficiency has been much discussed in the literature. Explanations include better nutrition, incentive and morale factors, and a range of labor market variables like size of good quality applicants, labor turnover rate, cost of shirking etc. (for reviews see Valenchik 1997; Akerloff and Yellen). The wage–efficiency relationship could be observed in firms of any size group. But it has been maintained that it would be more important in larger enterprises, that is to say, the minimum wage-cost point would be established at a higher level, the larger the size of the enterprise. The more important points supporting this hypothesis include:

- The cost of supervision increases with employment size. Hence larger firms, at the margin, would meet more of their labor requirements by increasing wages rather than by hiring more workers.
- Larger firms have more expensive machinery and a higher capital–labor ratio. Thus the cost of labor turnover for them – in terms of output loss when a worker leaves and a new recruit has to be trained – is higher than for smaller firms. Hence they will be willing to offer a higher wage to reduce the turnover rate.
- Since larger firms generally have more complex, multi-stage production processes, the costs of "shirking" and the resultant stoppages in production would be much higher for the bigger enterprise.
- If the quality of labor needed increases with the size and value of the capital equipment, larger enterprises would be offering a higher wage to attract a pool of applicants in which workers of potential quality are better represented.

A second, and perhaps more important factor in the "worker quality" issue, is the formation of skill through on-the-job training. The hypothesis that the cost of producing "superior" labor within the enterprise increases with the *volume* of superior labor needed in large enterprises yields the wage–size relationship directly. This is not an unreasonable hypothesis if the production function of "superior" labor includes some relatively fixed factor of production, specific to the enterprise, which cannot be increased at unchanged cost at the same rate as the total volume of employment. Management or supervisory labor could indeed be such a factor of production.

Profit Sharing: Firms that are more profitable may share part of their profit with the workers as a part of a process that is known as rent-sharing in macroeconomics. In view of this, a positive relation between the firm size and wage differential might be attributed to the fact that bigger firms are more profitable. There are three sources of a larger share of rent in bigger firms. First is the existence of economies of scale. The second is the greater market power of larger firms who are able to charge monopoly prices in the product market. The third is the increase in capital intensity (capital–labor ratio) with enterprise size. The last factor might need some explanation.

It should be noted that the distinction between wage–efficiency and profit sharing factors turn on the *sources* of the wage difference, not on the mechanism of wage formation. More profitable firms are willing to share their larger rent with their workers presumably because of increasing the incentive or morale of workers. From this point-of-view, profit sharing works like efficiency wage. The difference is that while the factors behind efficiency wage originate on the workers' side, the profit-sharing effect originates in the production process.[19]

A couple of models have been suggested elsewhere (*op. cit*., Chapter 15) which tries to sort out the two effects and provide some idea of the quantitative significance of each. The interrelationship implies that the earnings and production functions can only be estimated within a simultaneous system of equations. These can be written as follows:

$$\ln(W_i) = \alpha_1 + f(X_{1i}) + \beta_1 \ln(\frac{Y_i}{L_i}) + \gamma_1 \ln(L_i) + \varepsilon_{1i}$$

$$\ln(\frac{Y_i}{L_i}) = \alpha_2 + g(X_{2i}) + \beta_2 \ln(\frac{K_i}{L_i}) + \gamma_2 \ln(L_i) + \eta_2 \ln(W_i) + \varepsilon_{2i}$$

The following points about this system need to be stressed:

The vectors X_{1i} and X_{2i} represent variables that enter one or other of the two functions to be estimated simultaneously – the former variables such as capital utilization which affect only the production (value added per worker) equation; the latter measured human capital variables which influence earnings.

The employment size variable ln (L) enters both the earnings and the production functions, but it has different interpretations in the two equations. In the earnings function the coefficient of this variable (γ_1) measures the impact of firm size on efficiency wage as discussed above). On the other hand the coefficient in the production function ln(L)'s coefficient(γ_2) measures the impact of economies of scale.

This model allows explicitly for the decomposition of the size effect in the earning function into a direct effect originating in the earnings function, and a productivity effect, working through returns to scale and higher capital–labor ratio, which might lead to higher rents and higher wages.

However, this formulation cannot throw light on the question if the feed-back from the production process to earnings is due to rent sharing or the unobserved quality of labor associated with higher capital intensity. As already mentioned, bigger firms might pay a wage premium to retain

[19] This formulation revises the one given in Mazumdar and Mazaheri, Chapter 15.

workers with capital specific skills that are not captured by the observed human capital components. This means that the choice between the profit sharing and the capital-specific labor quality hypotheses is inconclusive. In other words these two factors in the framework of the model are not identifiable, although the decomposition of the size effect into its components is still achievable.

One way to identify if higher productivity (and rent), as associated with higher capital intensity and the scale factor, might affect earnings is to repeat the estimation for firms with different degrees of profitability. The analysis makes sense only if we assume (to be verified in the empirical work) that the unprofitable firms are not solely concentrated in the smaller size groups and if the capital intensity varies sufficiently for unprofitable firms as well as profitable firms. If the relevant coefficients in the two groups are not significantly different from each other, we can reasonably argue that profit sharing is *not* a serious influence in the outcome. Any significant positive value of the coefficient of productivity in the earnings function could then be ascribed to the "unobserved quality" of labor associated with capital intensity. Alternatively, profit sharing is strongly suggested, if the coefficient of productivity turns out to be more important in the earnings equation for the profitable group.

The reader is referred to the source cited for full discussion of the empirical application of this approach to the RPED data for four countries. Here it is sufficient to summarize the main results. The simultaneous equation system of equation (1) was estimated and the reduced form of these equations enabled us to break down the total elasticity of earnings with respect to firm size into its various components: the direct effect of size (which has been interpreted here as the efficiency wage effect); the feedback effect from the production process on earnings; and further, the components of the feedback into the effect due to economies of scale, and that due to capital intensity. We tested for the profit sharing *versus* capital related quality of labor effect, by breaking down the sample into "profitable" and "unprofitable" firms, as suggested in the last paragraph. It was found that the feed back from the production process was only significant for the profitable sub-sample, thus supporting the profit sharing hypothesis. The final results of the decomposition are given in Table 6.7.

Except for Kenya, a sizable share of the size effect is attributed to the production process and is captured by the capital intensity and the scale effects. For instance, in the case of Zimbabwe 26% of the total size elasticity is associated with the production process, including 21% due to capital intensity and 5 due to the scale effect. Ghana and Zambia also have significant impact of the production function on earnings – 18% and 11%

respectively. Only in the case of Kenya, the production process does not seem to be contributing to the explanation of the earning function and hence almost the entire size effect can be attributed to direct size effect or the efficiency wage effect, as interpreted here.

Table 6.7: Decomposition of the Elasticity of Earning with Respect to Size of the Firm (Percentage of total elasticity)

	Ghana	*Kenya*	*Zambia*	*Zimbabwe*
Direct Size Effect	0.82%	0.99%	0.89%	0.74%
Indirect Size Effect				
Scale Effect	0.03%	0.01%	0.07%	0.05
Capital Intensity	0.15%	0.00%	0.05%	0.21%
Total	100%	100%	100%	100%
	(0.121)	(0.114)	(0.159)	(0.185)

Note: Total elasticity is the elasticity of earning with respect to size as in a single-equation estimation. The absolute value for each country is given in parentheses). The decomposition was achieved by decomposing this elasticity into its components in the reduced form of the simultaneous equations.

The explanation of inter-country differences requires more research. But it is clear from a cursory look at the data that the structure of industry in terms of establishment size does seem to play a significant role. Looking at the distribution of value added by size groups of establishments, Zimbabwe has the one most skewed to the right, with the "very large" (more than 500 workers) accounting for nearly 67% of the total. The corresponding percentage for Ghana, at the other extreme, was 16, with the percentages for Kenya and Zambia being 45 and 41 respectively. At the same time the larger capital use per worker in the very large firms did not produce any decline in capital productivity in the countries with more skewed distribution as compared to Kenya. The value-added–capital ratio in the very large firms was 0.75 for Zimbabwe, 0.78 for Zambia, 0.77 for Ghana – and only 0.48 for Kenya. The higher capital productivity in the large firms in countries other than Kenya translated itself into the higher elasticity of earnings with respect to size attributable to the production process.[20]

[20] An alternative model, in which the efficiency wage effect is measured, not by the impact of the predicted absolute wage, but by that of the residual of the earnings function, is also discussed in the chapter cited.

Labor Market Institutions

The discussion in the sub-sections above have sought to dispel the notion of high and inflexible wages in the formal sector of sub-Saharan Africa as being a major problem of labor as a factor of production for firms in this sector. But how about labor legislation creating rigidities in employment? The most important among these is the importance of public sector employment and job security regulations.

The public sector has a strong presence in the formal sector as discussed in the opening chapter of this book. It grew in importance during the decades of the 1970s and the 1980s, as the private sector in many countries failed to generate growth. The swing away from wage growth to employment growth was also stronger in the public sector in several of the countries in the RPED sample. As the public sector stepped in to provide some employment growth while the growth rate in employment in the formal sector slackened, most countries in sub-Saharan Africa sought to protect employment of those already employed through job security legislation.

It has generally been assumed in policy documents of the international and other organizations that labor laws protecting the employment of those employed in the formal sector had a serious effect on labor costs even in private enterprises. It made firms wary of adjusting their labor force to changing market conditions. By raising the effective price of regular workers, firms were induced to employ a larger proportion of the workers as casual workers, but this practice did not nullify the costs of regulation completely. Since the skill formation among the workers who could not be given long-term contracts was of a significantly lower order, the labor cost would still be higher than otherwise. Even if the enforcement of labor regulations were incomplete, the cost of paying bribes to inspectors clearly added to the costs of labor.

Little empirical evidence, however, exists on the extent and importance of such costs. Fallon and Lucas attempted an econometric analysis of the time-series of employment, but their conclusion that the demand for labor was significantly reduced by job-security regulation depends heavily on the extreme assumption that the dummy variable signifying the downward movement of the demand function really picks up the onset of the job security legislation rather than other significant changes in the economic landscape.

Table 6.8: Effect of Changes in Specific Regulations on Hiring Workers

Removal of the following:						
1. Layoff requirements						
Overall	15.0 (2.61)	9.4 (2.81)	23.7 (2.52)	4.0 (2.88)	14.4 (2.66)	38.1 (2.18)
No of firms responding	153	181	186	199	202	189
By firm size						
Micro	7.5 (2.78)	1.9 (1.98)	14.9 (2.70)	0.0 (1.21)	6.7 (2.85)	14.6 (2.66)
Small	21.2 (2.52)	17.7 (2.65)	30.4 (2.39)	5.3 (2.88)	13.4 (2.69)	45.2 (2.10)
Medium	9.1 (2.67)	10.3 (2.77)	27.5 (2.43)	6.1 (2.76)	21.6 (2.51)	47.5 (1.97)
Large	30.0 (2.20)	0.0 (3.00)	35.7 (2.29)	16.3 (2.67)	28.6 (2.43)	46.9 (2.00)
Very large	0.0 (3.0)	8.3 (2.83)	12.5 (2.75)	9.1 (2.46)	10.0 (2.50)	22.2 (2.25)
2. Hiring restrictions:						
Overall			14.5 (2.71)	0.0 (3.00)	2.0 (2.95)	20.0 (2.54)
No of firms responding			166	195	202	175
By firm size						
Micro			11.9 (2.76)	0.0 (3.00)	0.0 (2.98)	9.5 (2.79)
Small			15.8 (2.68)	0.0 (3.99)	1.5 (2.97)	25.9 (2.48)
Medium			14.6 (2.71)	0.0 (3.00)	5.9 (1.80)	22.8 (2.44)
Large			21.4 (2.57)	0.0 (3.00)	0.0 (3.00)	14.8 (2.67)
Very large			14.3 (2.71)	0.0 (3.00)	0.0 (3.00)	31.8 (2.27)

Note 1: The numbers outside parentheses indicate percentage of firms that would hire more if the corresponding labor regulations are removed whereas the numbers inside parentheses are average scores for the proposed questions.

Note 2: *Respondents had* three optional answers with corresponding scores of 1–3. *Increase the number of permanent workers*, *Decrease the number of permanent workers*, and M*aintain the number of permanent workers*.

The RPED made a strong attempt to fill this gap in knowledge by including a series of questions to the employers directed at evaluating the constraints on production and employment decisions emanating from labor regulations. The material has been treated in another book by the authors and readers are referred to it for the detailed statistical evidence.[21] Here it would suffice to summarize the main conclusions. It should be stressed that the surveys were conducted in the 1992–94 period when many of the countries had undergone some reforms which partially had eased the economic controls of previous regimes.

The regulations considered are: (i) minimum wages; (ii) the cost and difficulties of laying off permanent workers; (iii) restrictions on hiring temporary or foreign workers; and (iv) importance of restriction on firing workers in decisions to close down a business relative to other laws e.g., those relating to bankruptcy.

The respondents were asked in each case if a slight decrease of the minimum wage, or a removal of the restriction concerned would lead to a hiring of more workers. The responses were coded to measure both the proportion of firms which were responsive to the change, and the strength of the reaction. The results show that the effect of minimum wages was the least burdensome for the employers of all the restrictions considered. Of the other four regulations mentioned, "restrictions on layoffs and layout benefit requirements" seem to have been the most biting. Even then, the proportion of firms recognizing it as an effective "distortion" was in the highest case – Zimbabwe – only 38% of the overall sample. Turning to differences by size groups, as far as minimum wages are concerned, it is interesting to note that it is not the micro, but the small firms, which seemed to be most affected by them. Nevertheless, even for the two most severely affected countries on this point, the percentage of firms complaining was only around 30%.

Other regulations affecting hiring and firing of workers became, as one would expect, more "distortionary" as the enterprise size increased, but it is highly suggestive that in nearly all cases the largest size-group was not reporting the biggest incidence. "Medium" and "large" firms were the most affected, and even in the worst case – Zimbabwe – only just about half of these categories reported that laws relating to layoffs had an impact on their hiring decisions. The second country in terms of the severity of the impact was Kenya – with 35% of the large firms saying they would increase their hiring of permanent workers if layoff regulations were removed. It is also seen from the data reproduced in Table 6.8 that the strength of the reaction

[21] Dipak Mazumdar (with Ata Mazaheri) (2002), Chapter 2.

was quite mild, most countries scoring near the ‘no change’ score of 3 on a descending scale of 1 to 3.

The surveys had another question seeking to evaluate the impact of the layoff regulations on enterprise decision. Employers were asked if rules on layoffs, whether originating with the government or trade unions, impeded flexibility in the sense of preventing the firms from temporarily reducing production if necessary. Government regulations increasing costs of short-run flexibility seemed to have been most important for Zimbabwe for practically all sizes of firms ranging from the small to the very large. This was followed in ranking by Kenya (medium and large) and Tanzania (very large only). Other countries reported little trouble with this particular problem. Trade Union rules were recognized as important in three countries – Kenya, Tanzania and Zimbabwe. However, respondents in most countries and in all size classes above the micro group, recognized that “high financial costs of layoffs” contributed significantly to inflexibility, quite apart from direct government or trade union rules regarding layoffs. Evidently, firms find it costly to temporarily lay-off their firm-specific labor force. However, the percentage of firms which recognized this problem as “severe” generally did not exceed 50% in any group other than in Tanzania and Zambia. Also it should be recognized that this type of labor practice might have originated historically in regulations, which cast their shadow on firm operations even after the rules themselves had been formally relaxed.

Lastly, the survey questions asked respondents another important issue pertaining to the “cost of closing down the business.” Entrepreneurs might be seriously concerned about starting a business if they perceive that there is the prospect of serious financial liability in closing down the business if things go wrong. How do labor regulations on this point compare with other regulations like bankruptcy law in the eyes of the managers/owners?

The results from the responses to the survey questionnaire on this issue are given in Chapter 7 on Regulations (see Table 7.6). Two non-labor regulations affecting firm closure – “Government restriction on selling/transfer of business” and the “legal process of bankruptcy” were contrasted with labor related constraints – restrictions on firing of workers imposed by government, trade union restrictions on the same point, and the “financial cost of firing workers.” The last presumably referred to the compensation owners had to pay their workers if they shut down the business. The responses were scored 1 to 5 in an ascending scale of severity. Overall, for all countries, the cost of firing scored highest compared to any of the others. In the four Anglophone countries the mean score was in the range 2.4 to 2.7. As against this, direct government restrictions on closure scored 1.5 or less, as did trade union restrictions on firing. Two qualifications to this conclusion should be mentioned. Zimbabwe is one country where direct government restrictions seemed to be more important. Secondly, the severity of all types of restriction, including those emanating from trade unions, increased with firm size and was quite high for very large firms. A very surprising aspect of the data obtained from the surveys was that the two Francophone countries – Côte d'Ivoire and Cameroon – systematically gave very low scores to all the problems mentioned in the questionnaires, labor as well as non-labor.

In general the RPED material does *not* suggest that labor has been a more important source of difficulties facing the African manufacturing firm, compared to many other obstacles and regulations facing them. Chapter 7 reviews the material. In almost all parts of the questionnaire, respondents placed labor issues at the bottom end of their concerns. The most telling piece of evidence is provided in the responses to the question in which managers were asked to rank the "three biggest problems" facing the firm. Only one labor-related difficulty – lack of skilled labor – even made into the list of eight concerns, and even then this was at the bottom of the list. The percentage of respondents who mentioned this problem as one of the three biggest ranged from a low of 3.4% in Cameroon to 9.7% in Zambia. This compares with the problem of credit, ranging between 25.4% and 52.4%; or of demand, ranging between 18.2% and 46.6%; or of infrastructure ranging between 14.2% and 23.1% of the respondents (see Chapter 7, Table 7.5).

The Structure of Employment and Earnings

The last point about skilled workers brings us to the issue of the structure of employment in manufacturing firms and of skill differentials in the African economies. The RPED survey produced data on the composition of the labor force in the sample firms. It is possible to use these to give an idea of the proportions of white and blue-collar workers, though it is more difficult to decompose the latter in terms of skill. The proportion of blue-collar workers in the total by size group of firms is given in Table 6.9.

It is interesting to note that the proportion of blue-collar workers *increases* with size of firms – quite strongly in some countries. A glance at the table would show that around a third of the workforce are in white-collar occupations in a typical manufacturing firm. It has been noted that the wage differential between white and blue-collar workers is higher in African economies than in developed industrial countries – a finding that is in keeping with the economic theories of wage differentials (see below). Therefore, if it is found that African manufacturing has a larger presence of white-collar workers, this could be because of political or sociological factors. A possible hypothesis is that kinship ties or the political influence of the educated forces employers to accommodate an unusually large proportion of white-collar job seekers. Alternatively, we could have an economic hypothesis postulating that, in spite of the higher wage differential, white-collar workers in Africa are relatively less productive than the blue-collar ones, relative to the usual situation in developed countries. Secondly, the larger proportion of white-collar workers could be partly due to the inadequate development of infrastructure – for example, a shortage of service providers outside the firms to which various necessary functions could be contracted out.

Table 6.9: Average Share of Blue-collar Workers

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Ghana*	*Tanzania*	*Zambia*	*Zimbabwe*
Micro	0.68	0.35	0.67	0.38	0.56	0.58	0.70
Small	0.64	0.63	0.67	0.34	0.60	0.63	0.74
Medium	0.68	0.75	0.73	0.58	0.60	0.62	0.77
Large	0.81	0.68	0.79	0.70	0.59	0.66	0.76
Very large	0.83	0.79	0.74	0.78	0.63	0.69	0.67

Earnings Differentials by Skill

We can study the pattern of occupational wage differentials in Africa in a wider perspective of the international picture from the data on earnings by occupations, collected by the ILO for a large number of countries on a regular basis for some time. The material is more extensive in its coverage than the RPED dataset. Sectors other than manufacturing are also included. The ILO has been sending out formatted questionnaires to member countries each year asking them to report both the minimum and average earnings of workers in a long list of designated occupations. The list has increased in length from time to time, but is seen to have remained reasonably stable for a number of years at a stretch. The returns are edited and we are supplied with a liberal amount of footnotes which document what type of wage is being reported – whether minimum or average or a range; for males or females or both; time-rated or piece rated etc. It is thus possible to identify occupational wages, on a reasonably comparable basis for a number of countries. The returns are published in special issues of the ILO Bulletin each year in October, and are identified as the data from the "October Survey." Because of the nature of the survey, it is quite clear that the data are collected from registered establishments, i.e., the information relates to the "formal" sectors of the labor market.

Table 6.10: Occupational Wage Differentials in Africa, United States and United Kingdom by Sector (1991)

Sector	*Worker*	*Africa 1990–91 (Average)*	*United States 1991*	*United Kingdom 1991*
Mining	Miner	95.34		115.83
Industry	Unskilled	55.65	73.28	
	Semi-Skilled	79.90	63.31	78.86
	Skilled**	100.00	100.00	100.00
Construction	Unskilled	62.94	79.55	69.79
	Skilled	96.03	107.24	92.52
Distr. and Trans.	Unskilled	83.40	62.18	46.92
	Salesperson	82.74	73.73	65.25
	Skilled	116.68	97.54	82.58
White-collar	Clerical (Low)	147.11	78.58	86.27
	Technical (Middle)	210.44	137.03	108.28
	Professional (High)	296.47	196.19	192.42
Public Administration	Unskilled	73.19		77.04
	Clerical	105.42	97.59	92.34
	Executive	205.93	153.95	97.36

Source: October Survey of the ILO.
Note: The data presented for Africa are simple averages of the respective statistics of the following countries: Algeria, Benin, Burkina Faso, Burundi, Cameroon, Cent. Afr. Rep. , Chad, Côte d'Ivoire, Gabon, Mali, Mauritius, Rwanda, Seychelles, Sierra Leone, Tunisia, and Zambia. It should also be further noted that data were not available for all of these in some of the occupations given in the table. ** 100=Base

Despite some limitations of the data[22] this wealth of material can be

[22] The basic problem with using the "October Survey" is the question if Labor Offices across the world have interpreted the occupational categories in a meaningful way for us to make either inter-temporal or inter-regional comparisons of occupational wage differentials. The confidence of the unit responsible for collecting these data on this point rests on two arguments: first, the number of occupations is quite large so that averages for particular categories, say arranged by skill-groups would most likely iron out misreported or extravagant numbers. Secondly, since the same type of information has been asked for over a long period of time, reporting authorities tend to acquire familiarity with the procedures and sources.

used to provide some indications of the extent of occupational wage differentials in Africa compared to the advanced countries. This is done for 1991 in Table 6.10.

The major points, which emerge from the tables, are the following:

- The skilled–unskilled differential within industry and in the construction sector in Africa is wider than in the USA. or the UK However, the differential between skilled and semi-skilled workers is lower in Africa. Both these results can be explained in terms of Reder’s substitutability hypothesis (Reder 1955). African economies, with a shortage of skills, are able to adjust downward the skill content required in the highly skilled occupations. However, since a minimum of skills is needed for industrial work, a large gap in skills exists between operatives and unskilled laborers. With the shortage of skills going down to the operative's level, the substitutability of unskilled labor for all labor with some skill is smaller in Africa, but the substitutability of semi-skilled for skilled labor in the sectors remains high.
- It is sometimes maintained that the distributive sector is the soft underbelly for the labor market where wages for unskilled or low-skill labor is allowed to fall to levels below those maintained in industry and construction by institutional or efficiency-wage factors. Our data show that this hypothesis is borne out in the USA. and the UK (at least in 1991), but not in Africa. It should, however, be remembered that more of the employed in the tertiary sector in Africa are found in the informal sector, which is not covered in this wage survey.
- A major difference between Africa and the developed countries is revealed in the ratio of wages of white-collar to blue-collar workers. In Africa, the premium above skilled industrial work is high for even low and middle levels of white-collar work (outside public administration), but not so in the USA or the UK. The premium seems to have fallen sharply in the latter half of the 1980s, but was still well above that for the developed countries. This result is, of course, what is expected from the general shortage of educated labor in Africa.
- The major differences on this point between the private and the public sectors in Africa are also seen in the tables. Public sector wages for middle and higher level white-collar workers are lower than in the private sector in Africa as well as in the developed countries. However, the margin of the difference tends to be much larger in Africa.

> Evidently, the wage decline in many African countries in the eighties had taken a toll on the public sector white-collar workers disproportionately.

How do the results from the RPED survey look against the background of this discussion of African occupational wage differential from the ILO surveys? A direct comparison is not possible because in the RPED data the production workers are not broken down into various skill categories as in the ILO survey. However, the comparatively high differential in favor of white-collar workers, much higher than in the advanced countries, is confirmed by the RPED data for manufacturing enterprises alone.

Earnings Differentials by Education

The high white–blue collar wage differential in sub-Saharan Africa has its counterpart in the much larger returns to education, particularly at the higher levels, which are confirmed both by the RPED data set for manufacturing and other data from Household Surveys for the economy as a whole. The material is surveyed in Chapter 14 of Mazumdar and Mazaheri (2002), and the reader is referred to this chapter for full documentation.

The major conclusion from the estimation of the earnings functions from the RPED data sets reported above is the convex nature of the functions for all countries, even when we separate the samples into two classes of occupations. This finding, which is confirmed by the analysis from the Household Surveys for Kenya, Ghana and Zambia, contradicts the perceived view propagated by Psacharopoulos (1994) among others. In a popular paper summarizing his previous work (1985, Table 1 and Figure 1, pp. 586–87), Psacharopoulos wrote that the "table maintained the earlier well documented declining rate of return pattern by level of education" (p. 585). The sources of Psacharapoulos's reported results are diverse. They have been culled from the work of different researchers employing different types of analysis to different types of data sets. In most cases, it is not possible to go back to the original analysis to see if they are compatible with the present data sets. In any event, the majority of these studies are quite old. Nevertheless, Psacharapoulos's presentation has established a "norm" for the whole world, which the evidence surely is not able to bear. In a very recent study, for example Gallup (1994) found that in Malaysia, for all three races separately – Malays, Chinese, and Indian – the rates of return to education increased systematically from primary through secondary to the tertiary level. Gallup was induced to remark, citing

Psacharapoulos that the Malaysian situation was "unusual" compared to other countries.

The RPED data generally show that the marginal increment to earnings increases successively for different levels of education starting from "No Education" through primary to different stages of higher education (*op. cit.* Tables 14.2 and 14.3). Admittedly, the rates of returns given in are for several years of education for each level in question. But since the number of years is larger for primary and become smaller as we go to higher levels, the returns per year would increase even more than shown as we go up the educational ladder.

Secondly, the coefficients reported measure returns to education only on the assumption that the worker would have earned a sum equal to the amount estimated at each level, if he had chosen to work in the labor market rather than increase his human capital. For primary school participants this might be an overestimate of the foregone earnings if they participate only partly in the labor market when they do not go to school. For the higher levels we have to similarly devalue the costs of education in so far as unemployment for these educational groups is quite high in African economies. Thus while the absolute rates of return are overestimated by taking the uncorrected values of the coefficients of the earnings functions, the relative differences for the three levels, after correcting for non-participation and unemployment, are not obvious.

Thirdly, the social costs clearly increase with the level of education, as far as higher education in African countries is heavily subsidized. The social rates of return could then be increasing at a faster rate than the private returns for higher levels of education. (It will be recalled that Psacharopoulos suggested that the social rate declined linearly with higher levels, 1985, p. 587).

The Inequality in the Distribution of Earnings

The finding that, compared to developed economies, wage differentials in Africa are not so much higher between the more and less skilled among blue collar workers, but much higher as between the white and blue-collar occupations, has implications for the nature of the distribution of earnings among the manufacturing workforce. We would expect that the distribution would be more unequal if we concentrate attention on the lower part of the distribution compared to the highest, rather than on the middle range. Table 6.11 presents some measures of earnings inequality among workers covered by the RPED surveys.

Table 6.11: Measures of Earning Inequality

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Gini Coefficient	0.4621	0.5092	0.4196	0.4406	0.4528	0.5020	0.5382
CV	109	167	124	122	147	145	143
P10/P90	0.02	0.06	0.06	0.11	0.02	0.07	0.04
P25/Median	0.62	0.68	0.7	0.67	0.66	0.68	0.73
P75/Median	1.83	1.75	1.56	1.54	1.58	1.77	1.9

Note: CV stands for coefficient of variation.

Of the seven countries, Zambia and Zimbabwe are the two with the greatest inequality of earnings (though in the case of Zambia the Gini measure of inequality might have been exaggerated by data errors, as revealed by the exceptionally high coefficient of variation). This finding about the Southern African countries is consistent with what the data show about occupational differentials earlier. Contrary to expectations it is Ghana and not Tanzania, which shows the lowest degree of inequality.

Table 6.12: Spread of Earnings in Selected Developed Countries

Country (date)	*Ratio of P10 to P90*
Netherlands (1987)	0.42
Germany (1984)	0.40
Australia (1989/90)	0.36
United Kingdom (1986)	0.32
Sweden (1992)	0.29
Canada (1987)	0.22
United States (1991)	0.18

Source: Gottschalk and Smeeding, Figure 1, p. 644.

The statistics comparing the ratio of earnings at the first decile with those in the 9th decile reveal the extreme difference in earnings at the two ends of the distribution. It might be interesting to make a quick comparison with some readily available data that exists for advanced countries. The comparison is not exact. Gottschalk and Smeeding present some data on earnings inequality for selected developed countries around 1990. They refer to full-time regular males with "full-year jobs," and in all occupations. Thus, unlike the RPED sample, they include non-manufacturing. Secondly, the RPED data discussed above include female workers, though the proportion of such workers in the RPED surveys is small.[23] Nonetheless, some interest attaches to the numbers of the P10/P90 ratios given by Gottschalk and Smeeding as provided in Table 6.12. The data are presented in *ascending* order of inequality.

The comparison shows the very much larger degree of inequality that exists among African workers, even if we consider the most unequal of the sample of developed countries – which happened to be in North America. No doubt, the degree of inequality discussed above in Africa is increased by the inclusion of female workers in our sample. But as against this, it is very likely that the inequality measure for our sample in Africa is dampened considerably by the exclusion of workers in non-manufacturing, particularly in the tertiary, agricultural and the informal sectors generally. It seems clear that the underestimation of earnings inequality in the African scene because of the latter would be vastly more than the overestimation due to the former.

Conclusion

Most countries in sub-Saharan Africa had by the 1970s moved away from the era of high wage policy established immediately after decolonization. But the myth of high wages in the formal sector, maintained way above the alternative earnings in other sectors, by institutional forces originating government legislation or trade unions, persists. The chapter summarizes the evidence presented more extensively in another book, *Wages and Employment in Africa,* that real wages have been continuously eroded in the last three decades, principally by nominal wage increases not keeping up with inflation. At the same time the employment–wage trade off had decisively shifted towards employment increase at the expense of wage decline both in the public and the private sectors. It makes sense to expect that, in the face of this persistent decline in formal sector wages the gap in earning between the rural and the urban sectors, and within the latter between the formal and the informal sector, would have been eroded over time. In countries like Kenya where this appears not to be so, based on the evidence of income per capita in different sectors available from household surveys, closer examination shows that this is partly due to the nature of rural–urban migration in this economy. Migrants have responded to the fall

[23] Ghana is the only country in the RPED survey which had a sizable proportion of females in the sample of workers – at 26% of the total. In all the other six countries the proportion was between 9 and 14% (cf. *op. cit.,* Table 13.8, p. 241).

in real income in urban areas by splitting the household between the rural and urban sectors, with some of the dependents supported by the rural homestead. Welfare levels are much closer together if one makes allowance for the artificially low dependency ratio in towns.

This is not to deny that there are significant intra-sectoral differences in earnings within the urban labor market. In particular, the urban labor market in Africa, like in other developing countries, is characterized by a strong positive relationship of earnings with the size of the enterprise. This is revealed not only in the substantial difference in the level of earnings between the "informal" and the "formal" sectors, but also between firms of different size groups within the "formal" sector. Although the wage–size relationship is found in developed countries as well, the magnitude of the relationship is quantitatively much larger in sub-Saharan Africa (as it is in some other developing countries).

At first sight the increase in wages with firm size, after controlling for measurable human capital attributes of the workers, might seem to be a consequence of institutional influences emanating from trade unions or governments. But while there is clearly an association between these variables, the direction of the causality is hard to establish firmly. At the same time that factors emanating from the heterogeneous quality of labor and of techniques of production would seem to be much more important in developing countries. These elements contribute to the two major *economic* reasons for the observed wage–size relationship – the efficiency-wage hypothesis and profit sharing considerations. We have summarized in this chapter some of the discussion in *Wages and Employment in Africa,* where we go into considerable length to suggest models which might empirically disentangle the effects of these separate but interacting factors. The results from one of the simultaneous models presented here seem to suggest that profit sharing does play some – albeit a minor role – in the explanation of the higher wages in large firms.

Various aspects of labor regulations were looked at because of the general feeling about the importance of labor legislation in creating inflexibility and high cost of business in Africa. Two conclusions immediately emerge from a quick overview of the results. First, as is to be expected the effect of minimum wages is the least burdensome for the employers of all the restrictions considered. Secondly, the impact of existing labor restrictions on hiring decisions seems to be the most severe for employers in Zambia and Zimbabwe among the seven countries surveyed.

Of the four regulations mentioned, "restrictions on layoffs and layout benefit requirements" seem to have been the most biting. Even then, the proportion of firms recognizing it as an effective "distortion" was in the highest case – Zimbabwe – only 38% of the overall sample. It is apparent from the surveys that labor regulations are nowhere near the top of the major problems. The World Bank survey, discussed in Chapter 7, in fact ranks this set of problems at 11 in the list of 15. Similarly, the RPED survey of managers, recording the importance of the "three biggest problems," does not rank labor regulation issues as being one of them.

In the last section of the chapter the discussion turns to the issue of skill differentials. It has often been maintained that the low level of education and formal training in Africa could be expected to make the price of skilled labor high to the detriment of the business success of manufacturing firms. Our review of the data thrown up by the RPED surveys and comparison with international statistics reported by the ILO does support the hypothesis of a relatively high differential in favor of white-collar workers. Furthermore this differential is larger in the private sector, showing that the large presence of the public sector in white-collar occupations has little to do with the relatively high price of skilled labor. The evidence reviewed about the increasing returns to education in African economies, and the larger degree of inequality among wage earners (compared to those in developed countries), are consistent with the existence of high skill differentials. White-collar workers in the RPED manufacturing firms make up around 30% of the labor force, though this proportion declines slightly with larger firms size. Thus the high price of white-collar labor could be a factor increasing wage costs of manufacturers.

7 The Impact of Regulations and Infrastructure Relative to Other Problems Facing the Firm

Introduction

The factors affecting smooth operations of firms and their ability to grow can be classified in a number of groups.

(i) First is the economic landscape, which is determined (a) by the structural factors determining the price and productivity of factors of production, as analyzed in the previous chapters; and (b) by macroeconomic policies which determine such key variables as the inflation rate, the level of demand, the exchange rate, the burden of taxation and the interest rate. Poor macroeconomic management not only creates costs for the firm's operations, e.g., an overvalued exchange rate, but it could also increase strongly the *uncertainty* facing the firm's management.

(ii) A second group of factors affecting the firm's decision-making environment is the role of regulations. Examples of typical government regulations cover a wide range of inputs and outputs. Direct control of prices and quantities of output figures in the list along with regulations affecting banking finance, the supply of raw materials, labor, foreign exchange, location and many others. Regulations are often quantitative in nature, requiring administrative measures by the state. Two distinct costs are generated in the process for the firm's operations. Individual firms are treated differently, hence affecting the allocative efficiency of scarce inputs. Additionally, since the bureaucracy is crucially involved in the process, corruption supplants the operation of the market. While in a limited number of cases bribes offered to officials are known with the same level of certainty as market prices, most often corruption seriously increases the degree of uncertainty facing the entrepreneur. It should be added that there is an interaction between weak macro-economic management of the economy and the importance of regulations. For example, an overvalued exchange rate creates the necessity for administrative rationing of scarce foreign exchange.

(iii) Next in importance, and indeed in some developing countries at the top of the list of problems, is inadequate infrastructure – utilities, transport, suitable land and buildings etc. This area of investment has been mostly the responsibility of governments, and even well meaning governments, which have not been burdened by excessive spending on defense or the civil service, have often been miserably wrong in forecasting demand for infrastructure correctly.

(iv) It has been increasingly recognized that lack of social capital in African economies, as in other developing countries, has increased the costs of economic operations for individual entrepreneurs. Normal legal institutions often fail in the task of reliable contract enforcement. The long delay and unreliability of the courts force agents to look for alternative, less expensive means of conflict resolution. Not only do firms face a high risk of contract default, but it encourages opportunism in business practices so that abilities other than efficiency in the economic management of firms is ultimately rewarded.

Conceptually and in terms of data availability, the last set of issues is rather different from the first three groups. Hence the discussion is divided into two parts: this chapter deals with regulations and the infrastructure problems, and their importance, relative to other problems of the economic landscape. The issues of contract enforcement are discussed in Chapter 8.

Evidence on the Relative Importance of Different Obstacles

The usual way of assessing the importance attached by entrepreneurs to the different classes of problems hampering their activities is through structured questionnaires addressed to managers, inviting them to attach scores to specific problems in order of their severity. The RPED surveys included a set of these questions in their questionnaires. But before we discuss the material thrown up by these surveys, it might be useful to report on an ambitious world-wide survey conducted through mailed questionnaires by the World Bank.

The World Bank Survey 1997

The survey was conducted for the World Development Report for 1997. It was a private sector survey that covered more than 3,600 entrepreneurs in 69 countries. The methodology, questionnaire and results are reported in Brunetti *et al.* (1997). The response rate was unusually high for a survey which depended partly on mail. Interestingly enough the response rate was much higher in developing countries than in developed ones. The sub-Saharan region (SSA) had a response rate of 49% overall.

The Scope of the Survey: The survey covered all sectors. In the final sample used 51% of the companies were in manufacturing, 41% in services and 8% in agriculture. Small firms (less than 50 workers) accounted for 40% of the sample, medium (50–200 workers) firms had a representation of 32% and the large firms 28%. Companies involved in export activities and those that were not had almost equal presence in the final tally. Companies with foreign participation accounted for 35% of the total.

The Questionnaire: The questions were grouped into five categories;

> *Predictability of laws and policies:* The questions are designed to evaluate the uncertainty created by changing macroeconomic and regulatory policies.
>
> *Political instability and security of property:* This group of questions cover the ground of social capital defined in the introduction above.
>
> *Government-business interface:* Respondents were asked to judge on a six-point scale how problematic policy areas were for doing business. It listed 15 areas of concern – including several types of regulations, but also branching out to problems of infrastructure, political instability, corruption, crime and corruption. In terms of our classification in the introduction this set of questions included both regulations and social capital issues.
>
> *Bureaucratic red tape:* This section goes into details of dealing with the bureaucracy. Questions are asked to evaluate the costs of bribes paid to officials.
>
> *Efficiency of government in providing services:* Questions under this head were meant to throw light on the perceived efficiency of public services in infrastructure and utilities.

Probably the most useful way to summarize the results of the inquiry is to reproduce the ranking of the fifteen different problem areas which the respondents scored in terms of perceived difficulty in the third section of the questionnaire. The problem areas are portrayed in Figure 7.1 in terms of the mean scores attained from respondents in the sub-Saharan Africa region.

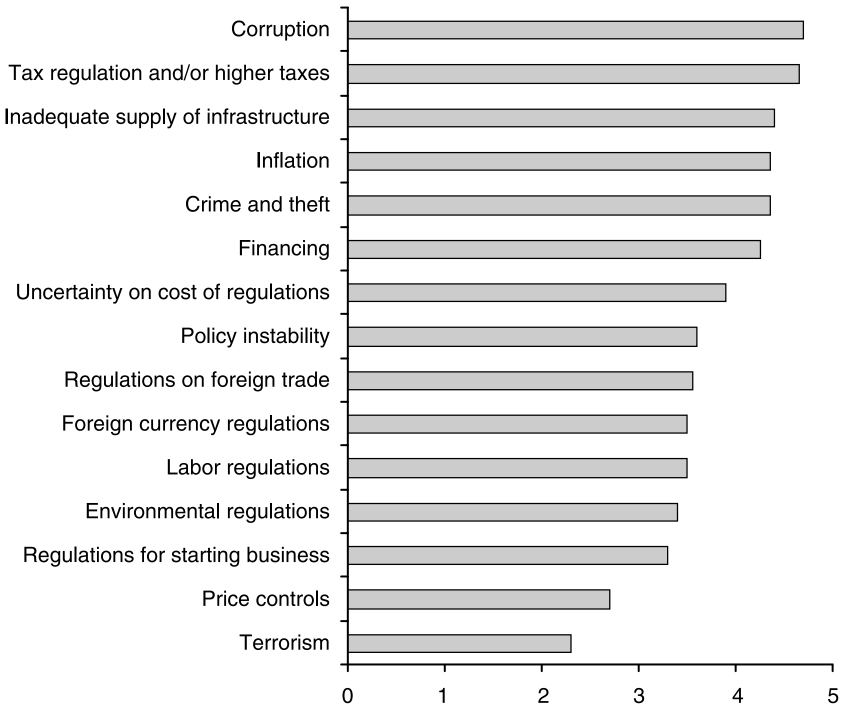

Figure 7.1: Ranking of Obstacles for Doing Business (sub-Saharan Africa)

Source: Brunetti *et al.* (1997).

The most striking result is that none of the common regulations expected to affect business efficiency made it to the top half of the league table. The only exception is tax regulations, but here the respondents were most likely thinking as much of the level of taxes as their administration. Corruption, and presumably the uncertainty created by its pervasiveness for businesses tops the list. Several other problem areas ranked in the top half of the list involve the creation of uncertainty – e.g., inflation, crime and policy instability. In addition poor infrastructure and problems of finance are considered major difficulties.

Another startling result from the responses to this question was that, of the six regions of the developing world distinguished,[24] only one, SSEA, had a significantly different ranking of the importance of regulations. SSEA entrepreneurs ranked labor regulations as 4 in order of importance and regulations for starting business/ new operations as 5. Corruption was in the first three of the scores in all regions other than the SSEA, tax regulations and/or high taxes figured within the band of the first five important difficulties, and infrastructure problems were ranked 5 or higher in all regions.

It might be interesting to compare the bar chart of scores for SSA given above with that of the developed countries as represented by the OECD sample. This is given in Figure 7.2. The difference with SSA – and the other developing regions – is at once apparent. Regulations dominate the top scores, while infrastructure, corruption, crime and inflation all drop to the bottom half of the league. The only factor in common between SSA and OECD with a score of more than 3 is finance.

The survey went into great detail about the nature of government-private interface. Overall respondents were asked to record if the state was perceived as a helping hand, a neutral agent or an opponent. While only 20% of the entrepreneurs considered the state to be an out-and-out opponent in the OECD and SSEA regions, the percentage was over 30% in all the other regions of the developing world. In SSA, 35% of the respondents found the state to be a hostile agent, exceeded only by LAC where 40% thought so.

Corruption, and its consequences, were clearly the major factor behind this perception. In SSA 50% of the entrepreneurs reported that they were frequently asked to pay "irregular additional payments to get things done." While, among those who frequently paid bribes, about a third knew in advance how much they had to pay, a majority suffered from uncertainty about the future, in the sense "that the firm always has to fear that it will be asked for more e.g. by another official." A whopping 70% of the SSA respondents indicated that they had low expectations about getting redress from another source, e.g., another official or superior, "if a government

[24] The regions are: SSEA=South and South-East Asia; MENA=Middle East and North Africa; CEE=Central and East Europe; LAC=Latin America and the Caribbean; SSA=sub-Saharan Africa; and CIS=Commonwealth and the Independent States. In addition the developed countries of the OECD formed another group.

agent acts against the rule." A similar majority, however, indicated that "if a firm pays the additional payment the service is usually delivered as agreed."

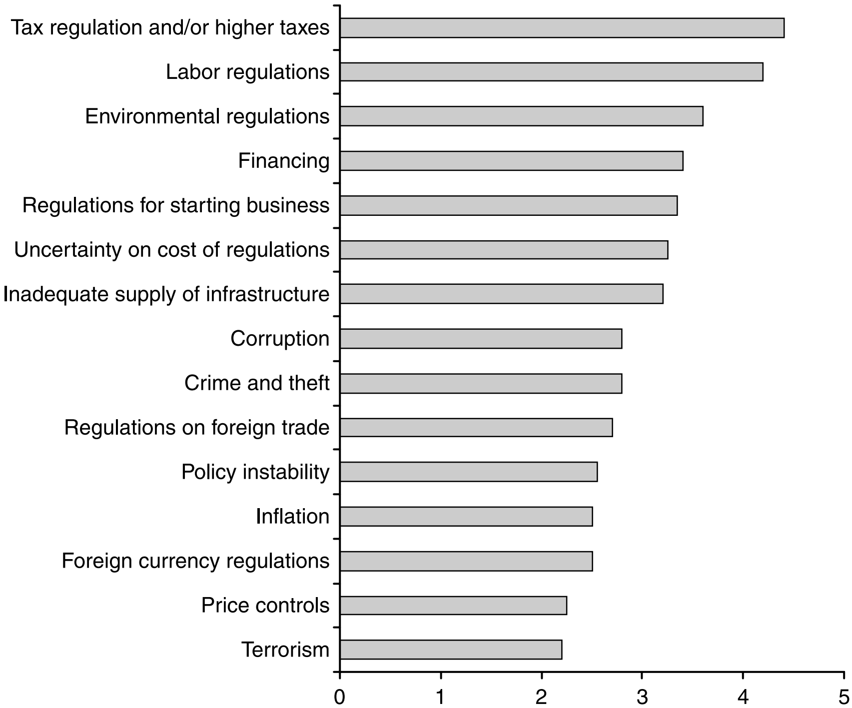

Figure 7.2: Ranking of Obstacles for Doing Business (OECD)

Source: Brunetti *et al.* (1997).

It should be now clear why regulations received a low score as difficulties in SSA, as in other developing regions. It is not the regulations *per se* which create problems for entrepreneurs, but their administration by the government, and the power they give officials to demand bribes. Bribes, together with the uncertainty they create, are seen as an integral part of doing business in this region.

Turning to infrastructure services, the surveyed firms were asked about their satisfaction or otherwise with different types of services. The SSA region was distinguished by having the largest percentage of respondents (about 45%) who found interrupted power supply a serious problem, with power outages occurring every week or more frequently. Only 30%

reported road conditions to be satisfactory, and just 20% found customs to be efficient. Interestingly, on both these two last problems, only the CIS had a lower percentage of satisfied customers.

Evidence on Obstacles from the RPED Surveys

The problems facing entrepreneurs, affecting the firm's operations or growth, are asked at several points in the RPRD questionnaire. Perhaps the most useful is the set of questions asking respondents to rank the severity of various obstacles to *firm expansion.* The interviewed manager was asked to quantify subjectively a list of factors on the degree to which they actually constitute an obstacle to the growth of his firm. The questions were intended to identify sources of obstacles to growth at the moment of the interview and they are not necessarily identical to factors affecting past growth. Firms were asked to rank from one (no obstacle) to five (severe obstacle) the major obstacles to their expansion and were given fifteen options. These options include factors such as taxes, lack of business support, import competition, lack of demand, lack of infrastructure, etc. Using the data from only the first wave of the surveys, Biggs and Srivastava (1996) found that regulatory constraints generally ranked as the least important obstacles. Top of the list was lack of credit and lack of demand.

In order to determine how firms' characteristics may affect their response to the perceived obstacles, we have reorganized and regrouped these factors in four different categories and used average responses for each category. These categories are, *Demand constraints*, *Credit constraints*, *Regulations constraints*, and *Infrastructure constraints*. *Demand constraints* includes lack of demand. *Credit constraints* include lack of credit. *Regulation constraints* include: ownership regulations, taxes, gaining investment benefits, government restrictions on activities, labor regulations, difficulty in obtaining licenses, price controls, foreign exchange controls, and location regulations. *Infrastructure constraints* include lack of business support services, lack of infrastructure, and utility prices. The classification of the responses in these four groups will allow us to better understand the potential differences in their significance as well as how different firm attributes can lead to a different set of responses.

Tables 7.1 and 7.2 summarize the distribution of the aforementioned categories. As Table 7.1 reveals, credit constraints are considered the most significant obstacle to expansion whereas regulation constraints are considered the least significant in all countries. Furthermore, demand constraints and infrastructure constraints are considered almost equally important in most of the countries. Table 7.2 sets out the size distribution of these bundles of obstacles and reveals some significant findings. Credit constraints appear to be more severe for smaller firms whereas both infrastructure and regulation constraints are more significant for larger firms. There also exists a positive relation between demand constraints and size, however, this relation appears to be rather mild.

Table 7.1: Obstacles to Firm Expansion

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Demand	3.68	2.12	2.24	2.35	2.90	2.83	2.91
Credit	3.87	2.64	3.82	2.81	3.75	3.14	3.06
Infrastructure	2.39	1.68	1.87	2.39	2.67	2.72	2.65
Regulation	1.78	1.39	1.22	1.63	1.23	1.30	1.85

Note: The actual responses range from 1–5 where 1 stands for no obstacle and 5 stands for severe obstacle.

Table 7.2: Obstacles to Firm Expansion, by Size Groups

	All	*Micro*	*Small*	*Medium*	*Large*	*Very Large*
Demand	2.72	2.57	2.64	2.95	2.83	3.01
Credit	3.30	3.81	3.26	3.05	2.92	2.71
Infrastructure	2.40	2.19	2.40	2.54	2.63	2.52
Regulation	1.48	1.29	1.44	1.58	1.78	1.73

Note: The actual responses range from 1–5 where 1 stands for no obstacle and 5 stands for severe obstacle.

To see how significant firm characteristics such as size, sector, foreign ownership, and other factors are in determining the responses of firm managers, we apply a two-way censored Tobit model. The dependent variables, here, are the four categories of obstacles we defined earlier. The value attached to each of these categories is constrained between one (no obstacle) and five (severe obstacles). The independent variables are sector and firm's size, variables indicating the extent of import and export orientation, and the percentage of foreign ownership. The results are summarized in Table 7.3. Consistent with our earlier finding, there appears to be a significant and positive relation between size and firm's response to demand constraints, larger firms appear to perceive demand as a more severe problem. However, the size has a stronger and a more negative effect on credit constraints as smaller firms are more severely constrained by lack of credit. Size also appears to be a significant determinant of how firms perceive regulation and infrastructure as obstacles to their growth. In both cases it appears that smaller firms are less concerned about these types of obstacles. Smaller firms, serving more local markets with simpler production techniques, come across these particular constraints less frequently and hence feel less affected by them.

Table 7.3: Tobit Estimates of Perceived Obstacles to Firm Expansion

	Demand	*Credit*	*Regulation*	*Infrastructure*
Constant	2.03***	3.75***	1.38***	1.76***
Ln(Size)	0.137**	−0.216***	0.094***	0.129***
Other Factors				
Import Dummy	0.295	0.175	0.144**	0.204**
Export Dummy	−0.430**	−0.086	−0.005	−0.022
Foreign Dummy	0.184	−0.754***	0.037	−0.203*
Sector				
Food	0.016	−0.548	−0.038	0.135
Metal	−0.651***	−0.155	0.017	0.308**
Wood	−0.419***	−0.100	0.091	0.196
Country				
Cameroon	1.18***	1.07***	0.031	−0.19
Côte d'Ivoire	−0.924**	−0.358	−0.542***	−1.05***
Ghana	−1.18***	0.649**	−0.809***	−0.734***
Kenya	−0.667***	−0.646**	−0.400***	−0.267***
Tanzania	0.228	0.597**	−0.609***	−0.581***
Zambia	−0.126	−0.068	−0.760***	0.202
Observations	1070	1067	1073	1071
Quasi R^2	0.0854	0.1094	0.1351	0.1102

Notes: * indicates significance at 10%, ** at 5%, and *** at 1%. Import, Export, and Foreign refer respectively to the percentage of raw material imported, the percentage of total sale exported, and the percentage of foreign ownership.

Other characteristics of the firm also contribute to their responses. Whether it is lack of demand, insufficient credit, difficult regulation, or inadequate infrastructure, those firms that engage in imports find themselves more severely constrained than the average firm whereas those firms that engage in exporting do not perceive these constraints as severe for their expansion plans. Analytically, importing firms are more inward oriented and hence are more prone to find themselves severely constrained by factors affecting domestic business environment. Exporting firms, however, are more outward oriented and hence less likely to face the domestic environment. Firms with foreign ownership, on the other hand, are less likely to be credit constrained or to find infrastructure as a severe constraint. However, these firms find lack of demand and regulations as more significant obstacles to their expansion plans although neither of these two were found significant.

Some differences with the World Bank Survey discussed earlier should be noted. First, and most important, the questionnaire did not ask for the evaluation of "corruption." We found in the World Bank survey that it was not the regulations *per se*, but the associated problems of corruption arising out of the administration of the regulations, which were singled out by the respondents as the most serious problem.

Second, the RPED samples include more small and medium firms than the World Bank effort. Our results show that larger firms are affected more by regulations.

Third, differences by type of regulation and countries, as revealed by the country dummies in Table 7.3, add some information. The importance of regulations was judged to be more important in Zimbabwe (the base for the country dummies) and Cameroon. In more detailed examination of the responses (not shown) foreign exchange controls, difficulty in obtaining licenses and labor regulations were deemed to be fairly important by a sizable minority of firms in these two countries. The last two were also important in Cameroon. Infrastructure problems were clearly most severe in Zimbabwe and Zambia and least important in Côte d'Ivoire. Ghana, which had undergone some years of successful adjustment programs (including rebuilding of its infrastructure) at the time of the survey, clearly showed relatively small incidence of these problems, controlling for the firm characteristics, but suffered from more severe credit constraints.

Fourth, the question is about obstacles to the expansion of firms. Regulations might be felt to be more burdensome in starting a new firm or in the day-to-day operations, affecting efficiency.

Obstacles to the Operation of Firms

In another part of the surveys a question was included in which managers were asked to rank the different types of regulations on the *operations* of the firm. The only *non-regulatory* difficulty included in the list could have been "access to domestic finance." But, as can be seen from Table 7.4 the largest proportion of firms considering the regulation severe was with respect to this finance question. In three out of five Anglophone countries (Kenya, Tanzania, and Zambia), "restrictions on access to domestic finance" is ranked as the top problem. However, in Zimbabwe, restrictions on foreign exchange are considered as the more important difficulty by close to 39% of the firms. Zimbabwe is in fact the one country where several other regulatory constraints were singled out as being severe by a significant minority of entrepreneurs.

Table 7.4: The Importance of Different Types of Regulations for the Operation of Firms

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Restrictions on Activities			1.6	8	3.9	4.7	12.1
in which you participate			(1.08)	(1.30)	(1.14)	(1.15)	(1.39)
Capital Requirements			2.6	11.6	16.3	10.3	16.8
			(1.10)	(1.39)	(1.59)	(1.38)	(1.56)
Joint Venture Restrictions			2.6	2.7	4.5	1.9	11.3
			(1.13)	(1.11)	(1.19)	(1.07)	(1.33)
Access to Domestic			3.1	27.7	21.8	17.4	26.6
Finance			(1.13)	(1.94)	(1.79)	(1.61)	(1.91)
Repatriation of Profits	2.3	1.4	1.6	6.7	3	2.4	17.6
	(1.09)	(1.06)	(1.07)	(1.26)	(1.11)	(1.06)	(1.61)
Foreign Exchange for	10.6	2.1		23.1	3	4.7	38.8
Business Travel	(1.38)	(1.10)		(1.76)	(1.10)	(1.16)	(2.31)
Approval of Foreign	3.9	2.6		4.5	4	5.2	16
Loans	(1.20)	(1.13)		(1.17)	(1.15)	(1.18)	(1.54)
Payment of Fees to non-	4.5	0.1		4.9	3.5	3.3	11.1
Residents	(1.18)	(1.04)		(1.78)	(1.09)	(1.09)	(1.39)
Payment of technology	1.5	0.7		3.6	1		11.1
licenses and Royalties	(1.11)	(1.04)		(1.11)	(1.04)		(1.38)
Observations	132	145	192	225	203	213	188

Note: Same as in Table 7.1

In another set of questions the managers were given the option to choose their three biggest problems from a much larger set – both regulatory and non-regulatory. The results are summarized in Table 7.5. Again credit stands out as the most important difficulty. As Table 7.5 reveals, at least 40% of managers rank credit among their top three biggest problems. This percentage is highest for Ghana where it stands at around 80% and lowest for Zimbabwe where the percentage is in the mid 40s. "Lack of demand" constitutes the second most important problem reported by the managers in three countries namely Cameroon, Ghana, and Zimbabwe where more than 35% of reporting firms view this as one of their top three biggest problems. For Tanzania, however, lack of infrastructure is reported by close to 39% to be among their top three biggest problems versus only 18% who indicate lack of demand.

Furthermore, in Zambia, where the respondents recorded only the first two problems, credit is still considered to be the biggest problem. However, unlike the other countries, in Zambia, competition from imports is reported to be the second most important problem along with lack of demand.

What is the interpretation of the problem of lack of demand which seems to be a pervasive difficulty perceived by a sizable group across the RPED countries? Van Biesebroeck (2001) suggests that "it might be a sign of too little price flexibility or producing the wrong products." He finds that exporters are significantly less likely to face a lack of demand

Table 7.5: The Three Biggest Problems (Percentages)

	Cameroon	*Ghana*	*Tanzania*	*Zambia**	*Zimbabwe*
Taxes	27 (6.5)	21.9 (2.40)	10 (2.4)	4.3 (0.9)	11.6 (6.5)
Lack of Infrastructure	15.9 (1.6)	19.2 (1.9)	38.7 (9.2)	14.2 (4.7)	23.1 (1.6)
Utility Prices	6.9 (0)	22.7 (1.4)	29.4 (7.7)	11.1 (3.3)	8.4 (.)
Credit	59.3 (25.9)	83.3 (52.4)	66.7 (35.7)	40.1 (25.4)	45.6 (25.9)
No Demand	46.6 (22.2)	33.5 (10.5)	18.2 (3.9)	17.2 (10.3)	37.5 (22.2)
Foreign Exchange	0	8.1 (0.5)	3.6 (1)	7.5 (6.5)	14.3 (.)
Competition from Imports	18.3 (8.1)	16.3 (6.7)	21.1 (6.8)	20.6 (11.3)	13.9 (8.10)
Lack of Skilled Labor	3.4 (.)		9.3 (1.9)	9.7 (2.8)	7.4 (.)
Observations	185	210	207	213	195

Note: The numbers outside parentheses refer to the percentage of firms that reported each of the items to be among their first, second, or third biggest problem. The numbers outside parentheses refer to the percentage of the firms that have reported the item as their first biggest problem.
* Only the two biggest problems were reported for Zambia.

Obstacles to Closing Down the Business

The smooth exit of firms, which are no longer viable, is as important to the efficient functioning of the economy as profitable operation and growth. In sub-Saharan Africa, as in other developing countries, there are impediments to bankruptcy and shutdowns. Some of them might be due to the lack of legal infrastructure (an aspect of the underdeveloped social capital stock) like adequate bankruptcy laws. It might also be partly due to legislation to protect existing jobs inspired by non-economic considerations. An attempt was made to quantify the rigidity created by different types of regulations on closing down a business. To this effect, the employers were asked to indicate how government restrictions on transfer of assets or the legal process of bankruptcy and liquidation ranked as problems in *closing down a business* relative to labor issues emanating from the government or trade unions. The employers could base their replies on their past experience or knowledge about others. The data are given in Table 7.6.

It is seen that all the Anglophone countries in Table 7.6 "the cost of firing workers" was clearly the most important. Zimbabwe was the only one reporting that government restriction on firing workers was also quite important – about 40% of the firms indicating this to be a significant issue with a score of 2.8 out of a maximum of 5. Trade union restrictions on dismissal were adjudged less important, although of greater importance than restrictions on selling or bankruptcy.

It should, however be noted that in general the severity of all the restrictions increased with firm size. For the very large firms the impact of direct restrictions on closure seems to be as important as the cost of firing workers.

A very surprising aspect of the data obtained from the surveys was that the two Francophone countries – Côte d'Ivoire and Cameroon – systematically gave very low scores to all the problems mentioned in the questionnaires, labor as well as non-labor. In the absence of further information about systematic bias in the survey results on this point for the Francophone countries, we can only conclude that, contrary to common assumptions, labor regulations had less distortionary effects on manufacturing firms than in some of the other countries.

Table 7.6: Severity of the Impact of Existing Regulations in Closing Down a Business[1]

	Cameroon[2]	*Côte d'Ivoire*[2]	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Govt. restrictions on selling/transfer						
Overall	3.0 (1.2)	3.7 (1.2)	11.7 (1.4)	13.5 (1.4)	8.0 (1.3)	30.5 (2.0)
No of firms responding	165	353	437	469	522	174
By firm size						
Micro	2.7 (1.1)	0.9 (1.0)	2.9 (1.1)	7.6 (1.2)	1.2 (1.2)	8.3 (1.3)
Small	3.3 (1.2)	4.3 (1.2)	11.2 (1.4)	13.2 (1.5)	4.9 (1.2)	20.0 (1.8)
Medium	3.7 (1.1)	6.9 (1.2)	15.8 (1.5)	15.3 (1.5)	16.2 (1.5)	38.6 (2.2)
Large	7.7 (1.2)	3.4 (1.1)	23.7 (1.9)	33.3 (2.1)	16.7 (1.5)	35.7 (2.2)
Very large	0.0 (1.0)	4.5 (1.2)	33.3 (2.1)	45.0 (2.7)	18.0 (2.0)	42.2 (2.7)
Govt. restrictions on firing workers						
Overall		4.3 (1.2)	33.4 (2.1)	19.1 (1.6)	19.4 (1.6)	52.0 (2.8)
No of firms responding		349	332	194	201	175
By firm size						
Micro		4.5 (1.2)	13.8(1.4)	1.4 (1.1)	6.7 (1.2)	19.4 (2.4)
Small		6.1 (1.2)	32.6 (2.1)	24.3 (1.6)	20.5 (1.6)	45.2 (2.7)
Medium		8.6 (1.6)	48.4 (2.4)	6.2 (1.7)	30.0 (1.9)	66.1 (3.3)
Large		16.7 (1.6)	53.3 (3.0)	16.7 (2.0)	24.3 (14.2)	62.1 (2.9)
Very large		22.7 (1.6)	53.8 (3.2)	54.5 (3.0)	40.0 (2.4)	73.9 (3.)

Note 1: The numbers outside parentheses indicate percentage of firms claiming the regulation to severely affect their decision-making. The numbers in parentheses stand for the average score reported for each question. The scores range from 1 to 5 for which one is *no obstacle* and five is a *very severe obstacle*. Based on this score range, scores 3 to 5 are considered severe and are chosen to calculated the percentages.
Note 2: For these two countries, the range of score is from 1 to 7 for which scores 1–5 is similar to other countries, score 6 is *no opinion* and score 7 is *not applicable*. For the purpose of this table, score 6 is dropped and score 7 is taken equivalent to score 1.

Table 7.6 (Continued) Severity of the Impact of Existing Regulations in Closing Down a Business[1]

	Cameroon[2]	*Côte d'Ivoire[2]*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Legal process of bankruptcy						
Overall	4.1 (1.2)	4.3 (1.2)	19.7 (1.6)	18.5 (1.6)	9.8 (1.3)	26.7 (1.9)
No of firms responding	169	345	417	460	523	158
By firm size						
Micro	3.3 (1.2)	2.7 (1.1)	17.1 (1.5)	13.6 (1.4)	3.5 (1.1)	17.1 (1.5)
Small	3.3 (1.2)	3.5 (1.2)	44.3 (2.4)	20.3 (1.6)	9.3 (1.4)	19.2 (1.7)
Medium	6.9 (1.2)	5.6 (1.2)	62.8 (2.9)	15.9 (1.5)	16,5 (1.5)	36.0 (2.0)
Large	7.7 (1.2)	10.7 (1.3)	66.7 (3.1)	31.2 (2.0)	10.0 (1.4)	25.9 (1.8)
Very large	0.0 (1.0)	10.0 (1.4)	69.2 (3.6)	52.5 (2.4)	24.0 (1.8)	40.0 (2.4)
Cost of firing Workers						
Overall		8.3 (1.3)	42.5 (2.4)	50.0 (2.7)	57.2 (2.9)	59.1 (2.7)
No of firms responding		349	322	194	201	181
By firm size						
Micro		7.8 (1.3)	15.7 (1.5)	22.5 (1.8)	41.7 (2.5)	13.2 (1.5)
Small		7.0 (1.2)	44.3 (2.4)	59.5 (3.1)	49.3 (2.7)	38.7 (2.3)
Medium		5.0 (1.4)	62.8 (2.9)	56.3 (3.3)	70.0 (3.5)	74.1 (3.3)
Large		10.7 (1.3)	66.7 (3.1)	100.0 (4.2)	50.0 (3.0)	41.3 (3.0)
Very large		14.3 (1.4)	69.2 (3.6)	72.7 (4.2)	50.0 (2.8)	78.3 (3.3)
Trade union restrictions on firing workers						
Overall		7.1 (1.2)	38.4 (2.2)	31.4 (2.1)	23.4 (1.9)	34.5 (2.1)
No of firms responding		350	328	194	201	171
By firm size						
Micro		1.8 (1.1)	10.1 (1.5)	4.2 (1.2)	5.0 (1.2)	11.4 (1.3)
Small		7.9 (1.3)	47.7 (2.4)	36.5 (2.2)	19.4 (1.7)	40.0 (2.3)
Medium		6.9 (1.3)	51.1 (2.5)	50.0 (2.9)	40.0 (2.4)	46.1 (2.5)
Large		7.1 (1.5)	63.3 (3.2)	100.0 (3.5)	42.9 (2.6)	34.5 (2.1)
Very large		17.4 (1.5)	69.2 (3.6)	63.6 (3.5)	56.0 (3.1)	33.3 (2.2)

Specific Regulations: Foreign Exchange

The RPED surveys had a specific question on the shortage of foreign exchange as it affected firms' operations. The respondents were asked to rank the problems created by foreign exchange controls and the results are reported in Table 7.7.

Table 7.7: Severity of Foreign Exchange Problems

	Cameroon	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Delay in Obtaining Foreign	10.2	44.1	8.6	13.4	41.2
Exchanges	(1.34)	(2.61)	(1.27)	(1.45)	(2.50)
Availability of Foreign	9.4	45.7	4.3	14.3	45.1
Exchanges	(1.31)	(2.69)	(1.14)	(1.51)	(2.66)
Paperwork Required	30.8	32.7	11.8	9	45.9
	(1.98)	(2.18)	(1.40)	(1.28)	(2.65)

Note: The numbers outside parentheses indicate percentage of firms claiming the regulation to severely affect their decision-making. The numbers in parentheses stand for the average score reported for each question. The scores range from 1 to 5 for which one is *no obstacle* and 5 is a *very severe obstacle*. Based on this score range, scores 3 to 5 are considered severe and are chosen to calculate the percentages.

It is interesting to note that even after many of these countries had adopted liberalization measures prior to the date of the surveys, three of the five countries producing answers to this question had a serious problem with the availability of foreign exchange in time. Firms in Tanzania and Zambia seem to be less bothered on this point. Again there is indication that the administration of the control regime was as important, if not more so, as the actual shortage.

Specific Regulations: Taxes and Subsidies

It appears from both the RPED and the World Bank surveys that taxation and their administration were considered by entrepreneurs to be high in the list of problems facing them. The general tax system in most countries in the region includes both internal and external taxation. The main component of the latter is import duties on inputs. The domestic taxes include sales tax, the *company tax* usually calculated as a tax on profits for firms in the formal sector, and a local tax on informal sector firms, comprising a fixed duty, though variables across districts, and sometimes a proportional duty on building and machinery used in the business. The incidence of taxes as culled from the RPED surveys are given in Table 7.8.

Table 7.8: The Incidence of Taxes

	Côte d'Ivoire	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Company Tax						
Percentage of Firms Paying	62.8	83.9	52.9	68.8	65.4	51.5
Mean Percentage of Total Sales	3.23 (5.76)	1.22 (5.19)	2.85 (3.50)	0.31 (2.24)	2.81 (3.31)	5.55 (6.58)
Sales Tax						
Percentage of Firms Paying	51.5	44.7	50.7	53.2	61.2	61.9
Mean value Relative to Total Sales	9.17 (7.94)	6.47 (10.49)	9.31 (7.65)	.. ..	9.04 (10.65)	3.55 (6.10)
Local Tax						
Percentage of Firms Paying	75.1	.. ..	79.6	.. ..	63.2	69.4
Mean value Relative to Total Sales	1.90 (5.10)	.. ..	0.45 (1.10)	.. ..	0.98 (2.76)	0.63 (3.73)

Note: Based on Wave one of the RPED surveys. The values in parentheses are standard deviations.

A significant majority of firms reported paying taxes, and the incidence of taxes as percentage of sales was not by any means on the low side. However, firms in some lines of business or of certain characteristics enjoyed tax advantages. The problem here is that the benefits affected different firms differently, and also that there is considerable uncertainty about the availability of advantages. Needless to say, the discretionary power given to administrators increased the costs of "corruption" which, we have seen, was identified as the major problem of businesses. Marchant (1997) in the study of Côte d'Ivoire reported that industries like furniture or clothing, which were dominated by informal sector firms were "completely out of the allocation process (of benefits)." Large firms seem more likely to have been favored. "Quite often, recipients accounted for a large share of the sales on some markets like *gross textile products and secondary products for human consumption;* their respective market shares were about 84.5% and 70.2%. Some of them were even among the five most important firms in a market. Very often, recipients were foreign owned. Of noticeable importance is the fact that some of the less competitive markets were also those where firms benefited the most from tax advantages" (*ibid*., pp. 13–14).

Turning now to investment subsidies, many countries in sub-Saharan Africa have tried to help entrepreneurs with such schemes as duty drawback on imported machinery; rebates on tax dues; schemes of accelerated depreciation; and special initial allowances for investment undertaken.

The RPED surveys tried to collect information on the experience of such subsidies for the sample surveyed. The following table summarizes the results. In general, close to or over 20% of firms in Zimbabwe, Ghana, and Côte d'Ivoire have succeeded in obtaining investment subsidies and while more than a third of the firms in Cameroon have done so, only a fraction of those in Kenya, Tanzania, and Zambia have obtained investment subsidies. The form of subsidy received also differs considerably. For instance, firms in Zimbabwe are more likely to obtain their subsidy through special initial allowances, whereas firms in the Francophone countries receive their subsidy mostly in the form of tax incentives such as tax rebates or duty drawback on imported machinery.

Table 7.9: The Incidence of Subsidies

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Percentage Applied Investment Subsidy	52.3	22.9	24.0	4.4	5.3	15.9	33.5
Percentage Received Investment Subsidy	37.3	18.5	21.5	3.6	3.8	9.4	23.1
Average Waiting Months	10.55	8.07	7.5	..	3.51	4.09	9.23
	(8.13)	(5.44)	(7.11)	..	(3.82)	(3.38)	(8.42)
Number of Firms Received Each Type of Subsidy							
Duty Drawback on Imported Machinery	28	24	35	10	8	16	13
Reduction in Company Tax Rates	19	22	13	..	3	9	4
Rebates on Tax Dues	46	22	5	5	3	6	1
Deferrals/and or Reduction in Income Tax	9	8	4	6	3	5	4
Accelerated Depreciation	2	2	9	..	0	5	6
Regional Tax Reductions	4	3	2	..	0	2	0
Special Initial Allowances	5	2	..	9	7	3	35
Number of Respondents	195	227	200	225	209	214	195

Note: Based on Wave one of the RPED surveys. The values in parentheses are standard deviations.

To obtain a better picture of how investment subsidies are granted, we have also conducted a Probit estimation on the determinants of investment subsidy. In this estimation, like in other models, different variables are added to account for firm characteristics. These variables in addition to country and sector dummies also include, firm size, firm age, and several dummy variables for export orientation, capital location, legal status, and ownership. In addition to the fact that the estimation provides a rather good fit, the results turn out to be interesting to say the least. The country specific dummy variables were found significant for Cameroon, Kenya, and Tanzania – the first positive and the latter two negative. This indicates that the rather significant differences as between the other countries – Zimbabwe, Ghana, Côte d'Ivoire, and Zambia – found in the first line of Table 7.9, can only be explained through other variables. Furthermore, neither legal status (entrepreneurship) nor capital location were significant although both positive. The size of the firm appears to contribute significantly and positively to the probability of receiving investment subsidy. Larger firms, as might be expected, appear to gain much better access to these subsidies. Firm age, however, is significant but with a negative sign, implying that the older firms are less likely to receive subsidies. It is important to note that these results are not sensitive to the inclusion of the micro firms and hence provide a rather strong indication as to which type of firms are more likely to receive investment subsidies, the bigger and the younger.

Among other variables, export orientation and the ownership structure also appear to contribute strongly to the probability of access to investment subsidy. Export-oriented and local private firms are significantly more likely to receive subsidies. Not surprisingly, foreign owned firms are less likely to get subsidies, while firms owned jointly by local and foreign entrepreneurs do not exhibit much difference from the locally owned firms. The state-owned firms, however, are found much less likely to access investment subsidies – a finding that partly explains the overall small incidence of subsidies in a country like Tanzania which has a relatively large number of state-owned firms.

Problems of Infrastructure

We have seen earlier in the chapter that both the World Bank Survey and the RPED survey – differing substantially in the coverage and design of the samples – produced the result that all respondents recognized infrastructure problems to be in the top league of their problems. The RPED questionnaire enables us to go into some details about the nature of the infrastructure problems faced by manufacturing firms in Africa. The following two tables set out the relative importance of different types of problems encountered within the general area of infrastructure. Respondents were asked to score each type of infrastructure service used on a scale of increasing difficulty ranging from 1 to 5. Table 7.10 classifies the responses by country.

Table 7.10: Relative Difficulties with Different Types of Services (by Country)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Electricity	47.8	52.0	50.9	50.4	65.9	54.2	49.2
	(2.72)	(2.77)	(2.72)	(2.68)	(3.27)	(2.95)	(2.71)
Water	20.2	15.3	15.0	30.7	20.6	33.6	15.9
	(1.68)	(1.52)	(1.44)	(2.05)	(1.75)	(12.14)	(1.59)
Freight Transport	29.9	13.5	17.9	16.9	16.8	29.0	.
	(1.92)	(1.45)	(1.55)	(1.58)	(1.49)	(1.98)	
Transport for Workers	9.7	3.5	.	8.5	11.7	30.4	51.1
	(1.31)	(1.13)		(1.30)	(1.34)	(2.01)	(2.67)
Roads	41.7	10.5	11.7	51.3	36.4	59.8	19.9
	(2.37)	(1.33)	(1.36)	(2.88)	(2.02)	(3.17)	(1.59)
Telephones	45.6	27.9	38.2	45.1	52.6	62.6	81.0
	(2.55)	(1.95)	(2.34)	(2.48)	(2.91)	(3.11)	(3.95)
Air and Sea Port	36.0	15.7	11.2	12.8	3.8	5.2	16.4
	(2.26)	(1.49)	(1.36)	(1.41)	(1.13)	(1.16)	(1.49)
Waste Disposal	12.0	10.0	11.7	37.6	20.5	38.8	12.5
	(1.49)	(1.34)	(1.35)	(2.32)	(1.72)	(2.35)	(1.41)
Security	41.3	25.3	.	47.9	23.1	60.7	44.5
	(2.50)	(2.90)		(2.59)	(1.73)	(3.07)	(2.35)
Observations	209	229	214	226	214	214	195

Note: Like before, the figures inside parentheses represent the degree of severity as ranked from 1–5 and the values outside parentheses are the percentage of firms that perceive each problem to be severe.

In a subsequent question the firms were asked to identify their "greatest problem" from the above list. It is seen that the supply of electricity is the biggest problem in all countries. Roads and telephones are the next importance. Problems with roads are particularly mentioned in Kenya while telephones are seriously under-performing in Ghana. A large proportion of firms in almost all countries indicated that "security" was also a very serious problem, and the score given to it is also quite high.

Another perspective on the inter-country variation of the relative importance of different types of problems can be obtained from Table 7.11, which sets out the column percentages of firms identifying the most severe infrastructure problem in each country. Electricity tops the list in Côte d'Ivoire, Ghana and Tanzania. Telephones are cited by the largest group of firms in Zimbabwe as the "biggest problem," while "security" seems to be a particularly important concern in Zambia. Roads come as an important second category of problems in Cameroon, Côte d'Ivoire and Kenya.

Table 7.11: Percentage of Firms with the Biggest Problem (Column percentages for each country)

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Electricity	24.0	62.9	48.4	24.9	52.7	21.9	15.2
Water	2.7	4.0	4.5	8.3	4.3	5.2	6.7
Freight Transport	9.8	4.0	7.7	1.5	7.0	5.7	6.7
Transport for Workers	0.5	1.3		1.0	1.6	3.6	13.5
Roads	15.8	20.0	4.5	28.8	8.6	13.0	2.8
Telephones	13.1	8.6	45.2	9.3	10.2	13.5	47.8
Air and Sea Port	15.3	6.0	3.2	0.5	7.5		1.1
Waste Disposal	1.6	4.0	4.5	7.8	4.8	5.2	0.6
Security	2.0	6.0		15.2		25.0	5.1
Observations	183	151	155	205	186	192	195

We had seen earlier in the chapter (Table 7.3) that infrastructure problems increased in importance as "obstacles to growth" as the firm size increased, after controlling for other relevant factors and country dummies. It can be seen from the results set out in Table 7.12 that the same conclusion is reinforced for individual items of infrastructure services. Smaller firms, operating in localized markets and often utilizing non-mechanized techniques of production, are less bothered by inadequate infrastructure than large firms. However, it is worth emphasizing that even for the sample of micro firms the problem of inadequate electricity and telephones was noticed by one-third of the firms, while bad road conditions created difficulties for 20% of them.

Table 7.12: Relative Difficulties with Different Types of Services (by size groups of firms, all countries)

	Micro	*Small*	*Medium*	*Large*	*Very Large*
Electricity	31.8	37.2	49.7	48.6	53.5
	(2.08)	(2.28)	(2.68)	(2.49)	(2.61)
Water	14.9	24.0	23.0	28.8	39.6
	(1.53)	(1.82)	(1.82)	(1.93)	(1.97)
Freight Transport	12.6	17.9	26.4	33.9	40.0
	(1.45)	(1.56)	(1.86)	(1.99)	(2.31)
Transport for Workers	10.4	17.9	23.1	27.9	36.4
	(1.33)	(1.58)	(1.81)	(1.89)	(2.00)
Roads	19.8	33.4	55.2	47.1	43.0
	(1.69)	(2.17)	(2.62)	(2.52)	(2.44)
Telephones	33.2	56.7	65.8	68.2	63.5
	(2.23)	(2.75)	(3.19)	(3.28)	(3.10)
Air and Sea Port	1.9	22.4	26.7	28.9	27.7
	(1.06)	(1.43)	(1.85)	(1.95)	(1.88)
Waste Disposal	19.0	21.7	23.0	24.0	18.9
	(1.65)	(1.75)	(1.81)	(1.82)	(1.64)
Security	31.8	37.2	49.7	48.6	53.5
	(2.09)	(2.28)	(2.08)	(2.49)	(2.61)
Observations	489	454	169	154	159

Note: Figures in the Table as in Table 7.10.

Table 7.13: **Percentage of Firms Reporting the Source of the Problem**

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Electricity							
Power Outage	50.0	38.6	66.1	74.6	89.6	21.1	50.8
Not Supplied	4.8	3.8	2.4	10.8	3.5	6.8	5.8
Too Expensive	42.7	55.3	29.1	6.9	5.6	70.7	36.7
Observations	124	132	127	96	129	133	132
Telephone							
Not Available	20.0	6.7	26.9	14.3	15.3	20.9	21.1
Do Not Work	9.5	54.7	55.9	57.1	77.9	39.2	72.9
Too Expensive	57.1	24.0	3.2	5.1	3.1	34.6	1.2
Observations	105	75	124	107	131	153	166

The RPED survey went on to ask probing questions about the exact nature of difficulties faced by firms for each of the infrastructure services mentioned in the tables. We have tabulated the answers obtained for two of the most important services which were considered to be problematic. The nature of the difficulties can be understood from the data presented in Table 7.13. For electricity, power outrage was the dominant source of the problem in Kenya and Tanzania, although it was quite important in all countries. But electricity seems to have been perceived as being too expensive in the two Francophone countries, Ghana and Zimbabwe, and high price of this service seems to have been the dominant source of complaint in Zambia. For telephone services, "not working" seems to be the common complaint in most countries

Conclusions

The review of the regulatory environment has outlined a wide variety of areas in which firms in sub-Saharan Africa are faced with administrative interference. We have referred both to the World Bank Survey of 1997 and the RPED surveys (1993–96) in which respondents were asked to evaluate the impact of these regulations on the firm's operations, relative to other pressing problems facing them. Both sets of surveys yielded the result that the impact of regulations was *not* in the top of the league in the entrepreneurs' perception of difficulties. This is true whether we consider the responses relating to "obstacles to expansion," "operation of the firm" or "closing down the business." This rather surprising result is probably due to the fact that there is a difference in the impact of the regulations *per se* and the problems created by their administration. Regulations increase the discretionary power of bureaucrats and add to the uncertainty facing the firms. The RPED survey did not seek explicitly the evaluation of "corruption" as a separate category of difficulties faced by the firm. But the World Bank Survey did, and was singled out by the respondents as a major source of difficulties. Another source of the difference in the results from the two surveys is almost certainly due to the different types of firms surveyed. The World Bank survey had a much larger representation of very large firms and of firms with foreign participation, operating in all sectors – not just manufacturing. Apart from this important difference with respect to the impact of "corruption," both sets of survey agree on the more important obstacles to the operation and growth of the firm. Finance, infrastructure, taxes and lack of demand dominate the list.

There are fifteen types of "obstacles" specified in the RPED questionnaire which managers were asked to score in terms of severity on a scale of 1 to 5. We regrouped the obstacles into four groups: demand, credit, infrastructure and regulation constraints. Classification of the mean scores by type of constraint and firm size shows that, while credit constraint was perceived to be the most severe, and regulation the least, for firms of all sizes, the importance of credit constraint decreased with firm size, while that of the others increased. A multivariate model was estimated to identify the major factors affecting each of the four groups of obstacles separately. The results confirm that the negative monotonic relationship between firm size and credit constraints stand even after we have controlled for other factors, while the relationship between firm size and obstacles due to regulations and infrastructure problems is significantly positive. Demand constraints are the most important for textiles and least important for firms in the wood sector. Of the variables indicating outward orientation firms using imports suffer more from demand, regulation and infrastructure, but export oriented firms report no significantly different degrees of obstacles than other firms in any of the categories analyzed. Foreign owned firms suffered less from credit constraints, but more so from the others.

We also looked at individual regulatory areas. One related to the regime of foreign exchange control. By the date of the surveys, all the RPED countries had adopted liberalization measures, one of whose objects had been to ease the pressures on the foreign exchange constraint arising from the overvaluation of currencies. Nevertheless, it was interesting to find that of responding firms three of the five countries – Cameroon, Kenya and Zimbabwe – considered the foreign exchange issue to be a severe problem.

From the data collected on the amount of taxes of various kinds paid relative to sales, it appears that the ratio, although not negligible, was not excessively high. There are a variety of means of allowing tax rebates. The evidence suggests that the unequal and, perhaps arbitrary, treatment of firms in granting rebates and subsidies, is probably the root cause of the high ranking given to tax issues in the entrepreneurs' evaluation of difficulties.

Finally, the last section of the chapter, we considered problems of infrastructure services, which were found to be in the top league of difficulties reported by the firms, less than credit constraints, but much more so than regulations. It seems that the difficulties are, in order of importance, electricity; telephone services and roads.

8 Contract Flexibility and Enforcement

Credit markets are among the most important institutions in a modern economy, affecting wealth distribution, aggregate output, and possibly the growth rate of GDP. In most developing countries today, the efficient functioning of such markets is severely hampered by the problems of a lack of collateralizable assets (which precludes entry into the formal side of the market for loans) and loan enforcement in informal credit markets. As a result and as revealed in the chapter on finance, the use of other sources of loan such as trade credits have been widespread among African manufacturing firms. These types of semi-formal contractual practices give rise to the issue of enforceability, which has attracted a lot of interest in both theory and practice among studies of firms in developed countries.

The study of contractual relationship in developing countries, however, remains limited mostly due to data constraints. Among the few available studies, Fafchamps (1996) uses RPED case study for Ghana to study the enforcement of commercial contracts in Ghana, whereas Fafchamps *et al.* (1998) also use RPED data to examine the relation between inventory provision and the implicit contractual risk with suppliers. Last but not least, Bigsten *et al.* (1999) use RPED surveys for five countries, including Cameroon, Côte d'Ivoire, Kenya, and Zimbabwe in addition to Burundi to study the structure of contracts, their flexibility, and contract resolution. In this section we intend to follow this path by studying the structure of contracts in sub-Saharan countries under study. We begin by providing empirical evidence on the issue of contractual disputes and enforcement patterns as used by clients and suppliers.

Contractual Disputes: Incidence, Frequency and Resolution

RPED surveys include a separate section devoted to the issue of resolution of conflicts between firms and their clients and suppliers. Each firm was specifically asked about the problems they have faced *last year* with regard to the relation with two separate groups: (i) their clients or customers who buy their product and services; and (ii) their suppliers who provide them with the essential inputs needed for their production process. The methods they have used to resolve those problems in each case were also recorded. This set of questions provides invaluable information that can help us better understand the structure of contracts in sub-Saharan countries more profoundly. Table 8.1 provides a summary of the first part of the conflict resolution section where the relation between firms and their clients is addressed. The conflict between a firm and its clients can arise from late payment or non payment by the client. As Table 8.1 reveals, with the exception of Tanzania, the issue of late payment has been prevalent in all sub-Saharan countries ranging from close to 43% in Côte d'Ivoire to almost 80% in Zimbabwe. Furthermore, while the percentage of firms facing non-payment by their clients in the previous year is considerably less, it still constitutes a very high number. For instance, in both Cameroon and Zimbabwe over 60% of firms were not paid by their clients in the previous year. However, as one might expect, the average number of late payment is almost twice that of non payment.

Table 8.1 also summarizes the methods used by the firms to resolve their conflicts. It shows that, in almost all cases, the vast majority of firms have used direct negotiation with their clients to resolve the non-payment or late payment while a small number (between 4–10%) have used private arbitration. More formal methods, however, such as intervention by a lawyer, or a court have only been used very extensively in Zimbabwe where almost half of the firms have resorted to them. In the other six countries, only between 15–30% have hired lawyer or gone to court to resolve their conflicts. Furthermore, whatever methods have been used in conflict resolution, between 34–61% of firms were successful in resolving the conflict by the time of the survey and it appears that a vast majority of those who have resolved the conflict were satisfied with the outcome. It is also interesting to note that in general between 34–46% of the respondents have indicated that they had continued their trade with the involved parties. However, there is a significant difference in this between those who have and those who have not successfully resolved their conflict. While between 59–81% of the former have indicated the resumption of trade, only 17–30% of the latter have. This is to be expected, but some might find surprising that the proportion who have continued trading even when they were dissatisfied with the resolution, is quite substantial.

Table 8.1: Firms Reporting Problems with Clients

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Late Payment							
Percentage	71.6%	42.8%	60.4%	60%	24.9%	67.8%	79.8%
No of Cases	..	2.19	5.07	5.64	1.35	8.39	10.2
	..	(5.7)	(9.6)	(4.2)	(5.63)	(13.6)	(14.9)
Non Payment							
Percentage	62.9%	34.1%	36.4%	36.4%	12.0%	39.4%	63.6%
No of Cases	..	1.25	1.76	1.22	0.89	1.35	4.7
	..	(3.3)	(5.4)	(3.9)	(3.9)	(2.7)	(0.6)
Resolution							
Direct Bargaining	90.6%	84.7%	..	72.2%	63.8%	88.5%	52.9%
Private Arbitration	11.6%	9.9%	..	3.5%	6.8%	6.4%	5.3%
Police	12.8%	10.9%	..	4.2%	6.8%	7.1%	5.3%
Lawyer	24.5%	16.4%	..	29.9%	15.3%	17.9%	47.7%
Courts	22.4%	17.3%	..	27.8%	32.2%	20.5%	43.8%
Outcome							
Resolved	34.5%	43.6%	..	50%	61.0%	64.3%	54.2%
Satisfied	84.0%	79.2%	..	87.1%	88.9%	82.0%	74.1%
Still Doing Business	43.6%	46.3%	..	43.4%	37.3%	..	36.1%
Resolved(1)	81.0%	78.9%	..	74.2%	62.0%	..	62.3%
Unresolved(2)	27.6%	28.6%	..	21.7%	29.6%	..	17.2%
Doing Business if First Time*	27.9%	31.3%	..	19.4%	30.0%	..	24.5%
Observations	208	229	212	225	217	214	198

Note: Based on Wave one of the RPED surveys. The values in parentheses are standard deviations.
* Refers to the case where this was the first transaction with the client.

Table 8.2 gives data on the responses to questions about problems encountered with the firms' *suppliers*. Comparing these figures with those of Table 8.1, we find that firms are less likely to face conflicts with their suppliers and the frequency of these conflicts is much lower. Between 15–54% of firms have faced late delivery by their suppliers in the prior year to the survey while between 14–55% have suffered from deficient quality. Firms in Zimbabwe are more likely to face both late delivery and deficient delivery as over 50% of them have been affected, while only 15–22% of firms in Côte d'Ivoire, Ghana, and Tanzania have reported contractual problem with their suppliers in the previous year. Zambia reports a disproportionately high incidence of deficient quality problems, firms with such problems being almost twice those who have faced late delivery. As with clients, firms have relied heavily on direct bargaining to resolve contractual problems with their suppliers. Along with the fact already noted that firms have less frequent contractual problems with their suppliers than with their clients, it appears that they are even more willing to settle their problems with suppliers amicably through negotiations. The percentage of firms using direct bargaining ranges from 56% in Zimbabwe to 85% in Cameroon. The use of other methods such as arbitration or even more formal methods such as action through courts have been negligible and below 7% in all countries. Between 61–78% of firms have reported their problems resolved prior to the survey and over 80% have been satisfied with the outcome. Furthermore, overall the vast majority of firms (between 85–90%) were still doing business with their suppliers even if the dispute have yet to be settled (between 69–85%).

Table 8.2: **Firms Reporting Problems with Suppliers**

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Late Delivery							
Percentage	37.1%	22.5%	19.7%	38.7%	15.2%	26.3%	54.3%
No of Cases	..	1.46	0.83	6.88	0.67	2.87	13.1
		(11.9)	(3.8)	(32.9)	(2.08)	(10.2)	(15.6)
Deficient Quality							
Percentage	43.7%	17.2%	22.3%	41.4%	14.3%	47.9%	55.4%
No of Cases	..	0.45	1.11	3.85	0.45	5.24	8.5
		(1.6)	(5.3)	(24.9)	(1.54)	(15.5)	(12.2)
Resolution							
Direct Bargaining	84.8%	79.0%	..	65.0%	68.1%	76.7%	55.6%
Private Arbitration	2.9%	6.6%	..	2.5%	0%	3.4%	1.6%
Police	2.0%	1.6%	..	3.3%	0%	0.9%	0%
Lawyer	5.9%	3.3%	..	5.0%	0%	4.3%	2.5%
Courts	5.9%	0%	..	3.3%	2.2%	4.3%	3.3%
Outcome							
Resolved	78.4%	68.9%	..	67.5%	78.3%	61.2%	65.8%
Satisfied	84.4%	83.3%	..	88.8%	80.6%	84.5%	76.9%
Still Doing Business	..	85.2%	..	87.3%	87.0%	..	89.9%
Resolved(1)	..	97.1%	..	94.4%	86.1%	..	95.2%
Unresolved(2)	..	69.2%	..	77.1%	88.2%	..	85.2%
Observations	207	227	208	222	217	213	197

Note: Based on Wave one of the RPED surveys. The values in parentheses are standard deviations.

Characteristics of Clients and Suppliers

Before analyzing the underlying behavior producing the outcome described above, it is important to provide some information with regard to their clients and suppliers. Table 8.3 provides a summary of the characteristics of the two groups. Close to two-thirds of the clients in almost every country are individuals and with the exception of Tanzania, where 40% of firms sell to public firms, less than a quarter of the clients are public firms. The use of credit purchase is quite widespread, but is clearly more important for public clients. Private clients who have bought on credit rather than cash ranges between a third and a half of the sample, except that in Tanzania only 19% used credit. The percentage of public clients who have bought on credit is also conspicuously low in Tanzania at 18%. In the other countries it ranges from 41% in Ghana to a high of 85% in Côte d'Ivoire. It also appears that the use of written agreement to conduct trade with the clients is not the prevalent mode, since around 50% of the firms use this type of agreement only in Cameroon and Zimbabwe, and the percentage is significantly less in the other countries. The table also gives the composition of problematic clients by different categories. The proportion of public firms among problematic clients is smaller, simply because the proportion of such firms in the total of clients is smaller. To get at the incidence of problems among this category of clients, one has to compare the percentages in this row with the percentages of the total given in row 3 of the table. If we make this comparison, we observe that in most cases the incidence of problems among public clients is proportionate to the percentage of public clients implying that there does not exist much difference between public firms and others in terms of their reliability. The primary exceptions here are Zimbabwe and Zambia: in Zimbabwe 24% of the clients were reported to be public firms whereas public firms constitute only a very small fraction (3.9%) of the problematic clients. In Zambia, 23% of the clients were public firms whereas the percentage of problematic clients is 12.9%. It is also interesting to note that firms are usually familiar with their problematic clients as in general only a quarter of problematic clients were first clients. Here Zimbabwe with over 34% and Tanzania with 17% have the highest and lowest percentages of first time problematic clients. In fact, on average, firms appear to have a rather long, although with varying degree (between 2.5–9.8 years), relationship with their problematic clients.

Like the clients, private individuals and firms also constitute over two thirds of the suppliers and with the exception of Tanzania, the public firms represent a small portion (5–17%) of the suppliers. The percentage of firms who use credit in their transactions with their suppliers varies considerably among countries, but the pattern resembles that indicated earlier for the clients. More than half the firms in Cameroon, Kenya, and Zimbabwe report using credit when dealing with private suppliers. As with the dealings with clients, Tanzania seems to be the country with a very low use of credit in transactions with suppliers. Note while public sector clients are very keen to use credit transactions (except in Tanzania), the use of credit transactions by public *suppliers* is much less in most countries. The surveys also indicted (not shown in the table) that a very small percentage of firms (low to mid single digit) are required to pay cash in advance in purchasing their raw materials.

Firms in sub-Saharan Africa, also, appear to be very loyal to their suppliers. According to RPED surveys, firms purchase the lion's share of their raw material from a single source, as the share of primary supplier of the raw material ranges from 61% in Kenya to close to 79% in Zimbabwe. This, despite the fact that few firms have indicated a monopsonistic situation with respect to their material inputs. In fact, the percentage of firms that had indicated dealings with a sole supplier, ranges from a low 3.4 in Ghana to a maximum of 21.3% in Côte d'Ivoire and Zimbabwe. This loyalty, however, has not been driven by a possible family or tribal relation between the firm and its suppliers as only a fraction of firms have categorized their suppler as a family member or a member of the same tribe.

As one might expect, the majority of the problematic suppliers are private firms and a very small percentage of them have any family or tribal relationship. Furthermore, with the exception of Tanzania, the percentage of first time problematic suppliers (those the firm has had the first transaction with) is below 10%, far below that of first time clients where it is over 20% and reaches 34% in Zimbabwe. This suggests that the firm and its supplier have had a rather lengthy relation whether or not they encountered contractual problems. In fact, the average years of relation with the problematic supplier ranges from close to 6 years in the Francophone countries to over 16 years in Zimbabwe. Interestingly, this is not much different from the overall years of relationship with all suppliers, problematic or otherwise, as provided in Table 8.3.

In sum, it is a normal procedure in the sub-Saharan countries represented in our survey to buy or sell on credit. Contractual problems arising from this relationship are widespread for both clients and suppliers; they are not restricted to family or tribal members but occur frequently even though the firms enjoy a long and loyal relationship with their respective partners. The majority of firms use informal methods such as direct bargaining to resolve their problems and they rarely resort to formal methods such as hiring a lawyer or going to court. The surveys indicate that the majority of these negotiations are successful as most of the conflicts had been resolved by the time of surveys and most of the firms are satisfied with the outcome.

Table 8.3: Characteristics of Clients and Suppliers

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
			Clients			
Type of Clients						
Private	73%	82%	76%	81%	78%	68%
Credit Purchase	56%	51%	32%	19%	31%	49%
Public	12%	13%	15%	40%	23%	24%
Credit Purchase	75%	85%	60%	18%	43%	67%
Written Agreement	53%	31%	44%	40%		51%
Characteristics of Problematic Clients						
Type of Client						
Individual	38.3%	57.7%	38.9%	32.2%	34.8%	25.5%
Private Firm	44.3%	25.2%	47.2%	23.7%	52.3%	64.1%
Public Firm	14.8%	12.6%	12.5%	42.4%	12.9%	3.9%
Relative, Same Tribe	13.6%	7.6%	21.7%	9.1%	3.7%	13.3%
First Time	29.7%	28.8%	21.7%	16.9%	23.5%	34.2%
Years of Relation	5.12	2.54	7.95	6.36	9.59	6.8
			Suppliers			
Type of Supplier						
Private	85.3%	76.2%	77.4%	67.6%	62.5%	85.3%
Credit Purchase	47%	32%	58.2%	8.7%	18%	60.8%
Public	15.2%	12.4%	7.4%	35.7%	21%	16.7%
Credit Purchase	42.3%	28.2%	25.1%	4.5%	20.6%	72.5%
Loyalty to Supplier						
Share, Primary Supplier	70.4%	77.7%	61.4%	79.2%	65%	78.8%
Sole Supplier	8.3%	21.3%	12.8%	15.8%	18.7%	21.3%
Friend or Family	6%	2.4%	11.1%	4.1%	2.3%	4.2%
Same Tribe	7.7%	3.9%	15.2%	5.3%	3.8%	12.8%
Years of Relation	7.3	7.0	8.7	8.6	9.6	14.7
Characteristics of Problematic Supplier						
Type of Firm						
Individual	8.7%	32.3%	14.8%	27.7%	11.1%	3.2%
Private Firm	74.0	40.3	72.1	19.1	73.5	79.4
Public Firm	1.9%	3.2%	6.6%	42.6%	9.4%	11.9%
Relative, Same Tribe	5.1%	0	0	4.3%	0	7%
First Time	10.4%	9.8%	5.8%	23.4%	7.7%	8.9%
Years of Relation	5.9	6.1	8.9	9.03	10.1	16.2
Observations	207	227	222	217	213	197

Note: Based on Wave one of the RPED surveys.

Methods Firms Use to Avoid Problems

The prevalence of contractual problems within sub-Saharan countries suggests that firms might have designed methods to screen their potential clients and suppliers. In RPED surveys, respondents were asked what strategies they follow to avoid problems with their clients and suppliers if they sell or buy on credit, and if problems occur what sort of penalties they seek. The responses given focus primarily on methods to avoid non payment and of screening trustworthy clients and suppliers. The results are summarized in Table 8.4.

The table indicates that the majority of respondents have not asked for any specific guarantee for their latest credit sale. In fact in Côte d'Ivoire, Kenya, and Zimbabwe over 70% of firms have asked for no guarantee. The primary type of reported guarantee has been post-dated check or invoice, which almost 40% of respondents in Zambia and close to 30% of those in Cameroon have asked for in their most recent credit sale. Interestingly enough, physical collateral has been seldom sought in any credit sale. The same observations can be made about relation with suppliers. Firms were asked to list the type of guarantee they provided to their suppliers/sub contractors on their three most recent purchases. The results (not in the table) provide more or less the same picture. Most firms, except those in Zambia, do not provide any specific guarantee to their suppliers when purchasing on credit. If they do, however, it is most likely a post-dated check or invoice. Other more formal sources of guarantee such as third party guarantee or physical collateral are seldom provided.

Table 8.4: Methods Used by Firms to Avoid Problems

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Zambia*	*Zimbabwe*
Type of Guarantee Asked					
None	48.2%	72.6%	72.9%	35.4%	64.2%
Physical Collateral	2.4%	0%	6.0%	2.4%	0.6%
Third Party or Group Guarantees	0.6%	11.5%	3.1%	1.6%	3.4%
Post-dated Check or Invoice	29.9%	15.9%	11.3%	46.6%	21.0%
Type of Penalty					
Interest Penalties	0.6%	30.0%	7.0%	6.3%	11.7%
Interruption of Credit	13.8%	13.3%	11.9%	2.4%	1.2%
Interruption of Deliveries	7.5%	1.1%	6.7%	8.7%	16.4%
Legal Action	10.0%	7.8%	59.7%	29.9%	28.1%
Rescheduling	45.0%	36.7%	9.0%	41.7%	18.7%
Observations	164	113	133	127	176

Note: Based on Wave one of the RPED surveys.

Firms were also asked what type of penalty they impose on their clients if they fail to repay for their credit sale or what type of penalty is imposed on them if they fail to repay on their credit purchase. As Table 8.4 reveals, rescheduling is the predominant option in both Francophone countries as well as in Zambia. However, respondents in Kenya and Zimbabwe indicate that more severe penalties such as legal action or interruption of delivery were taken but even in these two countries those firms that chose legal actions are in a minority. Moreover, a very small percentage of firms have sought to penalize through or have been penalized by credit interruption. In general it appears that most firms show flexibility and understanding when difficulties arise.

Some Evidence from Ghana

In a more detailed analysis of credit market in Ghana, fifty-eight Ghanaian firms were interviewed in January 1993. Questions were asked about the importance of trade credit in the financing of the firms' working capital requirements and the problems and difficulties firms encounter with suppliers and clients. Forty firms, ten for each sector, were selected from about two hundred available RPED firms and the rest of the sample consisted of suppliers and clients of these firms and of trading firms randomly selected on local markets. Using this survey, Fafchamps (1994) studies the methods used by these firms to avoid contractual problems. Most firms indicate that the most expedient way of avoiding problems with clients is to insist on cash payment on delivery. Credit should only be granted to clients who have demonstrated in the past their ability and willingness to pay. Fafchamps reports that firms sell to 34 regular customers on average, but only 6.6% of them receive credit and 8.7% pay advances. As our result indicates, relaying on legal sanctions and institutions is not perceived as a practical way of preventing problems. Many firms keep simple records of transactions and ask their clients to sign invoices when they get credit. Fafchamps also found that firms take different attitudes when problems arise. Some, mostly manufacturers, show flexibility and understanding. Others, mostly traders, suspend credit to bad payers and insist on the settlement of old debt before granting credit. Interestingly, only one respondent insisted that he actively maintains a reputation of being strict about payment deadline. Fafchamps reports that only one fourth of the traders and one sixth of manufacturers actively screen prospective trade credit recipients. The simplest methods consist of inspecting the client's work place.

Firms were also asked what strategies they follow to avoid problems with suppliers. Nearly a third of all the respondents – and nearly half the manufacturing firms – state that the best way to avoid problems is to inspect goods before payment. A third of the respondents indicate that paying cash for goods delivered on the spot and making sure that mutual obligations regarding payment and delivery are clearly defined and understood, although not necessarily put in writing, are efficient methods to prevent problems as well. Two-fifths of the firms declare that the best way to avoid problems is to deal with suppliers with whom they had satisfactory business in the past. Indeed, Fafchamps reports that the respondents in Ghana deal with an average of 5.2 regular suppliers, 2.9 of them on credit and that they have known the suppliers who give them credit for 7.9 years on average. Continuing business with reliable suppliers is thus the dominant way of preventing problems. This process, although not perfect against contractual problems since a portion of supplier's production risk is transferred to buyers through late or non-delivery, guarantees that when problems arise, they are more easily resolved.

For most business in Ghana, the direct and indirect costs of enforcement through courts are larger than the value of transactions and hence the threat of taking the debtor to court is seldom credible. Firms therefore prefer to conduct business with people they know. In particular they refrain from selling large quantities on credit to firms or individuals they know little about. What motivates firms to fulfill their contractual obligations, even if with some delay, is the desire to continue profitable, long-term relationships and to maintain sources of supply and demand. They pay their suppliers because they need more goods in the future and they deliver goods on time to keep customers satisfied. Thus the business relation which is partly determined by the debtor's business horizon is the creditor's best collateral.

Fafchamps further reports that in the case of Ghana, few reputation mechanisms were used. Information about bad clients or suppliers is not usually shared among firms, hence business transactions are seldom initiated on the basis of reputation. In fact, several Ghanaian firms when asked if they paid attention to their clients' reputation among the business community indicated that gossip is seldom reliable. In fact, only a few firms cited running back credit checks as a way of assessing the credit worthiness of their potential customers. Otherwise, personal recommendation is conceived as the only way by which economic agents can capitalize on their good behavior within larger group. Screening is also achieved by observing someone's pattern of cash purchases over time. Losses due to non payment by customers or non-delivery by suppliers are considered as part of a constant learning process about potential trading partners. Thus inexperienced firms are more prone to credit recovery problems.

Enforcement of Contracts and Contract Flexibility: A Theoretical Perspective

The results presented in the last section including the high frequency of contractual problems, the informal methods used to resolve these problems, and the resumption or continuation of trade with problematic firms, point to a high degree of contractual flexibility in sub-Saharan Africa. The RPED survey material strongly suggests that, even while agents are careful in entering into trading relationships involving credit or deferred payments, once business partners are selected, firms are keen on sustaining long-term relationships with them, and problems which arise as they do frequently – are dealt with through negotiations. This flexibility to a good extent is a by-product of the economic development of these countries. The low level of economic development results in an inevitable disruption within the supply chain network that ultimately manifests itself in different forms of contractual problems. Suppliers of raw material may not be able to deliver their commitments on time or may not be able to deliver the negotiated quality due to logistical problems often observed in a typical developing country. Furthermore, the markets for raw material and intermediate goods is many countries are very limited with a very limited available number of suppliers, which limit firms' alternatives. A primary aim of parties, once a business relationship is established, is to work to maintain it with understanding. The high cost of disruption of business, as well as of formal methods of contract enforcement, encourages firms to be highly flexible.

However, the necessity of contractual flexibility creates opportunistic behavior where the suppliers do not deliver their raw material or deliver deficient raw material and claiming unavailability, or the payment can be delayed on the basis of claimed cash flow problems. To reconcile between the necessity of contractual flexibility as a means for risk sharing and the possibility of opportunistic behavior, many economists have developed models which produce a solution of "optimum flexibility." "This is the level that maximizes economic welfare, that is, that ensures that most profitable transactions take place, and most opportunistic behavior is deterred" (Bigsten *et al.*, 1998).

Towards an Empirical Model

The theoretical exercises have not yet produced sufficiently precise hypotheses which can be tested about "optimum flexibility." Hence we have to rely on suggestive empirical patterns which are discussed in this section.

Determinants of the Incidence and Frequency of Contractual Problems

The incidence and frequency of contractual problems are partly a function of the environment in which the firm operates. Such factors can be accounted for by country dummies and sector dummies in a Probit model of the determinants of contractual problems. In addition, we need to specify firm-specific factors which can also affect the outcome. Larger firms are presumably more likely to engage in credit market and hence are more likely to face problems. Older firms, on the other hand, have a better chance of screening their clients and suppliers and therefore are less likely to face contractual problems. The legal organization of the firm can also be important. Limited liability firms may be more willing to take contractual risk with their clients and suppliers and hence are expected to face more contractual problems.

Factors affecting manager's ability to screen potential clients and suppliers also can impact the incidence and frequency of contractual disputes. Better-educated and more experienced managers might be able to screen clients and suppliers more easily. Furthermore, the ability of managers to join business groups can also enable better screening methods. We expect ethnicity to impact contractual disputes since the ease with which managers are able to participate in business networks might vary significantly from one ethnic group to another.

Table 8.5 provides estimation of the determinants of incidence and frequency of contractual problems with clients. The model follows the basic framework of the work done by Bigsten *et al.*, but some additional explanatory variables have been added. Also the sample of countries in our data set is different from that in Bigsten *et al.* Our work is based on a sample of four countries, Cameroon, Côte d'Ivoire, Kenya and Zimbabwe, and we use the first wave of the RPED survey. In the regressions to follow, we control for country differences in the pooled sample, and in all cases Zimbabwe is used as the base for the country dummies**.**

Country attributes appear to play a significant role. The result reported in Table 8.5 indicates that firms in Côte d'Ivoire and Kenya are significantly less likely to face contractual problems with the clients, in addition to the fact that the number of reported problem is also significantly lower. Among firm characteristics, however, the results indicate that although larger firms are not significantly more likely to incur contractual problems in total, they are more likely to face them more frequently. This is consistent with the fact that larger firms are presumably engaged with more clients and hence are prone to face problems with a larger number of firms. However, older firms are found more likely to face both significantly higher numbers of problems, and also with greater frequency. This result is somewhat unexpected, since older firms have more contacts and have been in business long enough to gather more information about their clients. It strongly suggests that firms which have been in the business long have learnt to live through and negotiate their way out of contractual problems with their clients, rather than develop better screening methods to weed out such problems altogether. However, the manager/owner's age is found to contribute significantly to a reduction of the frequency of late payments.

Table 8.5 also indicates that both individual clients and public firms are more likely to cause both late payment and non-payment. While one may expect individual clients to be more problematic, public firms are expected to cause less problems. Hence, this result is also rather contra-intuitive, but might say something about the quality of public sector management in the countries concerned. The export ratio, however, appear to show the expected sign. Firms that export more are found less likely to have problematic clients although the relation is not very strong. However, when we replaced the export ratio with an export dummy we found that firms that export are significantly less likely to face contractual problems with their clients in the form of either late payment or non payment. Using a written agreement, which one expects to lower the potential for contractual problems, was found to have the opposite (positive and significant) effect in both the incidence and frequency of late payment. However, it appears that these written agreements help deter non payment.

We have also added the screening and punishment methods that firms use in the case of contractual problems with their clients as determinants of the incidence and frequency of actual problems faced. Firms that use collateral and/or third party guarantee from their clients are unexpectedly more likely to face problems. The punishment methods used by the firm are also found to give the same result. Firms that disrupt credit or use legal action against their clients face more late payment or non payment. The causality problem is, however, particularly uncertain here.

Table 8.5: Determinants of Incidence and Frequency of Contractual Problems with Clients

	Incidence of Problems		*Frequency of Problems*	
	Late Payment	Non Payment	Late Payment	Non Payment
Constant	3.09 (1.52)	0.54 (1.43)	3.46 (1.42)	1.61 (1.39)
Country				
Cameroon	−0.47 (0.30)	−0.02 (0.20)		
Côte d'Ivoire	**−1.49 (0.29)**	**−1.13 (0.26)**	**−1.73 (0.25)**	**−1.01 (0.24)**
Kenya	**−0.92 (0.29)**	**−0.99 (0.26)**	**−0.81 (0.25)**	**−0.96 (0.25)**
Sector				
Food	0.11 (0.25)	0.30 (0.23)	0.41 (0.25)	0.30 (0.59)
Metal	0.18 (0.29)	0.12 (0.27)	0.23 (0.28)	−0.05 (0.04)
Wood	0.21 (0.30)	0.41 (0.28)	0.20 (0.30)	0.34 (0.43)
Average Incidence Firm Characteristics				
Firm Size	0.02 (0.07)	0.09 (0.07)	0.15 (0.07)	0.18 (0.07)
Firm Age	**0.35 (0.13)**	**0.28 (0.12)**	**0.39 (0.13)**	0.17 (0.12)
Limited Liability	−0.17 (0.21)	−0.06 (0.18)	0.27 (0.20)	−0.015 (0.20)
African Owner/Manager	−0.17 (0.27)	0.15 (0.25)	0.006 (0.25)	0.03 (0.24)
European Owner/Manager	−0.18 (0.32)	0.07 (0.28)	0.13 (0.28)	−0.10 (0.26)
Manager/Owner Age	−0.91 (0.41)	−0.42 (0.38)	**−1.12 (0.38)**	−0.65 (0.39)
Relationship with Clients				
Individuals	**0.81 (0.36)**	0.24 (0.28)	0.60 (0.28)	0.28 (0.27)
Public Firms	**0.58 (0.21)**	**0.64 (0.19)**	**0.38 (0.21)**	**0.44 (0.20)**
Export Ratio	−0.41 (0.40)	**−0.81 (0.32)**	−0.43 (0.32)	−0.66 (0.40)
Written Agreement	**0.57 (0.19)**	−0.07 (0.17)	0.46 (0.18)	−0.08 (0.18)
Screening and Punishment				
Collateral/Guarantee	**0.91 (0.27)**	−0.21 (0.21)	**0.82 (0.49)**	−0.07 (0.50)
Interruption of Credit	**1.47 (0.67)**	−0.12 (0.23)	0.30 (0.21)	−0.09 (0.23)
Legal Action	**0.43 (0.28)**	0.17 (0.47)	**0.52 (0.24)**	0.12 (0.23)
Observations	711	706	516	530
Log-Likelihood	−395.90	−455.58	−742.24	−609.51
Pseudo R^2	0.155	0.095	0.107	0.087

Note: Numbers in parentheses are standard errors. Bold indicate significance at 10% or less. In all cases Zimbabwe for the country and textile for the sector are used as base.

In sum, many of the results of the model tested in Table 8.5 are consistent with a world in which contract flexibility rather than formal contract enforcement is important in dealing with relationships with clients. Firm size and firm age do not give the manager an edge in reducing the incidence of problems. Formal measures taken to prevent these problems such as the use of written agreement or collateral and the threat of interruption of credit or legal action have not lead to a decrease in these problems.

Table 8.6: Determinants of Incidence and Frequency of Contractual Problems with Suppliers

	Incidence of Problems		*Frequency of Problems*	
	Late Delivery	Deficient Quality	Late Delivery	Deficient Quality
Constant	−0.29 (1.70)	0.69 (1.60)	−1.06 (2.13)	0.78 (1.67)
Country				
Cameroon	−0.29 (0.30)	−0.34 (0.29)		
Côte d'Ivoire	**−1.27 (0.32)**	**−1.85 (0.33)**	**−1.34 (0.30)**	**−1.71 (0.31)**
Kenya	**−0.55 (0.35)**	−0.48 (0.34)	−0.46 (0.36)	−0.39 (0.29)
Sector				
Food	−0.14 (0.25)	−0.29 (0.25)	−0.12 (0.34)	−0.08 (0.28)
Metal	−0.19 (0.25)	−0.31 (0.28)	−0.13 (0.41)	−0.22 (0.33)
Wood	−0.34 (0.30)	−0.09 (0.29)	−0.08 (0.42)	0.08 (0.34)
Average Incidence				
Firm Characteristics				
Firm Size	**0.24 (0.08)**	**0.16 (0.07)**	**0.35 (0.11)**	**0.32 (0.08)**
Firm Age	−0.10 (0.15)	0.01 (0.15)	−0.28 (0.19)	−0.16 (0.16)
Limited Liability	**0.34 (0.20)**	**0.36 (0.20)**	**0.47 (0.27)**	**0.45 (0.22)**
African Owner/Manager	**−0.52 (0.27)**	0.15 (0.27)	**−0.89 (0.34)**	−0.10 (0.27)
European Owner/Manager	−0.48 (0.30)	−0.39 (0.30)	−0.34 (0.36)	−0.18 (0.30)
Manager/Owner Age	0.64 (0.43)	−0.16 (0.41)	−0.11 (0.55)	−0.26 (0.44)
Relationship with Suppliers				
One Supplier Monopolistic	**0.39 (0.22)**	0.01 (0.23)	0.42 (0.29)	0.16 (0.23)
One Supplier Public Firm	−0.12 (0.27)	−0.18 (0.27)	−0.35 (0.37)	−0.54 (0.31)
Import Ratio	**0.50 (0.26)**	**−0.52 (0.28)**	−0.26 (0.41)	**−0.94 (0.37)**
% Bought from One Supplier	0.21 (0.38)	−0.53 (0.37)	0.01 (0.006)	0.01(0.004)
Length of Relationship	−0.10 (0.14)	−0.09 (0.14)	0.22 (0.18)	0.11 (0.15)
One Supplier Friend or Family	0.34 (0.23)	−0.05 (0.23)	**0.76 (0.41)**	0.12 (0.36)
Infrequent Purchases	−0.20 (0.27)	0.06 (0.25)	**−0.96 (0.42)**	0.05 (0.28)
Receives Supplier Credit	**0.57 (0.21)**	**0.46 (0.21)**	0.46 (0.32)	**0.41 (0.23)**
Gives Advance Payment	**0.72 (0.35)**	**0.94 (0.35)**	0.17(0.52)	**0.83 (0.41)**
Observations	577	575	413	413
Log-Likelihood	−371.47	−393.75	−453.63	−471.01
Pseudo R^2	0.172	0.125	0.198	0.181

Note: Numbers in parentheses are standard errors. Bold indicate significance at 10% or less. In all cases Zimbabwe for the country and textile for the sector are used as base.

The same exercise is repeated for the determinants of contractual problems with the firms' *suppliers*. It is encouraging to note that the same countries have less incidence of contractual problems as in the case of the model for clients – viz., Côte d'Ivoire and Kenya. As in the previous model sector attributes do not appear to impact either the incidence or the frequency of the contractual problems. Table 8.6 also shows that the larger firms are more likely to face contractual problems with their suppliers, as with the clients. However, the age of the firm does not appear to be significant. Among other firm characteristics, firms with limited liability have faced significantly more problems with their suppliers, while surprisingly firms with African owner/managers experienced significantly less payment problems.

Some variables in the model used details of the relationship with the suppliers. Of these two showing credit transaction – the dummy variables for firms receiving supplier credit and for those giving advance payment – were consistently significant. Both made problems of late delivery and deficient quality more likely. A monopolistic relation with the supplier or close relationship with the supplier as friend or family appears to have added slightly to the contractual problems. Furthermore, importing firms appear to be more prone to the incidence of late delivery as one might expect since the delivery of imported inputs is difficult in economies with weak infrastructure.

Conflict Resolution and Settlement Methods

Faced with the prospect of frequent contractual problems with their clients and suppliers, firms have to decide upon the resolution methods. As discussed before, these methods have inherently strategic implications and hence contain valuable information as to how firms perceive these problems and how they intend to resolve them. Furthermore, the actions undertaken also incur costs on the firms and which should also be taken into consideration. In whether to resort to more formal methods such as legal actions or police and lawyers or to conduct an informal direct bargaining, the firm not only has to look at the immediate cost associated with such an act, it also has to look at what impact it will leave on future contracts.

Table 8.7 provides the estimation of determinants of resolution methods used and the resultant settlement for contractual disputes with clients. As one might expect, the development of the legal system plays a significant role in determining whether a firm chooses the legal option to settle their disputes. In Zimbabwe with a more developed legal system, firms are more likely to use more formal methods and are significantly less likely to resort to direct bargaining than in the other countries. The table also reveals that larger firms are more likely to use legal methods while among firms using direct bargaining the size of the firm does not appear to matter. Also we find that while surprisingly the use of written agreements has not lead to the use of more legal actions, the firms were more likely to use legal action against first time offenders while relatives and friends were much less likely to face the court.

Table 8.7: Resolution Methods and Settlement with Clients

	Resolution Method		*Settlement*		
	Direct Bargaining	Court	Dispute Settled	Satisfied	Trade Continues
Constant	−1.22 (0.80)	−3.19 (0.80)	−0.01 (0.74)	0.93 (1.6)	−0.27 (0.78)
Country					
Cameroon	**2.28 (0.43)**	−0.31 (0.35)	**−0.91 (0.36)**	0.94 (0.89)	−0.10 (0.37)
Côte d'Ivoire	**1.99 (0.43)**	**−0.80 (0.29)**	−0.17 (0.37)	−0.01 (0.73)	0.20 (0.39)
Kenya	**1.13 (0.35)**	**−0.76 (0.36)**	−0.36 (0.34)	−0.25 (0.73)	**−0.80 (0.36)**
Firm Characteristics					
Firm Size	−0.02 (0.11)	**0.63 (0.11)**	−0.14 (0.10)	−0.20 (0.19)	−0.10 (0.10)
Firm Age	**0.33 (0.18)**	0.24 (0.18)	**0.43 (0.17)**	**0.78 (0.39)**	0.08 (0.17)
Limited Liability	−0.12 (0.28)	0.45 (0.26)	0.31 (0.25)	1.02 (0.81)	0.15 (0.26)
African Owner/Manager	0.59 (0.38)	0.33 (0.37)	0.17 (0.35)	1.49 (0.81)	−0.02 (0.35)
European Owner/Manager	0.43 (0.38)	−0.45 (0.39)	0.01 (0.35)	−0.86 (0.71)	−0.52 (0.38)
Relationship with Clients					
Public Firms	0.07 (0.26)	0.38 (0.24)	−0.31 (0.23)	−0.01 (0.48)	0.24 (0.24)
Export Ratio	−0.06 (0.06)	−0.02 (0.01)	0.06 (0.05)	0.05 (0.09)	−0.03 (0.06)
Written Agreement	0.35 (0.25)	0.01 (0.24)	−0.04 (0.22)	0.65 (0.47)	−0.20 (0.24)
Characteristics of Problematic Clients					
Individuals	−0.53 (0.32)	−0.19 (0.28)	**−0.56 (0.27)**	−0.63 (0.61)	**−0.98 (0.30)**
Public Firms	−0.20 (0.50)	**−1.88 (0.53)**	−0.63 (0.40)	−0.45 (1.02)	0.22 (0.42)
First Time	−0.25 (0.27)	**0.68 (0.27)**	**−0.53 (0.26)**	−0.14 (0.57)	**−0.68 (0.28)**
Relative or same tribe	0.42 (0.38)	**−0.71 (0.36)**	**0.95 (0.33)**	0.39 (0.65)	0.42 (0.34)
Resolution Method					
Direct Bargain			**0.57 (0.26)**	−0.64 (0.58)	**0.46 (0.28)**
Private Arbitration			−0.05 (0.42)	**−2.52 (0.89)**	−0.12 (0.46)
Police			**−1.09 (0.46)**	−0.48 (1.07)	**−1.82 (0.65)**
Lawyer+Court			**−0.54 (0.26)**	**−1.24 (0.53)**	**−1.24 (0.28)**
Observations	454	448	442	199	435
Log-Likelihood	−220.65	−236.61	−270.24	−72.73	−248.44
Pseudo R^2	0.155	0.205	0.148	0..209	0.214

Note: Numbers in parentheses are standard errors. Bold indicate significance at 10% or less. In all cases Zimbabwe for the country and textile for the sector are used as base. The sector dummies were deleted to save space.

Table 8.8: Resolution Methods and Settlement with Suppliers

	Resolution Method	*Settlement*	
	Direct Bargaining	Dispute Settled	Trade Continue
Constant	0.51 (1.03)	0.33 (1.09)	1.52 (1.79)
Country			
Cameroon	**1.99 (0.53)**	0.62 (0.50)	
Côte d'Ivoire	**1.71 (0.61)**	0.75 (0.61)	1.21 (1.13)
Kenya	0.44 (0.75)	1.26 (0.76)	0.10 (1.34)
Firm Characteristics			
Firm Size	−0.05 (0.12)	−0.03 (0.12)	0.06 (0.23)
Firm Age	−0.35 (0.24)	0.14 (0.24)	0.50 (0.43)
Limited Liability	**0.24 (0.09)**	−0.40 (0.32)	−0.79 (0.68)
African Owner/Manager	**0.82 (0.39)**	−0.38 (0.41)	−0.70 (0.71)
European Owner/Manager	**0.82 (0.45)**	−0.32 (0.41)	−1.25 (0.90)
Relationship with Suppliers			
One Supplier Monopolistic	0.55 (0.35)	−0.10 (0.36)	0.14 (0.63)
One Supplier Public Firm	−0.72 (0.42)	**1.25 (0.48)**	1.95 (1.27)
Import Ratio	0.07 (0.46)	−0.30 (0.47)	0.03 (0.93)
% Bought from One Supplier	**−0.011 (0.006)**	−0.02 (0.66)	−0.07 (0.09)
Length of Relationship	0.51 (0.22)	−0.23 (0.24)	0.46 (0.41)
One Supplier Friend or Family	−0.45 (0.40)	−0.58 (0.39)	−1.39 (0.94)
Infrequent Purchases	0.27 (0.46)	−0.56	1.02 (1.18)
Receives Supplier Credit	0.25 (0.33)	0.61	0.23 (0.56)
Gives Advance Payment	0.15 (0.55)	0.13	1.51 (1.50)
Characteristics of Problematic Suppliers			
Individual	0.53 (0.53)	−0.45 (0.48)	1.07 (0.89)
Public Firms	−0.95 (0.60)	−0.58 (0.65)	−0.61 (1.26)
First Time	**1.37 (0.60)**	−0.36 (0.48)	**−1.99 (0.75)**
Relative or same tribe	0.44 (0.63)	−0.80 (0.61)	−0.34 (1.04)
Resolution Method			
Direct Bargain		**1.53 (0.31)**	0.07 (0.52)
Lawyer+Court		0.16 (0.68)	−0.97 (0.99)
Observations	326	315	231
Log-Likelihood	−168.17	−166.38	−63.99
Pseudo R^2	0.190	0.151	0.229

Note: See Table 8.7.

Table 8.7 also suggests that older firms are more likely to use direct bargaining, and that they are not only more likely to settle their disputes with their clients, but also to be satisfied with the outcome. Characteristics of the clients play a major role in the settlement process. Individual clients and first-time clients are significantly less likely to have their disputes resolved whereas disputes with relatives or clients from the same tribe are much more likely to be resolved. It is, however, interesting to note that even if the disputes are resolved, such firms are much less likely to engage in further trade with the clients.

The bottom panel of the table addresses the question of success of different dispute resolution methods for the sample as a whole. Firms that use direct bargaining are more likely to settle their differences, and also create an atmosphere in which trade continues after the dispute. Those that use more formal methods such as police or lawyer and/or court are less likely to resolve the problem, and also less likely to be satisfied, and continue trading with same clients.

Table 8.8 repeats the same estimations for the disputes with *suppliers*. The overall picture here is much more ambiguous primarily due to the small sample size and missing values. There are some differences from the results obtained in the analysis of the settlement of disputes with clients. Unlike the disputes with clients first-time suppliers are more likely to be dealt with through direct bargaining but like before, once the dispute is settled, trade has much less chance to be resumed with the same party. The age of the firm does not seem to be of much importance in this case. However, for the whole sample, the disputes with suppliers, as with clients, are much more likely to be settled when direct bargaining is used.

Conclusions

The empirical results provided in this section and those reported by Bigsten *et al.* (2000) suggest a very loose relation between the firm and its clients/suppliers. Late payment and delivery is widely reported by the firms, but it has not discouraged them from interacting again. Firms rarely use formal methods to settle their disputes unless they are large enough to incur the associated costs and if they are located in countries with a relatively developed legal system. The use of legal system, however, is seen as a last resort and when it is used, the resolution process usually is lengthy and the outcome uncertain. Furthermore, the use of formal methods signals the end of the relation between the parties as firms rarely resume trade with the client/supplier even if the conflict is resolved.

The results reported also show that attempts such as the use of written agreements or the use of collateral or different type of guarantees to prevent contractual problems have rarely been successful. In fact, both theses methods have led to an increase in late payment by the clients but not non-payment. This implies that these methods are not used to eliminate the contractual problems all together but rather to minimize the more severe type of them. This, combined with the observed widespread existence of contractual problems, points to the fact that generally these problems are perceived to be inevitable – a product of an underdeveloped supply chain in these countries. Hence, firms use written agreements and/or collateral to prevent the worst-case scenario. In sum, firms treat contracts as more flexible than in developed countries, and are more ready to renegotiate if the terms of the contract are violated.

The flexibility of the contracts, and the resultant free-rider possibility, however, require an implicit assurance that they will finally be carried out. To this end, and in the absence of a formal method, firms use mutual trust. Therefore, when contracts are broken firms try to resolve the problem through direct bargaining and they usually continue their trade even when the contract is still in dispute. Firms rarely resort to formal resolution methods such as courts or lawyers and when that happens the firm usually refuse to trade anymore. Furthermore, as a significant sign for the importance of trust in such a fluid contractual environment, if first-time clients or suppliers fail to comply with the contract, they are more likely to be taken to court and the firm is more likely to refuse further trade with them. The observed phenomenon of contract flexibility provides a framework within which established firms can interact and hence help to facilitate trade. However, it may also prevent new firms from entering the market as they are less likely to trust or be trusted in such an environment. This also applies to foreign firms as such flexibility may exceed their level of risk tolerance.

Part IV
Dynamics of Firm Behavior

9 The Analysis of Capacity Utilization

Chapters 9 and 10 deal with the issues of efficiency of the sample firms at the point of time of the survey. The two chapters involve two different approaches to the problem which are best regarded as complimentary. The present considers the extent and determinants of capacity utilization – the extent to which the firms are from attaining the full potential output from the use of the inputs they do in fact use. The data on this variable as well as on its determinants are based on responses given to the questionnaire addressed to the managers. By contrast, Chapter 10 is a more "objective" approach to the question of technical efficiency – how far individual firms are away from the most efficient of the sample, which defines the "frontier." The estimations are based on econometric techniques and fitting production functions to the observed use of inputs.

This section discusses capacity utilization for the pooled sample of the firms surveyed. We intend to study the static aspects of firm level efficiency by analyzing three questions: How is capacity utilization distributed? What are the determinants of capacity utilization? And what are the obstacles to capacity utilization for different classes of firms?

Table 9.1 provides the distribution of capacity utilization. Capacity utilization here is defined as the ratio of actual output produced to the maximum possible output. It is a measure provided by the respondents to the firm questionnaire. The distribution varies across different countries with Côte d'Ivoire enjoying the highest capacity utilization with about 72% and Zambia and Cameroon having the lowest capacity utilization at around 46%. However, one can argue that by standards of more developed countries which usually stand between 70 and 90%, the capacity utilization of the manufacturing sector in African countries is extremely low. Table 9.2 provides further information about distribution of capacity utilization by sector and size. In general, although the distribution of capacity utilization differs between sectors, one cannot find a specific pattern linking all seven countries together. However, the corresponding distribution by size groups shows a unique pattern that can be applied to almost all the countries of our sample. It appears that in all countries with the exception of Tanzania, the capacity utilization increases with the increase in the size of the firm. This pattern is to some extent more transparent for Francophone countries and specifically Cameroon where larger firms appear to enjoy close to 50% higher capacity utilization relative to the mean.

Table 9.1: Summary Measures of Capacity Utilization

	Mean	*Median*	*25% Quartile*	*75% Quartile*
All	57.0	52.0	37.0	75.0
By Size				
Micro	53.5	50.0	33.3	70.0
Small	55.1	50.0	33.3	72.0
Medium	56.1	50.0	33.0	75.0
Large	59.7	62.8	40.0	80.0
Very Large	65.1	65.0	50.0	80.0

Note: All values are in percentages.

Table 9.2: Distribution of Capacity Utilization

	All	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Mean	57.0	46.9	71.9	51.7	64.0	48.8	46.2	63.2
Standard Deviation	26.8	26.3	21.7	23.8	25.1	25.3	26.4	25.2
By Size								
Micro	53.5	43.2	67.1	46.4	57.9	55.5	46.7	55.0
Small	55.1	44.9	69.4	53.8	65.9	46.2	47.7	66.2
Medium	56.1	46.7	72.5	47.0	67.7	36.7	41.3	64.9
Large	59.7	57.4	78.5	62.7	68.8	46.5	41.2	63.4
Very Large	65.1	62.3	78.2	65.9	69.0	41.8	51.0	66.6
By Sector								
Food	57.4	50.5	70.8	55.1	68.8	44.2	46.8	60.6
Metal	55.9	43.1	70.7	56.8	63.9	50.2	44.6	61.5
Textile	57.8	50.7	68.3	47.4	64.4	44.5	43.7	66.4
Wood	56.6	44.0	78.0	51.3	59.7	52.3	50.6	59.8

Note: All values are in percentages.

Determinants of Capacity Utilization

As already mentioned, Table 9.1 reveals that capacity utilization in these countries by international standards is very low. However, as evident from the standard deviations reported in Table 9.2, there is still substantial difference among different firms in each country. Hence, one important question is why these firms differ in their degree of capacity utilization. As Winston (1975) argues, determinants of excess capacity can be summarized in two very broad categories, the unintended excess capacity which results from unwanted accidents and misfortunes that occur after a plant is built or by rational *ex ante* investment planning.

Examples of the former set of reasons for excess capacity are plenty. Shaw and Sutton (1976) list several factors that can determine the existence of excess capacity. Firms may fail to estimate the growth of demand due to cyclical downturn in demand or secular decline in demand over time. Hence, the build up of capacity in advance of anticipated demand growth may lead to lower capacity utilization. Many factors may affect the firm's ability to produce its desired level and may leave the firm short of its full capacity utilization. The inadequacy of raw material may cripple the production at the firm level as does the shortage of skilled labor. Furthermore, the breakdown of equipment may leave the firm shy of its production goals and create excess capacity. In addition to supply constraints, the shortage of working capital or financial constraints may also lead to excess capacity as firms with sufficient capacity fail to produce due to lack of working capital.

A very different set of explanations postulates that firms create excess capacity because it is *ex ante* rational to do so. A downward-slopping demand curve makes it rational for the firms to run excess capacity since it is more profitable to do so. Firms may also strategically create excess capacity to deter entry in their market or increase their market share. Furthermore, as Forsund and Hialmarsson (1987) argue, when firms anticipate fluctuating demand, in their decision to build capacity, they will take into account both the cost of having excess capacity when demand does not materialize and the cost of not being able to meet the demand when the demand increase materializes. The optimal decision here again may lead to excess capacity.

To accommodate all these determining factors we estimate the following model,

$$\ln(Caput) = A + \alpha_1 \ln(K) + \alpha_2 \ln(L) + \alpha_3 \ln(\frac{Y}{L}) + \sum_{i=1}^{3} \beta_i D_i$$

In which *Caput* stands for capital utilization, *K* represents capital stock, *L* is the number of workers, and *Y* is the value added. Furthermore, in this model, D_i stands for the three above-mentioned constraints, namely demand, supply, and credit constraints. These sequential categorical variables are calculated from a question put to managers as how they rank the obstacles to full capacity utilization. The replies rank from one to three, where one is no obstacle and three is severe obstacle. A summary of the replies to this question is presented in Table 9.4 and will be discussed in more detail in the subsequent sub-section.

In this model, firm size is represented by the number of workers together with the value of physical capital and the labor productivity. The net effect of employment size on capacity utilization is theoretically uncertain. Economies of scale relating to the production relationship could be pulling in a different direction from scale economies relating to management of the firm or of marketing. The value of capital, controlling for the use of labor, measures capital-intensity. Traditional theories of capital utilization hypothesize a negative relation between capital intensity and capacity utilization since the more important are the capital costs the greater the incentive to economize on them through higher capacity utilization. However, this hypothesis competes with the alternative view mentioned above that firms might choose to create high capital intensity, together with more excess capacity as a strategic move to deter the entry of competitors. The relation between capacity utilization and capital intensity is also unclear theoretically, and the empirical evidence should decide which of the two possible effects prevail on balance.

Labor productivity could be used as a proxy for firm level efficiency. Firms with higher labor productivity, after controlling for capital intensity, presumably use capital more efficiently and hence have a higher rate of capacity utilization. An alternative to this variable would be a measure of technical efficiency. (This index is defined and analyzed extensively in Chapter 10.) The three constraints, relating to supply, demand, and credit, constraint are, of course all expected to have a negative effect on capacity utilization, but the relative magnitudes in the estimated relationship are of critical interest.

Table 9.3 presents the estimated model. We have estimated the model for each country separately, and for all countries pooled together. In all the models, sector and wave dummies were added to accommodate for possible differences. In addition, in the pooled model, country dummies are added for the same reason. The base in all models is the textile sector and in the pooled model it is Zimbabwe. The model fit is reasonable with Cameroon, Kenya, and the pooled model showing an adjusted R-Squared around 20% and with the exception of Tanzania, all other countries present significant results. Except for Tanzania, the size of the firm affects the utilization of capital positively. Hence, one can safely argue that larger firms, as measured by the number of workers employed, have less excess capacity. In addition, in accordance with our earlier analysis, capital stock negatively affects capacity utilization whereas productivity has a positive effect.[25] These results also hold across all countries but are not necessarily significant. Their importance is more impressive if one takes into consideration their uniformity across almost all countries. One can also infer a massive under-utilization of capital resources in the African manufacturing resources, as more capital-intensive firms do not use their capital efficiently. This might also be a symptom of the fact that many projects are completed despite anticipated excess capacity since prices and profits in an uncertain environment warrant so. This might be necessitated by the need to insure against the uncertain macro environment facing the countries, or might be dictated by the need to secure market power.

Table 9.3: Determinants of Capacity Utilization

	All	*Cameroon*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Constant	4.09	2.73	3.59	4.68	4.37	4.65	4.46
	(0.18)	(0.59)	(0.37)	(0.38)	(0.47)	(0.52)	(0.45)
Ln(L)	0.11	0.15	0.14	0.23	0.03	0.12	0.17
	(0.02)	(0.07)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)
Ln(K)	−0.07	−0.07	−0.05	−0.17	−0.04	−0.04	−0.08
	(0.01)	(0.04)	(0.03)	(0.04)	(0.29)	(0.04)	(0.04)
Ln(Y/L)	0.07	0.09	0.10	0.12	0.05	0.01	0.05
	(0.02)	(0.07)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
Supply	−0.01	0.42	−0.17	0.03	−0.18	0.09	−0.18
Constraints	(0.05)	(0.12)	(0.16)	(0.13)	(0.14)	(0.13)	(0.10)
Demand	−0.06	0.03	−0.09	−0.17	−0.11	−0.07	−0.04
Constraints	(0.02)	(0.07)	(0.05)	(0.06)	(0.07)	(0.06)	(0.05)
Credit	−0.11	−0.08	−0.08	−0.10	−0.03	−0.22	−0.11
Constraints	(0.02)	(0.07)	(0.05)	(0.05)	(0.07)	(0.06)	(0.05)
Adjusted R^2	0.1804	0.2286	0.1556	0.2523	0.0938	0.1211	0.1362

Note: The values in parentheses are standard errors.

[25] We have also estimated the model with the estimated technical efficiency replacing the labor productivity. Here again we found the coefficient of technical efficiency positive and significant. In this model, the estimated elasticity of capacity utilization was 0.16 against 0.07, which is found when labor productivity is used. This finding is also consistent with the fact that more efficient firms use the capacity more efficiently and hence enjoy higher capacity utilization.

Not surprisingly, perceived obstacles to capacity utilization also play a significant role in the determination of capacity utilization. Supply constraints, however, appear to be the weakest whereas credit constraints are the strongest factors leading to excess capacity followed closely by demand constraints. This implies that while production level can be relatively easily increased to full capacity by the manufacturing firms, the insufficiency of demand, and the unavailability of working capital prevent them from reaching their maximum potential. This is a significant finding as it clearly downplays the supply-side factors often presented as major impediments to development in African countries. It also suggests that while the manufacturing sector in Africa has the potential and the internal resources to thrive, it is under pressure from macroeconomic factors affecting the demand and the credit market.

Obstacles to Capacity Utilization

In this section, we discuss more specifically the obstacles to capacity utilization as perceived by the management of each firm. As mentioned earlier, management was asked about the factors that they considered to be obstacles to capacity utilization. The answers were ranked from one to three where one is no obstacle, two is moderate obstacle, and three is severe obstacle. The results are summarized in Table 9.4.

Table 9.4: Obstacles to Capacity Utilization

	Cameroon	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Shortage of Raw Materials	1.44	1.37	1.61	1.64	1.43	1.51
Shortage of Imported Raw Materials	1.59	1.17	1.20	1.34	1.18	1.17
Shortage of Skilled Labor	1.20	1.16	1.39	1.31	1.30	1.39
Equipment Breakdowns	1.35	1.24	1.28	1.58	1.57	1.41
Lack of Working Capital	2.27	2.15	1.91	2.48	2.20	1.69
Lack of Demand	2.55	2.00	2.14	1.78	2.21	2.01

Note: The actual responses range from 1–3 where 1 stands for no obstacle and 3 stands for severe obstacle.

While there is considerable variation among different countries, all appear to rank lack of demand and lack of working capital (labeled before as demand and credit constraints) ahead of all other factors that may affect the ability of the firm to produce (labeled before as supply constraints). In fact, all supply-based constraints are on average ranked below two, whereas demand and credit constraints are on average ranked above two for nine out of twelve possible cases. These results conform to our earlier econometric finding that attributes excess capacity to demand and credit constraints rather than supply-based constraints.

Table 9.5: Obstacles to Capacity Utilization, by Size Groups

	All	*Micro*	*Small*	*Medium*	*Large*	*Very Large*
Shortage of Raw Materials	1.50	1.47	1.53	1.45	1.50	1.61
Shortage of Imported Raw Materials	1.26	1.24	1.30	1.19	1.29	1.23
Shortage of Skilled Labor	1.30	1.20	1.34	1.35	1.33	1.42
Equipment Breakdowns	1.42	1.39	1.41	1.36	1.39	1.61
Lack of Working Capital	2.11	2.43	2.11	1.79	1.83	1.74
Lack of Demand	2.10	2.12	2.08	2.08	2.15	2.08

Note: The actual responses range from 1–3 where 1 stands for no obstacle and 3 stands for severe obstacle.

The question of interest in this section is how these obstacles differ across different classes of firms. In other words, perhaps more important than the significance of each obstacle to all firms in general is how differences in firm attributes can lead to different management perception concerning obstacles to capacity utilization. Many questions can be answered within this framework: Are larger firms more concerned about demand or supply? Do foreign owned firms face less credit constraint? How does trade orientation affect obstacles to capacity utilization? To this end, as before, we have used the three categories namely Supply, Demand, and Credit Constraints for which the answer is a categorical variable censored between one and three. Note that the score for the supply constraint is the average of five questions, while the demand, and credit constraints are measured directly by answers given by the management to the corresponding questions.

A two-way censored Tobit model is estimated for which the dependent variables are the three constraints and the independent variables are firm attributes including sector, size, the percentage of imports utilized, the percentage exported, and the percentage of foreign ownership. The model is estimated for each country separately and for all countries pooled. In the pooled model, country dummies are added to control for country specific effects and the results are summarized in Table 9.6. Focusing first on the supply obstacles, it appears that larger firms are more exposed to these obstacles as the probability of expressing these constraints as severe increases with the increase in the size of the firm. This result is interesting because the literature has not produced an agreement on how the importance of the supply-side constraints are likely to vary with firm size. Raw materials, both domestic and imported, as well as skilled labor are demanded in larger quantities by large firms, but they also have greater market power which might have given them an advantage in procuring these key inputs in a timely and unconstrained way.

Trade orientation affects capacity utilization differently. Exporters are likely to be more dependent on key imported inputs than importers. The expectation that import-oriented firms are less likely to attribute their excess capacity to supply side factors is borne out by the results. By the same token, foreign ownership provides the firm with factors of production that may not be available otherwise and hence decreases the probability that the supply side factors would be cited as obstacles to production and hence capacity utilization.

The very fact that firms with foreign ownership have a better access to factors of production will make them more likely candidates to complain about demand constraints. This is strongly confirmed in Table 9.6, where the coefficient of foreign ownership was found to be negative (positive) and significant in the estimation of the determinants of supply (demand) constraints. The estimation of the Tobit model for demand constraints reveals further information. Overall, firm size does not appear to be a significant factor. It seems that despite the fact that all firms are complaining about lack of demand, responses of different firms in different countries do not warrant an overall conclusion regarding the relation between size and probability of demand constraint. An important result is that in the pooled sample export-oriented firms are *less* demand constrained than the others, and this is also true of most countries, and significantly so for Cameroon and Zambia.

Table 9.6 also provides the estimate of the Tobit model for credit constraint. Unlike, demand constraint, micro firms are more likely to face credit problems. However, there does not appear to be a linear relation between the firm size and the probability of credit constraints as the medium firms are the least likely to face credit problem. Micro firms appear to complain the most about credit constraint but the difference among other size groups is negligible. If anything, there is weak evidence, in favor of a U-shaped relation between firm size and probability of credit crunch. Furthermore, both trade-oriented firms and foreign owned firms are less likely to perceive credit obstacle as a severe impediment to capacity utilization. It seems as if suppliers of credit use these firm attributes as a screening tool in their attempt to identify the creditworthiness of their clients. In addition to this, both export-oriented firms and those with foreign ownership enjoy an additional access to foreign credit market which is not available to other firms including importers and hence do not see credit constraint as significant as the others.

Table 9.6: **Tobit Estimates of Perceived Obstacles to Capacity Utilization**

	All	*Cameroon*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Supply Constraints							
Constant	0.06*	0.47***	0.17**	0.08	0.05	0.10	0.22*
Food	−0.07	−0.28*	−0.03	−0.02	0.21**	−0.17	−0.17
Metal	0.05	−0.22	0.14	−0.04	0.08	0.07	−0.06
Wood	0.12***	−0.08	0.24**	0.17*	0.003	0.05	0.15
Small	0.14***	−0.24	0.16*	0.20**	0.36***	0.22***	−0.24
Medium	0.08	−0.17	0.28**	0.11	0.43***	−0.16	−0.21
Large	0.15***	−0.66*	0.14	0.14	0.20*	0.32**	−0.06
Very large	0.26***	−0.08	0.38**	0.43***	0.29**	0.42***	−0.08
Import	−0.10***	−0.11	−0.05	0.04	−0.17**	−0.05	−0.07
Export	0.05	0.14	0.21**	−0.11	0.24**	−0.10	0.11
Foreign	−0.15**	0.18	−0.42**	−0.17		−0.12	0.05
Log-likelihood	−480.5	−56.8	−72.9	−60.2	−52.8	−78.2	−102.6
Demand Constraints							
Constant	0.67**	2.00***	1.43**	0.61	0.87***	0.72**	0.70
Food	−0.22	0.28	−1.32	−0.39	−1.13***	−0.05	2.56**
Metal	0.21	0.07	0.05	0.95	−0.52***	0.01	0.12
Wood	−0.26	−0.10	−0.13	0.86	−0.72***	−0.54	0.34
Small	−0.30	−0.78*	−1.84**	0.20	0.04	0.57	−2.8*
Medium	−0.28	−0.94	−1.59	0.53	−0.70*	0.80	−1.28
Large	0.17	−1.01	−1.84	1.22	−0.80*	2.22***	−1.20
Very large	0.09	−1.79*	−1.25	0.70	−0.35	2.59***	−1.32
Import	0.24	0.66	1.00	−1.25**	0.24	−0.09	1.97
Export	−0.56**	−0.88**	−1.21	−0.22	0.03	−1.77**	−0.12
Foreign	0.94**	0.70	1.44	0.86		1.09*	1.31
Log-likelihood	−846.9	−94.6	−124.4	−137.8	−148.1	−133.0	−132.7
Credit Constraints							
Constant	0.81***	1.72**	0.16	1.24**	2.07***	2.13***	1.56**
Food	−0.38	1.04*	0.81	−0.59	−1.42***	0.14**	−0.96
Metal	0.16	0.96*	2.1	0.80	−0.36	−0.75	−0.13
Wood	0.93***	1.15*	2.63*	1.50***	−0.08	0.82	0.14
Small	−0.89***	−0.77	1.28	−1.71***	−0.60**	−0.81	−1.89*
Medium	−1.36***	0.64	0.97	−2.71***	−0.22	−2.17**	−2.38**
Large	−0.89**	−0.10	−2.72	−3.12***	1.22**	−0.52	−0.86
Very large	−0.99***	−1.24	2.52*	−2.97***	1.89**	−1.77**	−1.08
Import	−0.15	−0.43	0.86	0.42	−1.13***	−0.65	−0.51
Export	−0.35	−0.99	−0.67	0.10	−0.94*	−0.56	−0.32
Foreign	−1.12***	−2.50***	−0.28	0.03		1.48*	−2.28
Log-likelihood	−747.7	−91.8	−108.4	−118.2	−113.2	−127.5	−125.1

Notes: * indicates significance at 10%, ** at 5%, and *** at 1%.

Conclusions

Capacity Utilization indices are based on responses given by the managers in the firm level surveys. At a mean value of 57% and a median of 52%, the degree of capacity utilization in African firms is decidedly low by international standards. Also there is a large dispersion among firms. Côte d'Ivoire, Kenya and Zimbabwe reported a higher degree of capacity utilization among the RPED countries, and the fact that these are the more industrialized of the lot is probably not a coincidental result.

The econometric model estimated to locate the major determinants of capacity utilization produced the following major results:

- Except for Tanzania, the employment size of the firm has a *positive* effect on capacity utilization.
- But holding size and overall efficiency constant, the use of capital per worker seems to be *negatively* related to capital intensity in all countries. The creation of excess capacity in anticipation of demand might be a reflection of the uncertain macroeconomic environment in the countries or of the need to attain market power.
- An attempt was made to study the relative importance of three groups of constraints on capacity utilization – supply constraints (which included shortage of raw materials, imported inputs and skilled labor), demand constraints and credit constraints. The scores given by respondents indicated the severity of each constraint as perceived by managers. Both the levels of the score and the multiple regression analysis revealed that contrary to expectations supply constraint was the least important. Credit constraint was the most troublesome, followed by demand constraint.
- In terms of the differential effects on various classes of firms, supply constraints, again unexpectedly, affected larger firms more severely, though there is some evidence that, as expected, credit constraints impacted micro firms negatively. The obstacles to capacity utilization of export-oriented firms were contributed less by demand side factors, and more by supply constraints. The problems with foreign-owned firms were exactly the opposite.

10 Technical Efficiency of Manufacturing Firms in Sub-Saharan Africa

Introduction

This chapter is concerned with analysis of the extent to which manufacturing firms are able to attain their potential of technical efficiency. The concept is defined in the next section. Intuitively it measures the distance which the sample firms are from the most efficient set among them. We will be focusing on five African countries, namely Ghana, Kenya, Tanzania, Zambia, and Zimbabwe. These countries, to a good extent, are representative of the existing challenges that hinder industrial development in sub-Saharan Africa. All five of these countries have initiated extensive policy reform programs; they span the diversity of per capita incomes and industrial development levels in the sub-Saharan Africa region; and they exhibit different levels of interaction within world markets.

Using the stochastic frontier approach, this section attempts to address two general questions, one related to the determinants of technical efficiency within each country and the other to the inter-country differences in technical efficiency. For the former, we examine the determinants of a firm's efficiency for each country separately within a unified framework. We specifically examine variables such as size, age, and several other firms and/or management related attributes. We find many similarities and several differences among the five countries under study. Of particular importance, we find common factors such as size and trade orientation to have significant impact on firms' efficiency across almost all five countries. For the second question, a general framework is introduced within which, technical efficiency of firms is compared across different countries.

Econometric Framework

Factor productivity, as often defined, is the ratio of output to the weighted average of a basket of inputs. This productivity may vary from firm to firm due to many reasons. Differences in the technological frontier in which the firms are located might be a source for productivity differential, or it might be attributed to the environment in which production takes place, or it might be due to different levels of efficiency at which the firms operate. The challenge for an economist is to decompose the inter-firm productivity differential into its various components. Technical efficiency has been often neglected in favor of other factors such as technological change and input growth. For instance, Solow's pioneer work (1957) seeks to attribute the change in productivity over time to these two factors and neglects the effect of technical efficiency altogether. In a cross-section study or a panel study in which the sample consists of few periods and many cross-section observations, as are the characteristics of the data-set used in this empirical study, factor productivity differentials are most probably determined by differences in technical efficiency rather than technological change. These facts necessitate a careful study of technical efficiency and its determinants.

The term *technical efficiency* which is often used in the literature draws from the works of Farrell (1956), who built upon the work of Debreu (1951) and Koopman (1951) to define a simple measure for efficiency. In his definition, Farrell decomposed what he called *economic efficiency* into *technical efficiency* and *allocative efficiency*. In his analysis, Farrell argued that the efficiency of a firm (economic efficiency) is the combination of the ability of the firm to maximize its output given a set of inputs (technical efficiency) and the ability of the firm to use the inputs in optimal proportions (allocative efficiency). In other words, by defining the frontier production as the "best practice" technology, any deviation from this frontier will constitute technical inefficiency (efficiency). Thus, models of technical efficiency and more particularly frontier production analysis need to estimate the frontier function and to define measures for technical inefficiency as deviations from the frontier.

Aigner, Lovell and Schmidt, Battese (1977), Cora (1977), and Meeusen and van den Brock (1977) pioneered the stochastic production frontier analysis that this chapter is based on. In this approach, a production frontier which defines output as a function of a given set of inputs, is stochastic. Unlike the tradition production analysis which assumes a deterministic relation between a set of inputs and the output, there are compelling empirical reasons to believe that the production processes that are optimally planned *ex ante* still yield an output which is subject to random variations. Many unwanted factors such as weather, human error, equipment failure, etc may alter the production process, and such random effects should not be confused with technical efficiency or inefficiency of the firms.

These considerations have led to the idea that the production frontier is itself stochastic and that particular outcomes may indeed lie above the frontier. This may happen when a particular producer has not only planned optimally but also enjoyed better-than-average drawings of the random variables. Alternatively, a particular producer might be below the frontier when the outcome of the random variable is not in the firm's favor. This plausible assumption leads to what has been known as the *composed error* model of technical inefficiency, in which the stochastic production frontier is composed of two error terms, one attributed to the random effect not under the firm's control and the other to the degree of inefficiency. More specifically, according to this model, one may write the frontier function as follows:

$$y_i = f(x_i;\beta)\exp(v_i - u_i) \qquad (1)$$

Where y represents output, $f(x)$ is the deterministic core of the frontier production function, v is some symmetrical random error with zero mean and a variance equal to σ_v^2, and the one-sided error term, $u \geq 0$ captures technical inefficiency and has a variance equal to σ^2. The total variance in this case will be the sum of two variances, i.e. $\sigma_s^2 = \sigma^2 + \sigma_v^2$. This formulation offers a number of compelling advantages. The stochastic production frontier permits the measurement errors to be subsumed in the symmetrical error components directly. By allowing for errors in the observations, this approach reduces the effect of the so-called outliers on the estimated frontier and hence, the estimated technical efficiency. Therefore, it reduces the high sensitivity to errors in the data as was prevalent in the deterministic frontier approach. Furthermore, this approach allows a firm to lie above the production frontier (below the optimal isoquant) when it enjoys favorable stochastic conditions as well as technical efficiency.

Battese and Coelli (1995) and Huang and Liu (1994) developed the stochastic frontier model that we use in our empirical analysis. This model allows for the determinants of inefficiency to be incorporated directly in the inefficiency term. In this model, the inefficiency term (u_{it}) is formulated as follows:

$$u_{it} = Z_{it}\delta + \varpi_{it} \tag{2}$$

Where Z ($1, z_1, z_2, \ldots, z_m$) is a matrix of variables that includes variable unity, time trend/or time dummies, and other variables such as the firm and/or entrepreneur characteristics that may affect the efficiency of the firm. ώ is assumed to be the truncation around $-Z\delta$ of a normal distribution with a mean equal to zero and a variance equal to σ^2. This truncation process necessarily leads to $\acute{\omega}_{it} > -Z_{it}\delta$. In other words, one may say that the inefficiency term (u_{it}) is a non-negative truncation of a normal distribution $N(\mu_{it}=Z_{it}\delta,, \sigma^2)$. Obviously, the random variable ώ does not have to be *iid* or non-negative. Furthermore, the mean of the truncated normal distribution $Z_{it}\delta$ is not required to be non-negative either. As indicated earlier, a significant improvement of this model over the first is the simultaneous modeling of the stochastic frontier and the determinants of the inefficiency term. This is a significant advantage since quite often researchers are more concerned about determinants of the inefficiency. The basic difference between Battese–Coelli and Huang–Liu model is the fact that in the latter the determinants of the inefficiency include the inputs. Hence, in Huang and Liu model, the marginal products and the elasticity of output with respect to the corresponding inputs are non-neutral to the degree of technical efficiency as the inefficiency is a function of those inputs. In both these models the technical efficiency is defined as:

$$TE = E(e^{-u})$$

Battesse and Coelli (1993) show that the expected technical efficiency can be written as:

$$E(e^{-U} \mid E = e) = \exp[-\mu_* + \frac{1}{2}\sigma_*]\{\frac{F[\frac{\mu_*}{\sigma_*} - \sigma_*]}{F(\frac{\mu_*}{\sigma_*})}\} \tag{3}$$

In which:

$$\mu_* = \frac{\sigma^2{}_V Z\delta - \sigma^2 e}{\sigma_V{}^2 + \sigma^2}$$

and:

$$\sigma_*{}^2 = \frac{\sigma^2 \sigma_V{}^2}{\sigma_V{}^2 + \sigma^2}$$

Here E is the sum of the random error and the efficiency term, i.e., $E = V - U$ and the rest of notations are as defined before.

Furthermore, in the case where the technical efficiency is a function of the corresponding inputs as in Huang and Liu (1994) model, the elasticity of output with respect to each input, involves the efficiency term. In other words:

$$\frac{\partial \ln(y_{it})}{\partial \ln(x_{it})} = \frac{\partial \ln f_{it}}{\partial \ln(x_{it})} - C_{it} \frac{\partial \mu_{it}}{\partial \ln(x_{it})} \tag{4}$$

where,

$$C_i = 1 - \frac{1}{\sigma}\left[\frac{F\left(\frac{\mu_i}{\sigma} - \sigma\right)F\left(\frac{\mu_i}{\sigma}\right)}{f\left(\frac{\mu_i}{\sigma} - \sigma\right)f\left(\frac{\mu_i}{\sigma}\right)}\right] \tag{5}$$

Here, f and F represent probability density function and probability distribution of the standard normal variable respectively. Hence, the elasticity of output with respect to the production inputs, as in Battese and Broca (1997) is the sum of two components: the elasticity of frontier output (first component) and the elasticity of the technical efficiency (second component). Clearly, all these elasticities are functions of the observations for the explanatory variables used in specification of the production function as well as those used in the technical efficiency model. In practice, however, the elasticities are usually calculated at the means of these explanatory variables.

The stochastic frontier model is parameterized in terms of σ^2 (variance of the inefficiency term) and γ which is defined as, σ^2/σ_s^2 (ratio of variance of the stochastic term to the total variance) and can take any value between zero and unity. For a simple regression in which all the firms operate on the frontier and hence no difference in terms of their relative technical efficiency can be conceived, γ is zero since the variation in the symmetric error will account for all variation in the residuals. In other words, if there is no inefficiency effect this parameter should not be significantly different from zero. Therefore, this implies that a zero test on this parameter can be used as a formal test for the null hypothesis of a simple regression model i.e. no inefficiency effect, against the alternative of a stochastic frontier model. This approach has been widely used in the empirical studies[26] and is the one adopted here.

Technical Efficiency within Countries

In this section we study the determinants of firm efficiency for each of the five countries separately. This analysis will help us to understand how different firm or management related characteristics can impact their performance and hence can provide invaluable information concerning productivity enhancing methods that may be undertaken by policy makers. This analysis logically precedes the analysis of inter-country differences in technical efficiency presented later in this chapter.

Determinants of Technical Efficiency

The economic literature has unveiled many factors that may affect the performance of firms. These factors can be classified in two general groups, those associated with firm characteristics, and those that can be attributed to manager characteristics. The former includes factors such as firm size, firm age, and trade orientation. The latter, however, includes factors that affect managerial skills such as manager experience, manager age, and education. This subsection studies the effect of these factors on the performance of firms for each country separately.

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[26] Frontier 4.1 by Coelli (1994) is used for the empirical analysis.

The RPED surveys have been used in several studies to measure the level of technical efficiency and its determinants. Biggs, Shah, and Sirvastava (1995) used the RPED surveys for three countries, namely Ghana, Kenya and Zimbabwe to estimate technical efficiency. Although, the technical efficiency has been estimated separately for each country, in this study the authors still conclude that firms in Zimbabwe are relatively more efficient than those of the other two countries. The estimated technical efficiency is then regressed on several firms and manager specific characteristics to see how each of these factors may affect the efficiency of the firm. The same two-stage approach is also followed by Mlambo (2000) in the study of technical efficiency in Zimbabwe. Several other studies, however, are more specific. For instance, Bigsten *et al.* (2000) estimate the impact of export on technical efficiency in four countries (Cameroon, Ghana, Kenya, and Zimbabwe). Here, again the estimation process is two stage where the technical efficiency is estimated in the first stage and the estimated values are then regressed on several determinants including measure of export. Lundvall and Battesse (2000), analyze the effect of firm age and firm size on technical efficiency in Kenya. However, unlike other studies, they use a one-stage estimation process which closely resembles the one reported in the econometric section and is used in this chapter.

In this section, we intend to use the general econometric framework as provided in the last section to estimate the stochastic frontier model and hence the technical efficiency values. However, we initially estimate the frontier function without incorporating the determinants of technical inefficiency in order to provide a better understanding as to how the production process looks like and to set a comparative framework. Furthermore, to estimate the stochastic frontier we use Solow's production function in which the relative wage is included as a production input along with the quantity of labor to account for possible differences in the quality of labor. According to this model, a 1% increase in the quality of labor as measured by the earning differential is equivalent to 1% increase in the quantity of worker. An optimizing employer, faced with the decision to increase labor input at the margin, has the choice to increase the number of workers or raise the wages of the existing workforce appropriately. If the optimizing process works in the long run, the elasticity of the wage component (w) in the production function should in equilibrium equal the elasticity of labor quantity (L).

Fitting a technical efficiency function, with Cobb-Douglas production relations, to our data set provides a framework to estimate the efficiency values and test the validity of Solow's production function. The results are given in Table 10.1. Overall, Solow's model in its specific form is rejected in all cases, as the elasticity of labor and the elasticity of the relative earnings are not equal. In other words, the strong implication of the Solow's model that the coefficients of the wage and the labor terms should be equal (in the double log formulation) is rejected in all countries, as shown by the chi-square test. However, the coefficients of relative earnings and labor are close enough to warrant support for the modified Solow's model where the wage premium will enhance the production but by a smaller margin than labor itself. We find that the coefficient of relative efficiency (earning elasticity) is smaller than the coefficient of labor (labor elasticity) in all cases.

Table 10.1: Estimation of Stochastic Frontier Function: a Test of the Solow Model

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Constant	6.64 (0.46)	5.96 (0.59)	8.87 (0.48)	8.82 (0.47)	3.81 (0.41)
Ln(K)	0.26 (0.03)	0.25 (0.03)	0.15 (0.04)	0.10 (0.03)	0.29 (0.03)
Ln(L)	0.68 (0.06)	0.86 (0.06)	0.89 (0.06)	0.96 (0.05)	0.72 (0.05)
Ln(w)	0.45 (0.05)	0.55 (0.05)	0.57 (0.06)	0.59 (0.05)	0.50 (0.06)
T	0.48 (0.06)	0.32 (0.08)	0.28 (0.08)	0.16 (0.05)	0.09 (0.04)
Food	−1.05 (0.13)	−0.93 (0.13)	0.62 (0.19)	−0.35 (0.11)	0.68 (0.09)
Metal	−0.78 (0.12)	−0.77 (0.13)	−0.30 (0.16)	−0.52 (0.12)	0.15 (0.10)
Wood	−0.25 (0.12)	−0.43 (0.13)	−0.19 (0.14)	0.29 (0.11)	0.07 (0.10)
Location (Capital)	0.01 (0.10)	0.08 (0.10)	0.24 (0.12)	−0.05 (0.08)	0.28 (0.07)
Capital Utilization	0.40 (0.09)	0.10 (0.10)	0.05 (0.03)	0.27 (0.06)	0.22 (0.07)
Variance Parameters					
$\sigma^2_s = \sigma^2 + \sigma_v^2$	9.99 (6.4)	12.94 (18.1)	37.32 (21.6)	14.57 (9.9)	12.92 (7.9)
$\gamma = \sigma^2/(\sigma^2 + \sigma_v^2)$	0.940 (0.04)	0.939 (0.09)	0.981 (0.01)	0.964 (0.03)	0.967 (0.02)
Log-likelihood	−492.52	−743.18	−647.99	−628.26	−612.47
Mean TE	0.6784	0.6802	0.5339	0.6515	0.6862
Π^2 Statistic for Solow Model	11.66	19.78	16.72	31.24	11.5

Note: The values in parentheses are standard errors.

It is also interesting to note that the estimated gamma parameter is significantly greater than zero for all countries, which indicates a significant variation in the efficiency of the firms involved. Figures 10.1–5 depict the distribution of the estimated technical efficiency. As demonstrated in these figures, the distribution of the technical efficiency is skewed to the left for Ghana, Tanzania, and Zambia. However, it is bimodal for Kenya and Zimbabwe. Interestingly enough, as we will discuss later, employment size is found to be a significant determinant of technical efficiency for only Kenya and Zimbabwe.

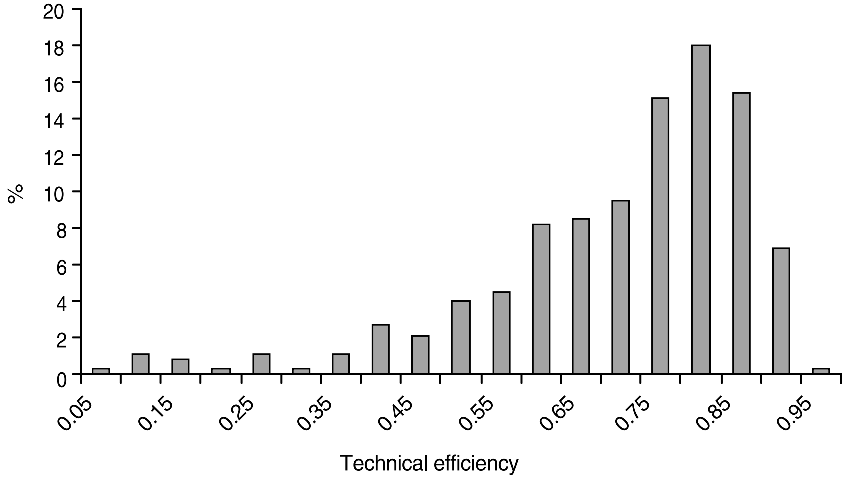

Figure 10.1: Distribution of Technical Efficiency (Ghana)

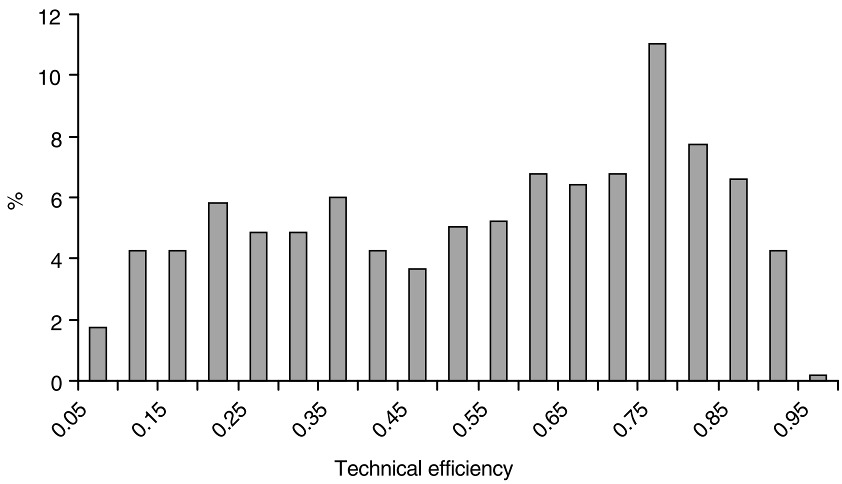

Figure 10.2: Distribution of Technical Efficiency (Kenya)

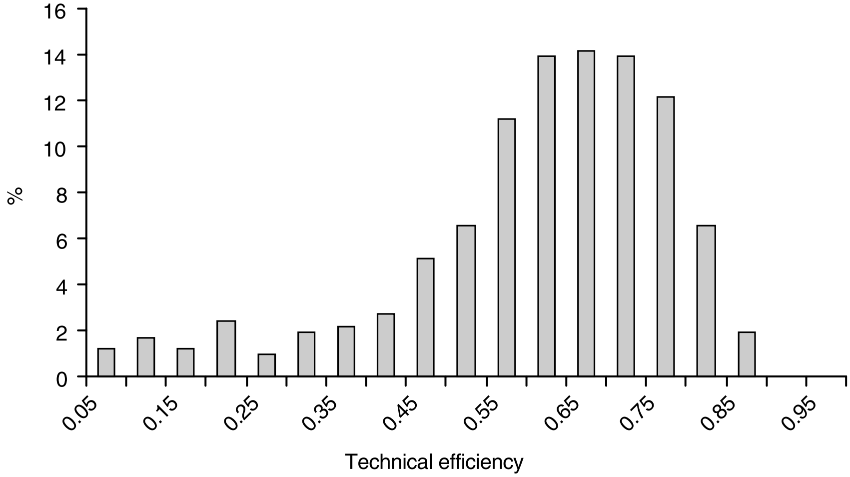

Figure 10.3: Distribution of Technical Efficiency (Tanzania)

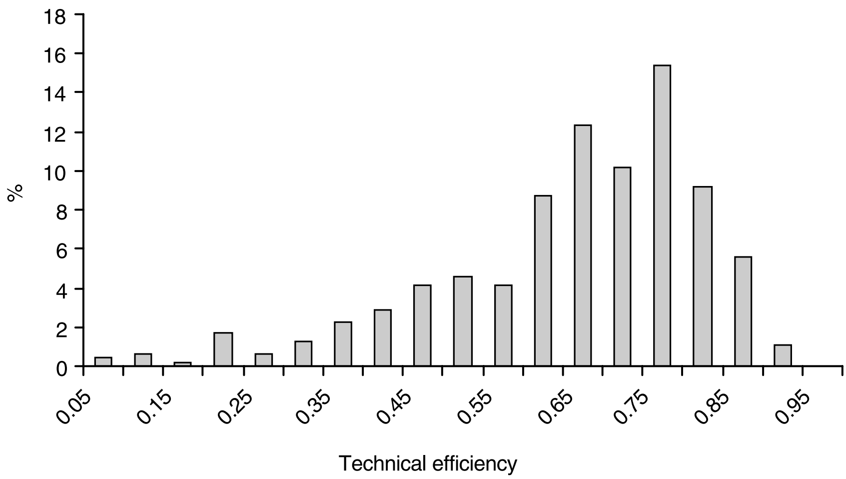

Figure 10.4: Distribution of Technical Efficiency (Zambia)

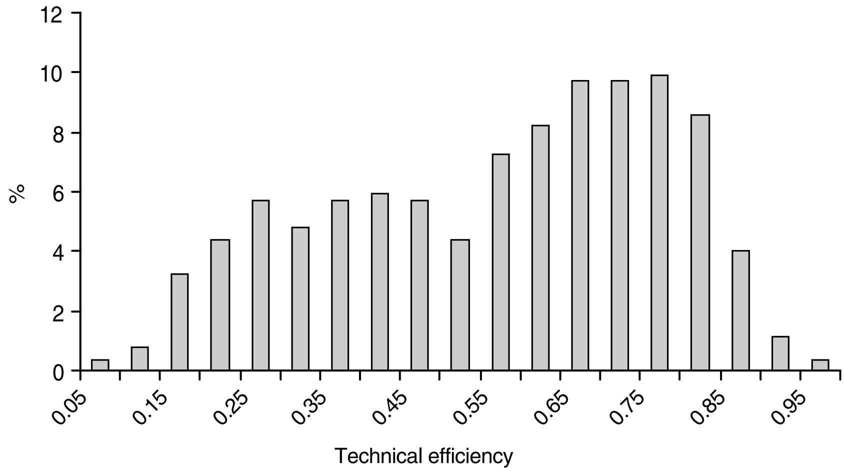

Figure 10.5: Distribution of Technical Efficiency (Zimbabwe)

Firm Size, Firm Age, and Technical Efficiency

Firm size and firm age, perhaps, are the most widely discussed factors affecting performance of a firm. There are several reasons that may lead one to believe that larger and older firms are more efficient. For instance, *learning models* of growth emphasize the role of manager in the learning process. Early learning models incorporate fixed or innate managerial capacity (Jovanovic, 1982), while subsequent theoretical models allow for human capital formation to impact managerial efficiency and firm growth (Pakes and Ericson, 1989). Thus, managers can enhance their abilities and the level of efficiency of the firm through various learning mechanisms such as formal and informal education and training. Hence, the learning models predict that firm age and firm size can both positively affect firm's efficiency. But they are negatively correlated with firm growth rates, as growing firms, in due course, exhaust their learning potentialities. This line of analysis has been prevalent in the more recent empirical studies of growth and technical efficiency.

In a recent paper, Lundvall and Battesse (2000) use firm age and firm size to proxy for the theory of firm survivorship as put forward by Jovanovic (1982). In this paper, Lundvall and Battesse (2000) use the RPED data for Kenya to study in detail the relation between firm size, firm age and technical efficiency and hence test the relevance of the firm survivorship theorem. In this subsection we analyze the relation between size, age and efficiency in line with the Lundvall and Battesse (2000) study. To this end, we estimate a stochastic production function with firm size and age as determinants of technical inefficiency. Unlike, the previous section, here, we use translog production functions to estimate the frontier as it has outperformed the Cobb-Douglas production function in all five countries when the determinants of efficiency are included.

The estimated production frontier is reported in Table 10.2 and Table 10.3 tests various null hypotheses for the parameters of the estimated model. The "no inefficiency effect" hypothesis is decisively rejected for all countries implying that there is significant variation in efficiency among firms. Time effect, signifying changes in the three years of the survey, seem to be important for only Zimbabwe and Tanzania. Furthermore, as the table demonstrates, the null hypothesis of no size effect can be rejected at 5% significance level for Kenya and Zimbabwe, whereas it can be rejected at 10% significance level for Tanzania. After controlling for size, the age effect is still important at the 10% level for Zimbabwe and Tanzania.

Table 10.4 presents the distribution of efficiency. As can be seen from this table, for both Kenya and Zimbabwe where the size effect was found to be significant, the technical efficiency appears to be increasing monotonically with size. For instance, in the case of Zimbabwe, the mean technical efficiency for small firms is 0.40 firms whereas it is 0.67 for large size firms. The same monotonic relation can also be witnessed in the case of Kenya. For other countries, however, this relation does not appear to be as straightforward. In the case of Tanzania, larger firms appear to be less efficient albeit mildly. For the other two countries and specifically for Zambia, however, technical efficiency appears to exhibit little correlation with size. It is also interesting to note that, with the exception of Tanzania and Ghana, where no specific relation between size and efficiency is revealed, the standard deviation of technical efficiency decreases considerably for larger firms. This indicates that smaller firms tend to be more heterogeneous in terms of their performance relative to their larger counterparts. This also conforms to our earlier illustration of the distribution of the technical efficiency as depicted in Figures 10.1–5.

Table 10.2: Size and Technical Efficiency

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Constant	9.71 (1.03)	5.57 (1.00)	6.64 (1.62)	5.59 (1.40)	6.96 (1.40)
Ln(K)	0.63 (0.23)	−0.64 (0.42)	1.33 (0.29)	−0.97 (0.45)	1.21 (0.47)
Ln(L)	−0.61 (0.50)	2.67 (0.73)	0.01 (0.70)	1.89 (0.67)	−0.24 (0.76)
T	−2.50 (0.70)	1.12 (0.95)	1.78 (0.98)	0.16 (0.88)	1.11 (0.74)
Ln(w)	−0.49 (0.30)	−1.27 (0.46)	0.89 (0.37)	0.02 (0.55)	−1.70 (0.54)
Ln(K)*Ln(K)	−0.02 (0.01)	0.01 (0.02)	−0.08 (0.01)	0.01 (0.02)	−0.01 (0.02)
Ln(L)*LN(L)	−0.03 (0.04)	−0.02 (0.05)	−0.05 (0.05)	0.03 (0.04)	0.01 (0.04)
Ln(w)*Ln(w)	0.49 (0.14)	−0.18 (0.20)	−0.56 (0.18)	0.12 (0.13)	0.07 (0.11)
T*T	0.02 (0.02)	0.09 (0.03)	−0.05 (0.02)	−0.02 (0.04)	0.18 (0.05)
Ln(K)*Ln(L)	0.04 (0.04)	0.01 (0.05)	0.17 (0.03)	−0.03 (0.03)	0.04 (0.05)
Ln(K)*T	0.05 (0.03)	0.06 (0.04)	0.02 (0.04)	−0.01 (0.04)	−0.08 (0.04)
Ln(K)*Ln(w)	0.01 (0.02)	0.05 (0.04)	−0.02 (0.07)	0.08 (0.03)	−0.06 (0.05)
Ln(L)*T	−0.08 (0.07)	−0.06 (0.07)	0.07 (0.02)	0.03 (0.05)	0.09 (0.06)
Ln(L)*Ln(w)	0.09 (0.05)	−0.18 (0.06)	−0.14 (0.05)	−0.06 (0.05)	−0.01 (0.08)
T*Ln(w)	0.03 (0.05)	−0.07 (0.06)	0.02 (0.06)	−0.05 (0.07)	−0.06 (0.07)
Determinants of Inefficiency					
Constant	−4.61 (3.15)	1.58 (0.76)	−8.91 (5.30)	0.37 (1.03)	1.90 (0.91)
D_{1994}	−2.15 (0.99)	0.43 (0.51)	0.13 (0.61)	0.04 (0.66)	0.01 (0.36)
D_{1995}	0.14 (0.69)	0.65 (0.54)	−0.94 (0.51	1.97 (0.84)	0.37 (0.38)
Ln(L)	2.84 (1.72)	0.20 (0.33)	0.39 (0.65)	−1.30 (0.73)	−0.30 (0.36)
Ln(L)*Ln(L)	−0.44 (0.26)	−0.14 (0.07)	0.02 (0.07)	−0.51 (0.24)	−0.18 (0.46)
Ln(age)*	−0.72 (0.83)	−0.33 (0.53)	3.08 (2.08)	−0.88 (0.86)	0.52 (0.46)
Ln(age)*Ln(age)	0.04 (0.22)	0.06 (0.13)	−0.27 (0.29)	−0.78 (0.38)	−0.27 (0.12)
Ln(L)*Ln(age)	0.20 (0.20)	−0.02 (0.11)	−0.08 (0.17)	1.46 (0.62)	0.27 (0.12)
Variance Parameters					
$\sigma^2_s = \sigma^2 + \sigma_v^2$	1.61 (0.39)	1.22 (0.21)	4.31 (1.19)	3.86 (0.97)	1.18 (0.14)
$\gamma = \sigma^2/(\sigma^2 + \sigma_v^2)$	0.67 (0.13)	0.52 (0.12)	0.85 (0.04)	0.88 (0.04)	0.78 (0.05)
Log-likelihood	−468.23	−715.18	−637.79	−618.32	−577.20
Mean TE	0.66	0.57	0.56	0.63	0.55

Table 10.3: Selected Tests of Hypotheses for Parameters of the Inefficiency

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*5% Critical Value*
H_o: No Efficiency Effect	17.84**	17.37**	51.10**	42.95**	67.15**	16.27
H_0: No Time Effect	3.12	0.74	2.72	3.22	4.01	5.99
H_0: No Size effect	2.38	8.82**	1.23	2.92	30.0**	7.82
H_0: No Age effect	0.46	1.28	6.78*	4.76	7.18*	7.82
H_0: No Size and Age effect	3.06	10.06*	7.44	4.90	36.74**	11.09

Note: (**) indicates significance at 5% level whereas (*) stands for significance at 10% level.

Table 10.4: Distribution of the Estimated Mean Efficiency

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
By Size					
Micro	0.69 (0.17)	0.41 (0.19)	0.60 (0.18)	0.60 (0.17)	0.27 (0.16)
Small	0.64 (0.18)	0.56 (0.16)	0.55 (0.27)	0.62 (0.15)	0.40 (0.22)
Medium	0.64 (0.13)	0.67 (0.14)	0.54 (0.20)	0.63 (0.15)	0.54 (0.16)
Large	0.61 (0.18)	0.75 (0.10)	0.48 (0.19)	0.68 (0.13)	0.67 (0.14)
Very Large	0.69 (0.19)	0.80 (0.10)	0.43 (0.24)	0.74 (0.09)	0.78 (0.10)
By Age					
1–4	0.68 (0.15)	0.38 (0.20)	0.65 (0.12)	0.57 (0.22)	0.49 (0.20)
5–10	0.66 (0.16)	0.43 (0.22)	0.59 (0.18)	0.59 (0.16)	0.41 (0.27)
11–20	0.65 (0.18)	0.59 (0.21)	0.55 (0.21)	0.63 (0.14)	0.44 (0.25)
21–30	0.65 (0.15)	0.60 (0.23)	0.48 (0.25)	0.66 (0.15)	0.60 (0.20)
>30	0.64 (0.16)	0.57 (0.24)	0.52 (0.22)	0.66 (0.16)	0.68 (0.17)
By Sector					
Food	0.66 (0.16)	0.56 (0.22)	0.53 (0.21)	0.63 (0.17)	0.56 (0.26)
Metal	0.63 (0.17)	0.57 (0.20)	0.53 (0.22)	0.63 (0.16)	0.51 (0.25)
Textile	0.69 (0.16)	0.61 (0.20)	0.58 (0.20)	0.63 (0.15)	0.56 (0.24)
Wood	0.65 (0.16)	0.56 (0.22)	0.58 (0.20)	0.62 (0.16)	0.54 (0.24)
By Location					
Capital	0.65 (0.17)	0.60 (0.21)	0.56 (0.21)	0.63 (0.16)	0.57 (0.25)
Non-capital	0.67 (0.17)	0.53 (0.20)	0.55 (0.20)	0.63 (0.17)	0.52 (0.25)
Overall	0.66 (0.16)	0.57 (0.21)	0.56 (0.21)	0.63 (0.16)	0.55 (0.25)

Note: The numbers in parentheses are standard deviations. The size groups are defined as before.

In addition to firm size, firm age was also found significant for two countries, namely, Zimbabwe and Tanzania and while not significant it was also found to exhibit strong relation with technical efficiency in the case of Zambia. As one might expect from theoretical considerations, the results indicate a strong and positive relation between firm age and technical efficiency for Zimbabwe. For instance, the average efficiency for firm older than 20 years is close to 0.60 for Zimbabwe whereas it is closer to 0.40 for firms 10 years old or younger. In the case of Tanzania, however, older firms are found to be generally less efficient than the younger firms. The latter results, although running contrary to *a priori* expectations, can be attributed to the distribution of firms within Tanzania where large inefficient public firms are represented in the sample surveyed. Much milder discrepancy in the performance of younger versus older firms can also be found for Zambia whereas for Ghana there does not appear to be any specific relation between age and efficiency. In the case of Kenya, however, older firms do appear to be more efficient. Table 10.4 shows that the average efficiency of firms that are younger than 10 years old is close to 0.40 whereas it is closer to 0.60 for older firms. However, unlike Zimbabwe where the efficiency increases monotonically with age, the distribution in Kenya appears to be binomial where firms that are younger than 10 years old and those that are older form the two groups.

The analysis so far has ignored any interaction between the size and the age of the firm. To further investigate the relation between size, age, and technical efficiency, we first present the distribution of firm age by size categories in Table 10.5. It is interesting to note that the average age increases monotonically with the increase in size for two countries, i.e. Zambia and Zimbabwe. Average efficiency was also found to be increasing with size for these two countries only. For the other three countries, namely Ghana, Kenya, and Tanzania the relation is less clear. This raises the question of how much size and age actually affect the performance of each firm and what is the direction of each effect independently. To this end, we have to further analyze the contribution of size and age to the technical efficiency, a task we intend to pursue in the next subsection.

Table 10.5: Distribution of Firm Age by Size Groups

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Size Groups					
Micro	10.27 (7.19)	14.71 (11.53)	12.56 (8.67)	15.54 (8.59)	13.10 (10.35)
Small	16.85 (11.29)	20.30 (13.30)	19.14 (16.6)	18.77 (11.76)	15.10 (11.47)
Medium	15.96 (7.75)	20.46 (10.29)	15.04 (10.33)	22.92 (10.36)	25.80 (13.63)
Large	25.59 (17.90)	19.68 (7.84)	22.25 (10.52)	23.26 (10.15)	27.84 (18.09)
Very Large	21.72 (15.15)	22.94 (10.49)	21.38 (13.63)	29.45 (14.98)	37.10 (13.38)
Overall	15.22 (11.49)	18.44 (11.73)	15.51 (9.94)	19.31 (11.41)	24.04 (15.32)

Note: The size groups are defined as before.

Contribution of Size and Age to Technical Efficiency

Using equation 4 and equation 5, the elasticity of technical efficiency with respect to both firm size and firm age is calculated and presented in Table 10.6. The overall impression gathered from our earlier analysis indicates that size contributes significantly and positively to the firm's technical efficiency for two countries, namely Zimbabwe and Kenya. This finding is supported strongly by the size elasticity presented in Table 10.6. Since the estimated elasticity, as indicated before, depends on the values of the independent variables, we have evaluated this elasticity at the mean levels for the relevant variables, i.e. size and earnings. The overall size elasticity of technical efficiency is estimated to be at 0.121 and 0.211 and is significant at 5% for Kenya and Zimbabwe respectively. This result is also reinforced by the fact that, when estimated at the sample means, the size elasticity is found to be positive and significant for all size intervals for both Kenya and Zimbabwe. Furthermore, this effect weakens for every larger size category which indicates that the positive size–efficiency relationship tends to be stronger for small than for large firms. This is an important finding as it shows that small firms are not only more divergent in terms of their technical efficiency, but also that they show more improvement in their performance as they grow.

Table 10.6: Elasticity of Technical Efficiency with Respect to Firm Size and Firm Age at the Means of Inputs

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Size Elasticity					
By Size Groups					
Micro	−0.122 (0.072)	0.230 (0.101)	−0.012 (0.017)	−0.061 (0.035)	0.214 (0.152)
Small	−0.092 (0.065)	0.160 (0.073)	−0.016 (0.011)	0.039 (0.017)	0.364 (0.090)
Medium	0.071 (0.066)	0.110 (0.052)	−0.029 (0.022)	0.065 (0.029)	0.267 (0.060)
Large	0.151 (0.100)	0.070 (0.030)	−0.034 (0.033)	0.085 (0.038)	0.189 (0.039)
Very Large	0.128 (0.078)	0.034 (0.015)	−0.039 (0.057)	0.077 (0.035)	0.094 (0.020)
By Firm Age					
1–4	−0.089 (0.063)	0.118 (0.109)	−0.012 (0.016)	0.133 (0.055)	0.362 (0.091)
5–10	−0.080 (0.051)	0.124 (0.075)	−0.016 (0.013)	0.076 (0.031)	0.357 (0.082)
11–20	−0.089 (0.056)	0.120 (0.054)	−0.018 (0.013)	0.007 (0.009)	0.292 (0.070)
21–30	−0.058 (0.047)	0.110 (0.044)	−0.018 (0.012)	0.003 (0.009)	0.205 (0.046)
>30	0.008 (0.047)	0.096 (0.035)	−0.019 (0.019)	0.014 (0.013)	0.133 (0.031)
Overall	−0.078 (0.051)	0.121 (0.050)	−0.016 (0.012)	0.023 (0.014)	0.211 (0.045)
Age Elasticity					
By Size Groups					
Micro	0.017 (0.020)	0.028 (0.116)	−0.090 (0.048)	0.174 (0.066)	0.147 (0.143)
Small	−0.017 (0.039)	0.010 (0.081)	−0.086 (0.041)	0.033 (0.019)	−0.050 (0.059)
Medium	−0.061 (0.054)	0.006 (0.052)	−0.132 90.066)	−0.031 (0.028)	−0.011 (0.051)
Large	−0.077 (0.063)	0.005 (0.034)	−0.131 (0.063)	−0.073 (0.039)	−0.036 (0.034)
Very Large	−0.046 (0.036)	0.002 (0.017)	−0.094 (0.076)	−0.082 (0.040)	−0.021 (0.020)
By Firm Age					
1–4	0.017 (0.050)	0.066 (0.191)	−0.090 (0.061)	−0.026 (0.043)	−0.269 (0.104)
5–10	0.003 (0.017)	0.038 (0.095)	−0.093 (0.050)	−0.004 (0.019)	−0.154 (0.058)
11–20	0.006 (0.032)	0.010 (0.056)	−0.098 (0.047)	0.065 (0.024)	−0.020 (0.048)
21–30	−0.029 (0.059)	0.003 (0.060)	−0.072 (0.039)	0.051 (0.025)	−0.004 (0.042)
>30	−0.059 (0.091)	0.001 (0.070)	−0.117 (0.052)	0.018 (0.023)	−0.000 (0.033)
Overall	−0.006 (0.022)	0.011 (0.058)	−0.095 (0.046)	0.039 (0.018)	−0.026 (0.036)

Note: The size groups are defined as before.

For the other three countries, namely, Ghana, Tanzania, and Zambia, the size elasticities are small and insignificant. In the case of Ghana and Tanzania, the overall size elasticity is negative. However, in the case of Tanzania, the estimated size elasticity is negative albeit insignificant for all size groups whereas for Ghana, this elasticity is negative for only micro and small firms. In the case of Zambia, however, although the overall size elasticity is insignificant, it is significant and positive for all size groups except the micro groups. The negative overall size elasticity for Ghana and Tanzania might be attributed to the fact that the distribution of firms in these two countries is skewed towards small and micro firms. Furthermore, Tanzania sample also includes a sizable number of very large public firms. This also may explain why, in the case of Tanzania and unlike Ghana, the size elasticity of technical efficiency remains negative for all size groups even the large and very large.

The size elasticity is also estimated for different firm age groups. Table 10.6 illustrates how size-efficiency relationship changes over the size spectrum. However, the partial elasticities shown there cannot shed light on the question of whether the size effect is heavily dependent on firm age. As Lundvall and Battese (2000) argue, *it is possible that the elasticity switches sign as the age variable is scaled up or down*. Lundvall and Battese (2000) suggest a simple solution in which the partial derivatives of the mean of the inefficiency effect (:$_{it}$), with respect to size is utilized. Using equation (2), this derivative can be written as:

$$\frac{\partial \mu_{it}}{\partial L} = \delta_3 + 2\delta_4 L_{it} + \delta_1 Age_{it}$$

According to this equation, the marginal effect of firm size is a linear function of firm size and firm age. In other words, by setting this derivative equal to zero and solving for the size, the resulting linear function will be:

$$L_{it} = \frac{\delta_3 + \delta_1 Age_{it}}{-2\delta_4}$$

This linear line in the size–age space defines the combination of size and age where the marginal effect of size on is technical inefficiency is zero. The two sides of this line, however, define the space where the effect of size on technical efficiency is either positive or negative depending on whether this equation stands for a minimum or maximum. We illustrate this line with the size–age values for the sample firms in both Kenya and Zimbabwe where firm size was found to be significant.

Figures 10.6–10 present the marginal effect of firm size on technical efficiency in the size–age space. Here, both size and age are in log terms. As indicated earlier, in these figures, the straight lines represent the combination of age and size for which the marginal effect of size on technical efficiency is zero. Depending on whether this combination, represents a maximum or minimum (whether the second derivatives are negative or positive), the two sides of this line imply whether the marginal effect of firm size on technical *inefficiency* is negative or positive. We have indicated this direction by (−) or a (+) sign. A negative (−) sign (positive (+) sign) indicates that in the specified area the marginal effect of firm size on technical *inefficiency* is negative (positive), hence the marginal effect on the technical efficiency will be positive (negative). Therefore, for the firms located in the negative (−) (positive (+)) area, firm size will lead to higher (lower) technical efficiency. The marginal impact of firm age on technical efficiency can also be read off using the same approach.

A close look at these figures indicates that the lines representing the marginal efficiency of firm age have different slopes. A steeper line, signals a strong impact of firm age on the size–efficiency relationship, while a flat line shows that the age effect is non-existent. Thus, a rather steep line for Tanzania, Zambia and Zimbabwe should not come as a surprise since the impact of age on technical efficiency was strong in each of these three countries.

Secondly, how the line divides up the observations is of interest. In the case of Kenya, Zimbabwe and Tanzania for example, the age–size line is at the extreme of observations showing that age has practically no effect on the marginal impact of size on efficiency (the age-size interaction is absent). In these countries, however, most of the firms are located in spaces with different signs. In Kenya and Zimbabwe the sign is *negative,* showing that the marginal impact of size on efficiency is positive, irrespective of firm age. The opposite is the case in Tanzania.

It is interesting to note that consistent with our earlier findings, the marginal impact of firm size on technical efficiency is positive and strong for both Kenya and Zimbabwe. In the case of Zimbabwe those firms that fall in the (+) area, include a handful of very old and yet small firms. In the case, of Kenya, however, the (+) area includes several micro size firms of different age groups. As we have seen, in these two countries the size effects were still significant but weaker when the micro firms (less than 10 workers) were excluded.

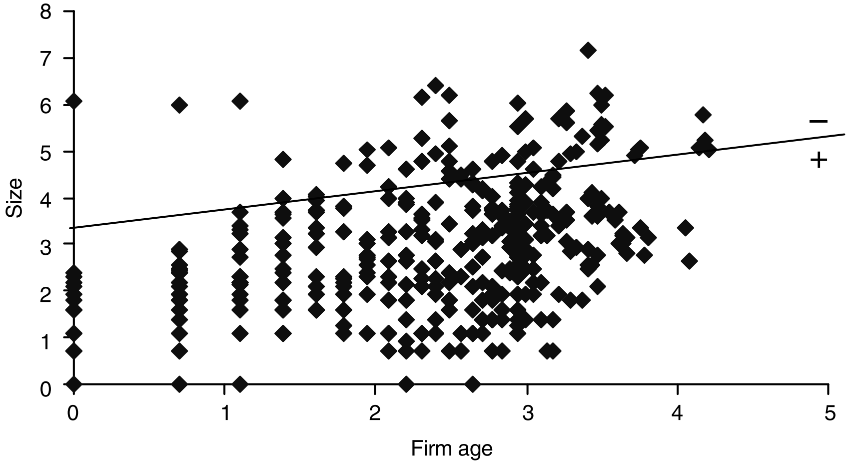

Figure 10.6: The Marginal Effect of Firm Size on Technical Inefficiency (Ghana)

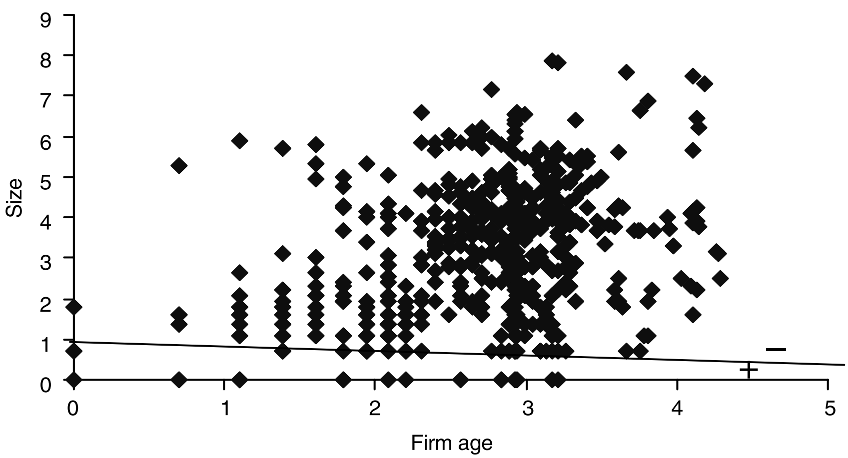

Figure 10.7: The Marginal Effect of Firm Size on Technical Inefficiency (Kenya)

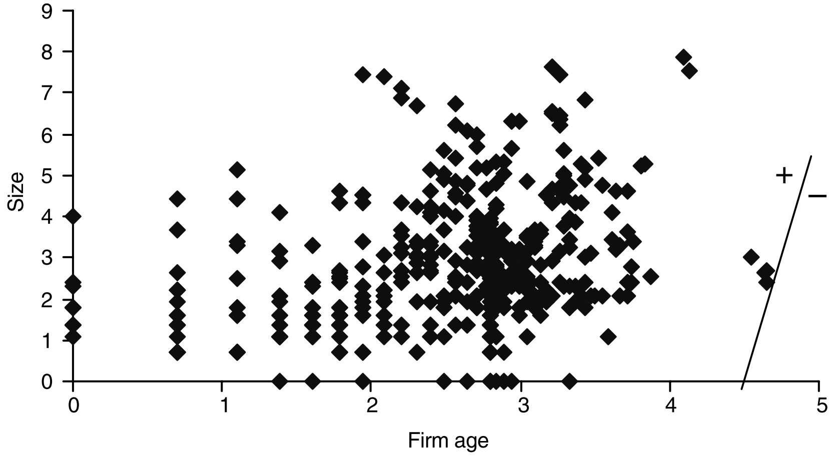

Figure 10.8: The Marginal Effect of Firm Size on Technical Inefficiency (Tanzania)

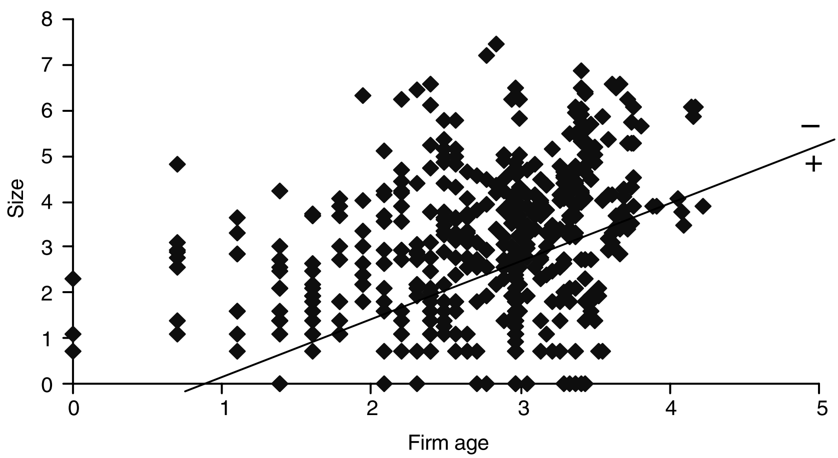

Figure 10.9: The Marginal Effect of Firm Size on Technical Inefficiency (Zambia)

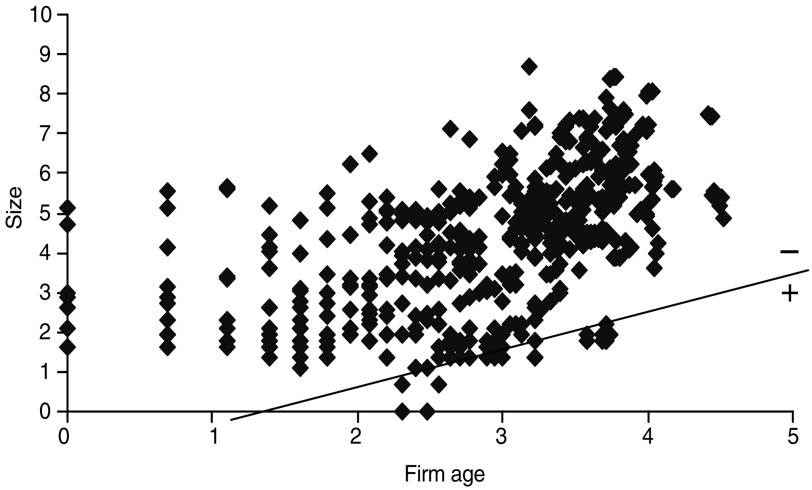

Figure 10.10: The Marginal Effect of Firm Size on Technical Inefficiency (Zimbabwe)

Ghana and Zambia are the two countries which show significant interaction of age and size on firm efficiency. However, the results are rather different. In Ghana, most of the firms fall in the (+) area whereas for Zambia most of them fall in the (−) area, although for both countries a sizable number of firms are located in the other area. This is also consistent with our earlier analysis where we found size to have a negative and insignificant impact on technical efficiency for Ghana and positive and insignificant impact for Zambia. The non-significance could probably be traced to the age–size interaction. Figure 10.6, depicting the marginal effects of size on technical efficiency in Ghana, suggests that only large and older firms in Ghana fall in the (−) area where the marginal impact of size on technical efficiency is positive. In the case of Zambia the (+) space, (i.e. with negative marginal effect of size on efficiency) is occupied by older and smaller firms.

It is also important to note that the results obtained here can be rather sensitive to both the level of aggregation used and the definition of variables. For instance, in a similar study of the relationship between size–age and technical efficiency in Kenya, Lundvall and Battese (2000) found the size to be significant in only two sectors and that the slope of line in the age–size space to vary rather considerably among different sectors.

Furthermore, instead of employment, Lundvall and Battese (2000) use intermediate input as a proxy for the firm size and found a much steeper age–size slope where the impact of age on the relation between size and technical efficiency was much stronger. However, in general their finding is similar to ours where the mean technical efficiency generally increases with the size and age but the age effect is rather weaker and less systematic.

Other Determinants of Technical Efficiency

In the last section, the relation between firm size, firm age and technical efficiency was studied in some detail. However, many other firm specific factors have been found in the literature to be affecting performance of the firm. Some of these factors might actually be the substantive cause of size-efficiency relation found in the last section.

The factors affecting firm efficiency can be classified into two main categories, those that measure human capital of entrepreneurs or managers and those that define firms' learning channels. The former includes those variables that can quantify managerial human capital such as age, experience, and education. The latter includes foreign ownership, trade orientation, and technology transfer. A more educated and experienced manager can contribute positively to the firm performance and hence increase the firm efficiency. Ownership is a significant factor in technical efficiency. A firm owned by foreigners, or one with licensing or technical transfer agreements with a foreign/multinational firm, has better access to know-how and better physical capital and hence has a better chance of being more efficient. Among other factors, trade orientation may also affect a firm performance, as export-oriented firms are likely to be more efficient since their international exposure warrants a specific standard level not enjoyed by an average firm. Participation in import activities might also contribute positively to the efficiency of a firm since it gives the firm access to capital not available otherwise, or it might help to provide more efficient machinery.

Table 10.7 estimates a translog production function for the five sub-Saharan countries. In this table, managerial attributes including manager's age and experience, and firm attributes including percentage of foreign ownership, a dummy for foreign technical assistance/licensing relationship, trade orientation in terms of percentage of raw material imported and percentage of output exported, are used as determinants of technical inefficiency. Table 10.8 provides the corresponding likelihood ratio tests for selected null hypotheses.[27]

Table 10.7: Management, Ownership, Trade, and Technical Efficiency

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Constant	9.44 (1.23)	8.81 (2.61)	6.91 (2.67)	5.71 (1.38)	9.25 (1.37)
Ln(K)	0.49 (0.25)	−0.48 (0.42)	1.44 (0.30)	−0.91 (0.47)	1.10 (0.45)
Ln(L)	−1.14 (0.43)	2.44 (0.70)	−0.25 (0.72)	1.89 (0.71)	0.51 (0.70)
T	−1.48 (0.68)	1.01 (0.76)	1.01 (0.95)	0.26 (0.89)	0.16 (0.60)
Ln(w)	−0.52 (0.29)	−1.44 (0.58)	0.98 (0.43)	−0.07 (0.57)	−2.37 (0.56)
Ln(K)*Ln(K)	−0.02 (0.01)	0.00 (0.02)	−0.08 (0.01)	0.01 (0.01)	−0.01 (0.02)
Ln(L)*LN(L)	0.02 (0.04)	−0.05 (0.04)	−0.04 (0.04)	0.04 (0.04)	0.00 (0.04)
Ln(w)*Ln(w)	0.22 (0.14)	−0.19 (0.11)	−0.41 (0.15)	0.05 (0.13)	0.13 (0.09)
T*T	0.02 (0.02)	0.10 (0.03)	−0.05 (0.02)	−0.01 (0.04)	0.21 (0.05)
Ln(K)*Ln(L)	0.03 (0.04)	0.03 (0.05)	0.17 (0.03)	−0.03 (0.04)	0.01 (0.05)
Ln(K)*T	0.05 (0.03)	0.06 (0.04)	0.03 (0.04)	0.00 (0.04)	−0.07 (0.04)
Ln(K)*Ln(w)	0.01 (0.02)	0.06 (0.04)	0.00 (0.08)	0.07 (0.03)	−0.06 (0.05)
Ln(L)*T	−0.10 (0.06)	0.01 (0.06)	0.07 (0.02)	0.02 (0.06)	0.07 (0.06)
Ln(L)*Ln(w)	0.12 (0.05)	−0.18 (0.06)	−0.12 (0.05)	−0.07 (0.03)	−0.02 (0.08)
T*Ln(w)	0.04 (0.05)	−0.09 90.06)	0.02 (0.06)	−0.05 90.07)	0.01 (0.07)
Determinants of Inefficiency					
Constant	−1.44 (1.29)	−0.88 (0.97)	−0.21 (0.57)	−2.50 (1.78)	−4.14 (2.30)
D_{1994}	−0.74 (0.57)	0.11 (0.38)	−0.30 (0.73)	0.27 (0.63)	−0.59 (0.42)
D_{1995}	0.38 (0.71)	0.73 (0.66)	−5.73 (2.06)	1.75 (0.80)	0.95 (0.49)
Manager Age	−1.25 (0.75)	−1.43 (0.83)	−5.73 (4.09)	−3.24 (1.01)	−4.60 (2.24)
Manager Experience	8.06 (4.98)	−1.40 (1.43)	1.28 (0.74)	−2.38 (1.31)	1.21 (0.60)
Manager Age^2	−0.04 (0.03)	0.19 (0.14)	5.38 (3.91)	−0.70 (0.94)	1.62 (0.58)
Manager Exp^2	−4.29 (2.48)	0.27 (0.53)	−0.14 (0.67)	−5.54 (2.78)	−2.63 (1.16)
Man. Age*Man. Exp	−1.06 (0.65)	0.23 (0.47)	−1.07 (1.08)	−6.36 (4.04)	−3.52 (1.83)
License	−1.47 (1.12)	−0.09 (0.70)	−0.18 (0.88)	−2.13 (0.98)	−3.05 (0.84)
Foreign Ownership	−0.16 (0.82)	0.16 (0.55)	1.88 (1.12)	1.36 (1.38)	−4.08 (1.97)
% Imported Raw Material	−0.26 (0.14)	−0.62 (0.44)	−2.54 (0.98)	−0.46 (0.37)	−1.78 (0.94)
% Total Export	−0.37 (0.14)	−0.33 (0.53)	−5.90 (2.23)	−2.51 (1.34)	−1.64 (0.79)
Variance Parameters					
$\sigma^2_s = \sigma^2 + \sigma_v^2$	2.26 (0.77)	1.08 (0.28)	4.68 (1.09)	3.44 (0.90)	2.79 (0.68)
$\gamma = \sigma^2/(\sigma^2+\sigma_v^2)$	0.79 (0.07)	0.219 (0.32)	0.87 (0.03)	0.86 (0.04)	0.88 (0.04)
Log-likelihood	−463.37	−736.44	−600.97	−615.73	−579.88
Mean TE	0.654	0.641	0.544	0.626	0.657

Note: See Table 10.1.

[27] We have repeated our analysis to include public ownership. We have found significant contribution to technical inefficiency for only Tanzania where public firms are by far less technically efficient. This result is a potential answer to the question of why Tanzanian firms exhibit different behavior than firms in other countries. It appears that Tanzanian sample is dominated by large public firms that are relatively inefficient.

As Table 10.8 reveals management age and experience are not found to be significant at a high level of probability, although they are relatively strong for several countries. Looking at the results of Table 10.7, manager's human capital appears to be strongest for Ghana, Tanzania, and Zimbabwe. Firms with more experienced managers are estimated to be more technically efficient. Furthermore, the interaction between manager experience and age also provides some useful information regarding the relation between technical efficiency and managerial human capital. For Ghana, Tanzania, and Zimbabwe, where the management effect is strongest, the coefficient on the interaction between manager age and experience is negative. This implies that *ceteris paribus*, the impact of both experience and age will be enhanced with older or more experienced managers, respectively.

Trade is the only variable that was found to be highly significant for all five countries. However, the foreign effect which includes both direct ownership and technical assistance/licensing agreement, was found to be significant only for Zimbabwe.

Table 10.8: Selected Tests of Hypotheses for Parameters of the Inefficiency

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*5% Critical Value*
H_0: No Efficiency Effect	31.64**	19.01**	61.51**	48.14**	61.79**	18.31
H_0: No Management Effect	7.7	0.38	6.16	4.24	5.91	11.07
H_0: No Foreign Effect	0.81	0.46	3.48	1.88	13.34**	5.99
H_0: No Trade Effect	5.20*	4.92*	8.31**	6.56**	4.62*	5.99

Note: (**) is significance at 5% level whereas (*) stands for significance at 10% level.

Table 10.9 provides measures of mean technical efficiency by categories of variables. It shows that foreign ownership increases technical efficiency for nearly all countries, although there does not appear to be a meaningful difference between firms with minority foreign ownership (0–40%) and those that enjoy majority foreign ownership (>40%).

Among other factors that may contribute to technical efficiency, trade orientation is found to be of the greatest significance. More specifically, import orientation is a significant determinant of technical efficiency in Zimbabwe, Tanzania, and Ghana, whereas export orientation is a significant determinant of technical efficiency in Zimbabwe, Zambia and Tanzania. Table 10.9 also reveals that on average those firms that engage in export are more efficient than those engaged in import – a result which may not come as a surprise.

Table 10.9: Distribution of the Estimated Technical Efficiency

	Ghana	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
By Size Groups					
Micro	0.639 (0.16)	0.616 (0.16)	0.585 (0.18)	0.585 (0.18)	0.542 (0.19)
Small	0.660 (0.16)	0.625 (0.12)	0.537 (0.22)	0.721(0.16)	0.539 (0.22)
Medium	0.625 (0.16)	0.662 (0.13)	0.562 (0.19)	0.620 (0.16)	0.590 (0.16)
Large	0.709 (0.12)	0.702 (0.12)	0.539 (0.19)	0.679 (0.14)	0.710 (0.13)
Very Large	0.684 (0.14)	0.699 (0.10)	0.488 (0.24)	0.784 (0.07)	0.819 (0.05)
By Sector					
Food	0.670 (0.15)	0.644 (0.14)	0.524 (0.21)	0.627 (0.17)	0.655 (0.20)
Metal	0.623 (0.16)	0.632 (0.14)	0.545 (0.20)	0.607 (0.17)	0.628 (0.20)
Textile	0.654 (0.16)	0.626 (0.15)	0.543 (0.20)	0.621 (0.16)	0.677 (0.17)
Wood	0.676 (0.14)	0.662 (0.13)	0.553 (0.20)	0.646 (0.16)	0.636 (0.17)
By Ownership					
Domestic	0.645 (0.16)	0.630 (0.14)	0.544 (0.20)	0.613 (0.16)	0.635 (0.19)
Technical Assistance	0.707 (0.15)	0.700 (0.13)	0.606 (0.22)	0.649 (0.16)	0.764 (0.14)
Minor Fgn Ownership	0.780 (0.13)	0.722 (0.12)	0.446 (0.28)	0.674 (0.09)	0.753 (0.14)
Major Fgn Ownership	0.827 (0.15)	0.704 (0.11)	0.596 (0.23)	0.725 (0.14)	0.738 (0.15)
By Trade					
No Trade	0.623 (0.17)	0.603 (0.14)	0.484 (0.20)	0.586 (0.17)	0.544 (0.20)
Import Oriented	0.647 (0.14)	0.679 (0.13)	0.575 (0.17)	0.651 (0.16)	0.715 (0.20)
Export Oriented	0.711 (0.15)	0.710 (0.11)	0.641 (0.20)	0.719 (0.11)	0.737 (0.13)
Overall	0.654 (0.16)	0.641 (0.14)	0.544 (0.19)	0.626 (0.16)	0.657 (0.19)

Note: The numbers in parentheses are standard deviations. The size groups are defined as before.

Inter-country Differences in Technical Efficiency

In this section we shift attention from the determinants of efficiency within each country to inter-country differences in technical efficiency. The analysis is done by pooling all the observations for the five countries together.

Theoretically, three main alternatives can contribute to the explanation of inter-country differences in technical efficiency. First, structural differences in a country, based on its development stage, may contribute to the observed differences in the firms' technical efficiency. Firms located in a relatively more developed country, will on average enjoy a higher level of technical efficiency. One may attribute this phenomenon to those factors that affect the smooth functioning of the economy, including the infrastructure of production as well as the structure of factor and product markets.

Another line of approach has emphasized the economies of learning. As discussed in the last section, Lundvall and Battesse (2000) use firm age and firm size to proxy for the theory of firm survivorship as put forward by Jovanovic (1982). According to this model, only firms that are more efficient survive and grow, hence larger and older firms are on average more efficient. Therefore, this theory implies that the greater preponderance of larger and older firms in those countries that are relatively more developed insures a higher relative technical efficiency for the firms operating in them. Size in this framework captures qualitative variables such as learning by doing, organizational superiority of larger firms, product quality differentials, first mover advantages of larger older firms and so on, and is positively associated with technical efficiency, as is firm age.

Third, other factors that may affect the performance of a firm within a country, as discussed in the previous section, may also contribute to the inter-country differences in technical efficiency. For instance, a more open policy may induce foreign investment in a country, may lead to more concentration of foreign owned companies, and hence may contribute positively to the overall technical efficiency of firms operating in that country. Other significant factors that might affect efficiency include policies toward human capital, access to physical capital, etc.

The task of this section is to answer two primary questions. First, are these five African countries different in terms of their technical efficiency? If yes, how different are they? Second, how much of these differences can be attributed to each of the aforementioned three groups of factors.

Differences in Technical Efficiency

We have estimated the stochastic frontier model as discussed by pooling the data for all countries together. To ensure that the inter-country differences are not sector or size specific we estimate the model for all five African countries (Africa Frontier) over all, and by different sector and size groups.

In all the cases, a translog function represents the production frontier where number of workers (L), the value of replacement capital (K), time trend (T), and relative wage to the industry in each country (w) are used as variables.[28] We have included the time trend in the production frontier

[28] We have also fitted Cobb-Douglas production function to our dataset. The likelihood ratio test for a null hypothesis of Cobb-Douglas production function versus the alternative of translog production function for the general African frontier yields a value of 100.94. This suggests that the Cobb-Douglas production function can be rejected in favor of translog production function at any reasonable significance level. Hence, in the empirical section, to conserve space, we only report the results for the translog production function.

(over the three waves of the survey) to account for possible shift in the production frontier or what is known in the literature as technological progress. We have also included the relative wage as a variable in our production frontier in line with the findings of the Solow (1981) model and to account for differences in quality of labor or what is known as embodied human capital. All values with the exception of time (*T*) are in natural logarithm. In all models, location dummy and capital utilization are added to the production function to account for their effect on the frontier. We have also included sector dummies in all production functions except for the sector specific frontier models. Furthermore, in all the models, time and country dummies are used as determinants of inefficiency to capture changes in technical efficiency in time as well as inter-country differences in technical efficiency. Furthermore, all local currency values have been converted to PPP numbers.

Table 10.10 presents the estimates for the Overall Africa Frontier, combining all countries and sectors, and then for each sector individually. Table 10.11 provides the resulting distribution of the estimated mean values of technical efficiency. Focusing first on the Overall Africa frontier, the estimated parameters for the country specific dummy variables are all positive and significant indicating that Zimbabwe (the base country) is the most technically efficient country in the group followed by Kenya, Zambia, Tanzania, and Ghana.[29]

[29] It has been argued in the literature and rightfully so that the inclusion of micro firms (those with 10 employees or less) in the estimation of frontier may bias the results. This argument primarily relies on the fact that these firms are prone to errors in their data report. To ensure that our data is not subject to this problem, we have re-estimated the African frontier as in Table 10.1 without the Micro firms. The resulting sample included 1536 observations. The estimated frontier did not differ materially from one reported in Table 1. Zimbabwe and Kenya with a mean technical efficiency of (0.737) and (0.735) respectively were the most efficient countries followed by Zambia with a mean technical efficiency of (0.640). Ghana with a mean technical efficiency of (0.481) was the least efficient country followed by Tanzania with (0.521).

Table 10.10: Africa Frontier Estimation – Overall and by Sector

	All	*Food*	*Metal*	*Textile*	*Wood*
Constant	4.98 (0.50)	4.59 (1.27)	5.35 (0.89)	5.05 (0.86)	8.07 (0.96)
Ln(K)	0.79 (0.09)	0.91 (0.23)	0.84 (0.17)	0.76 (0.17)	0.29 (0.22)
Ln(L)	−0.16 (0.13)	−0.51 (0.33)	−0.07 (0.25)	−0.14 (0.23)	0.38 (0.26)
T	−0.82 (0.26)	−0.85 (0.65)	−0.83 90.47)	−0.74 (0.42)	−1.83 (0.67)
Ln(w)	0.35 (0.12)	−0.09 (0.38)	0.73 (0.26)	0.28 (0.21)	0.76 (0.24)
Ln(K)*Ln(K)	−0.04 (0.01)	−0.05 (0.01)	−0.05 (0.01)	−0.04 (0.01)	−0.02 (0.01)
Ln(L)*Ln(L)	−0.07 (0.02)	−0.09 (0.04)	−0.09 (0.03)	−0.07 (0.03)	−0.001 (0.04)
T*T	0.21 (0.06)	0.26 (0.14)	0.17 (0.10)	0.25 (0.09)	0.27 (0.14)
Ln(w)*Ln(w)	0.01 (0.01)	0.01 (.02)	0.09 (0.03)	0.27 (0.02)	−0.03 (0.02)
Ln(K)*Ln(L)	0.12 (0.02)	0.16 (0.04)	0.14 (0.03)	0.11 (0.03)	0.04 (0.04)
Ln(K)*T	−0.04 (0.02)	0.001 (0.04)	0.02 (0.03)	−0.04 (0.03)	0.08 (0.03)
Ln(K)*Ln(w)	0.06 (0.01)	0.09 (0.04)	0.02 (0.03)	0.04 (0.02)	0.04 (0.02)
Ln(L)*T	0.01 (0.03)	−0.01 (0.06)	−0.04 (0.05)	0.06 (0.04)	−0.06 (0.06)
Ln(L)*Ln(w)	−0.12 (0.02)	−0.02 (0.07)	−0.08 (0.05)	−0.09 (0.04)	−0.13 (0.05)
T*Ln(w)	−0.02 (0.03)	0.05 (0.07)	0.004 (0.06)	0.03 (0.05)	−0.14 (0.05)
Determinants of Inefficiency					
Constant	−19.4 (4.2)	−11.9 (0.09)	−16.9 (19.5)	−20.6 (10.2)	−1.20 (0.16)
D_{1994}	−4.63 (0.98)	−7.08 (1.50)	−1.68 (2.06)	−4.56 (1.75)	−1.16 (0.33)
D_{1995}	−4.50 (0.84)	0.82 (0.75)	−2.07 (1.49)	−5.70 (1.66)	−1.24 90.33)
Ghana	13.23 (2.56)	0.59 (0.37)	7.16 (7.12)	15.70 (6.75)	2.67 (0.17)
Kenya	3.82 (0.86)	−0.81 (0.47)	4.27 (4.86)	7.72 (3.78)	0.51 (0.21)
Tanzania	11.75 (2.25)	−0.09 (0.84)	6.37 (6.82)	13.33 (5.86)	2.29 (0.20)
Zambia	6.36 (1.25)	0.57 (0.44)	−7.06 (7.36)	7.61 (3.76)	1.21 (0.27)
Variance Parameters					
$\sigma^2_s = \sigma^2 + \sigma_v^2$	9.21 (1.71)	6.18 (4.23)	10.61 (9.94)	10.72 (4.25)	0.97 (0.08)
$\gamma = \sigma^2/(\sigma^2+\sigma_v^2)$	0.928 (0.02)	0.868 (0.09)	0.951 (0.05)	0.953 (0.02)	0.914 (0.19)
Log-likelihood	−3217.05	−678.47	−740.37	−1005.55	−723.61
Mean TE	0.6486	0.7243	0.6161	0.6149	0.5877
Π^2: No Country Effect	68.82**	3.2	15.3**	32.28**	52.28**
Π^2: No Time Effect	9.56**	7.8**	0.46	6.3	22.18**

Note: Standard errors are in parentheses. Location-Sector dummies are not reported.

The estimated parameters also reveal that Tanzania and Ghana are by far the least efficient countries in the group. These findings are also confirmed by the distribution of the estimated mean technical efficiency as reported in Table 10.11. While the mean technical efficiency for the African frontier is 0.645, Zimbabwe with an estimated mean value of 0.728 is the most efficient country followed closely by Kenya with a mean technical efficiency of 0.694 and Zambia with 0.661. The least efficient country is Ghana with mean technical efficiency of 0.542 followed by Tanzania with 0.575. One interesting feature of this table is the fact that the standard deviation for the more efficient countries in the group is considerably lower than that for the least efficient. For instance, Zimbabwe, which is the most efficient country, has an estimated technical efficiency with a standard deviation of 0.09 whereas Ghana, which is the least efficient, has a standard deviation of 0.17. This finding is also confirmed by the frequency distribution of the technical efficiency as depicted in Figures 10.11–16. These frequency distributions exhibit skewness to the left. This skewness is more transparent for the least efficient countries, namely Ghana and Tanzania. This finding suggests that those firms located in the more efficient countries such as Zimbabwe are more homogenous than those located in the less efficient countries such as Ghana.

Table 10.11: Distribution of Estimated Mean Technical Efficiency

	All	*Food*	*Metal*	*Textile*	*Wood*
By Country					
Ghana	0.542 (0.17)	0.706 (0.10)	0.532 (0.16)	0.495 (0.12)	0.397 (0.11)
Kenya	0.694 (0.12)	0.741 (0.08)	0.596 (0.16)	0.630 (0.17)	0.720 (0.08)
Tanzania	0.575 (0.18)	0.724 (0.11)	0.568 (0.19)	0.530 (0.20)	0.514 (0.12)
Zambia	0.661 (0.12)	0.711 (0.09)	0.722 (0.11)	0.631 (0.15)	0.549 (0.11)
Zimbabwe	0.728 (0.09)	0.733 (0.09)	0.656 (0.13)	0.702 (0.10)	0.768 (0.04)
By Sector					
Food	0.656 (0.14)				
Metal	0.647 (0.15)				
Textile	0.658 (0.15)				
Wood	0.632 (0.16)				
Observations	2306	486	552	741	527
Overall	0.6486 (0.15)	0.7243 (0.09)	0.6161 (0.17)	0.6149 (0.18)	0.5977 (0.16)

Note: The values in parentheses are standard deviations.

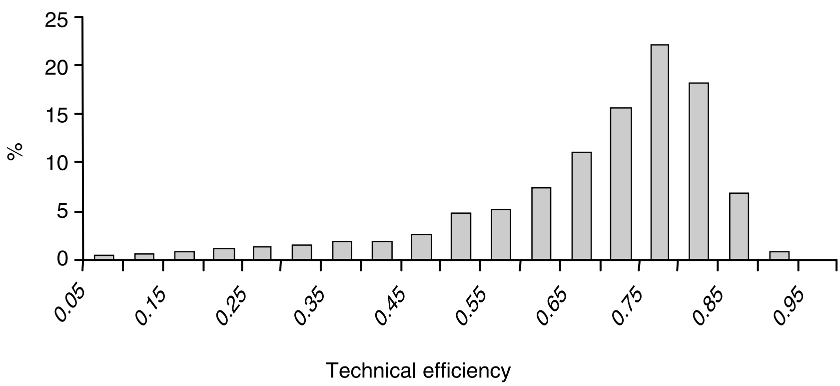

Figure 10.11: Frequency Distribution of Technical Efficiency in sub-Saharan Africa

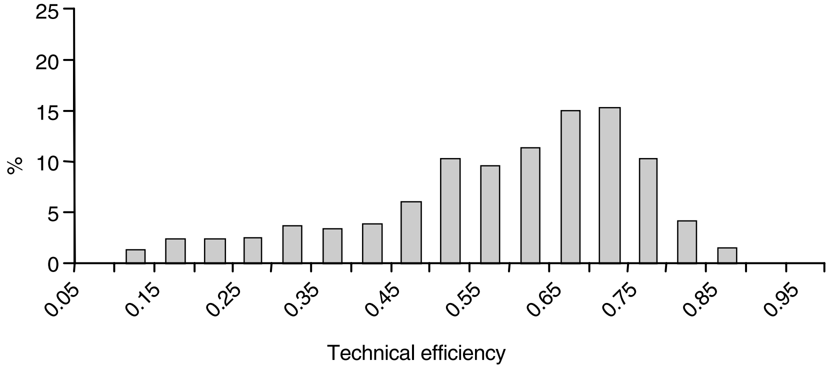

Figure 10.12: Frequency Distribution of Technical Efficiency in Ghana

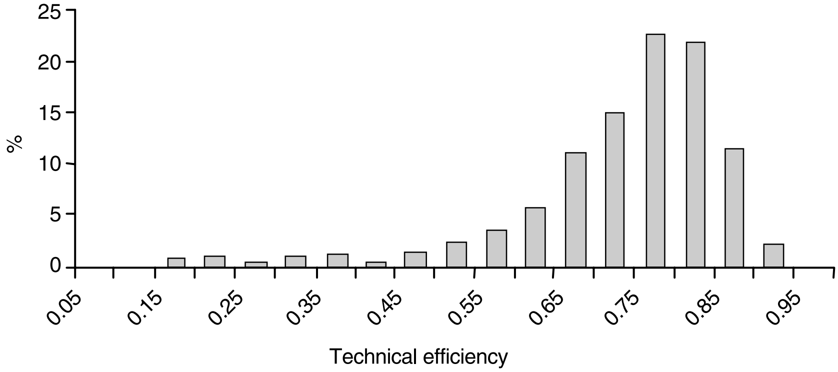

Figure 10.13: Frequency Distribution of Technical Efficiency in Kenya

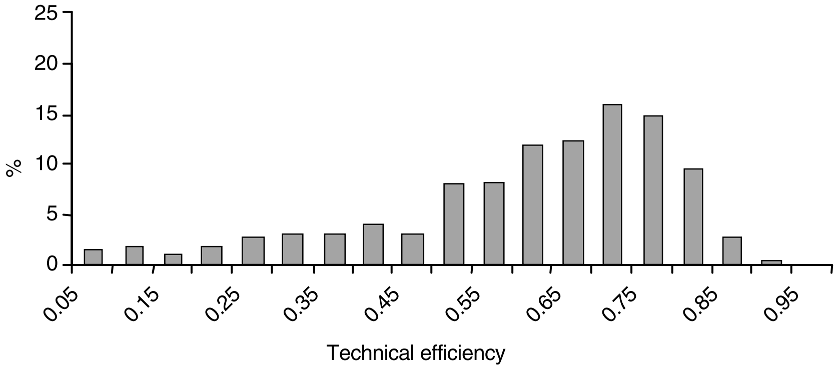

Figure 10.14: Frequency Distribution of Technical Efficiency in Tanzania

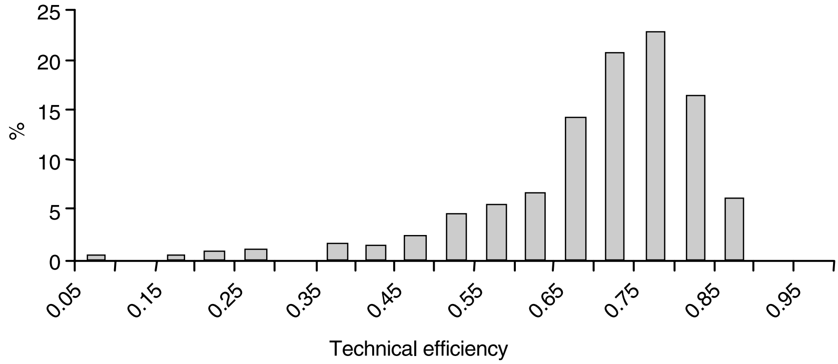

Figure 10.15: Frequency Distribution of Technical Efficiency in Zambia

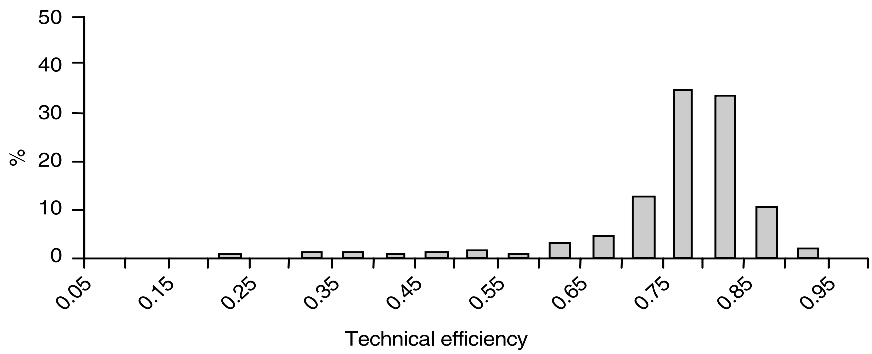

Figure 10.16: Frequency Distribution of Technical Efficiency in Zimbabwe

If technology is considerably different across sectors, it may be inappropriate to pool all sectors together for frontier analysis. To examine if this is true, we also estimate sector specific frontiers (Table 10.10). We notice that these results present only a slightly different picture. For textile and wood industries, Zimbabwe is still the most efficient country with Kenya following closely. For both these sectors, Ghana and Tanzania are the least efficient. These findings are in full accordance with the findings of the general African frontier. However, in metal sector Zambia is estimated to be more efficient. Food is the only sector that does not show much country specific differences.

Table 10.12: Africa Frontier Estimation: by Firm Size

	Micro	*Small*	*Medium*	*Large*	*Very Large*
Constant	5.57 (0.83)	8.96 (2.13)	3.12 (2.83)	3.98 (0.30)	9.39 (1.04)
Ln(K)	0.83 (0.15)	0.70 (0.23)	0.42 (0.09)	1.12 (0.93)	−0.06 (0.38)
Ln(L)	−1.53 (0.34)	−2.28 (1.17)	−0.95 (1.24)	−1.37 (0.32)	0.68 (0.87)
T	−0.90 (0.40)	−0.93 (0.55)	−0.27 (0.17)	−0.30 (0.14)	−0.82 (0.86)
Ln(w)	0.46 (0.21)	0.22 (0.34)	0.95 (1.70)	0.27 (1.24)	0.04 (0.78)
Ln(K)*Ln(K)	−0.05 (0.01)	−0.03 (0.01)	−0.04 (0.02)	−0.05 (0.03)	−0.005 (0.02)
Ln(L)*Ln(L)	−0.03 (0.09)	0.36 (0.21)	0.67 (1.44)	1.18 (0.40)	−0.12 (0.10)
T*T	0.23 (0.09)	0.15 (0.10)	0.11 (0.22)	0.06 (0.14)	0.19 (0.14)
Ln(w)*Ln(w)	0.04 (0.02)	−0.01 (0.02)	0.12 (0.06)	−0.007 (0.03)	−0.003 (0.02)
Ln(K)*Ln(L)	0.22 (0.04)	0.05 (0.06)	0.22 (0.24)	0.11 (0.13)	0.09 (0.07)
Ln(K)*T	−0.03 (0.03)	0.01 (0.03)	0.006 (0.05)	0.006 (0.05)	−0.05 (0.05)
Ln(K)*Ln(w)	0.04 (0.02)	0.07 (0.02)	0.05 (0.05)	0.06 (0.07)	0.08 (0.06)
Ln(L)*T	0.21 (0.08)	0.06 (0.12)	0.58 90.32)	0.50 (0.24)	0.12 (0.09)
Ln(L)*Ln(w)	−0.08 (0.06)	−0.17 (0.10)	−0.16 (0.48)	−0.10 (0.24)	−0.20 (0.12)
T*Ln(w)	−0.03 (0.05)	0.08 (0.05)	−0.15 (0.09)	−0.09 (0.08)	0.11 (0.08)
Determinants of Inefficiency					
Constant	−32.3 (32.7)	−8.45 (4.36)	−1.07 91.56)	−6.82 (7.90)	−4.52 (2.43)
D_{1994}	−0.12 (1.64)	−3.47 (1.64)	0.55 (0.66)	−1.92 (0.58)	−1.26 (0.64)
D_{1995}	0.09 (0.47)	−3.76 (1.84)	1.17 (0.59)	−9.28 (6.01)	−6.59 (3.19)
Ghana	5.96 (5.55)	6.52 (0.25)	1.39 (1.03)	6.61 (5.60)	4.77 (2.00)
Kenya	12.19 (10.2)	−6.94 (4.44)	−0.49 (0.58)	4.35 (3.42)	3.53 (1.61)
Tanzania	4.50 (4.36)	6.23 (2.58)	0.94 (0.99)	5.30 (5.41)	4.85 (1.94)
Zambia	3.51 (3.00)	0.72 (0.59)	1.39 (1.03)	2.98 (3.54)	0.97 (0.88)
Variance Parameters					
$\sigma^2_s = \sigma^2 + \sigma_v^2$	16.21 (14.6)	6.17 (2.15)	1.41 (0.56)	4.22 (3.26)	2.15 (0.56)
$\gamma = \sigma^2/(\sigma^2 + \sigma_v^2)$	0.959 (0.04)	0.879 (0.04)	0.696 (0.13)	0.909 (0.08)	0.850 (0.04)
Log-likelihood	−1073.46	−1028.97	−384.82	−338.86	−263.80
Mean TE	0.638	0.623	0.519	0.653	0.726
Π^2: No Country Effect	5.26	39.36**	12.89**	41.14**	19.14**
Π^2: No Time Effect	0.01	6.6*	7.92**	4.32	6.12*

Note: See Table 10.10.

Similarly, if technology and management behavior differ significantly among small and large firms, it may be inappropriate to pool them together and estimate a common frontier. To examine whether these differentials exist, we also estimated the African frontier for different size groups. These results are presented in Table 10.12. We observe that the country differences appear to be significant for all size groups with the sole exception of micro firms. Table 10.13 presents the resulting distribution of the estimated mean technical efficiency. For medium and small firms, Kenya appears to be the most efficient country followed by Zimbabwe, whereas in the large and very large size groups Zimbabwe is the most efficient country with Kenya and Zambia behind. Ghana and Tanzania are the least efficient countries. These results are very similar to the one obtained in the overall frontier, justifying its use in analyzing the characteristics determining technical efficiency.

Table 10.13: Distribution of the Estimated Technical Efficiency by Size Groups

	Micro	*Small*	*Medium*	*Large*	*Very Large*
By Country					
Ghana	0.634 (0.12)	0.504 (0.17)	0.207 (0.09)	0.530 (0.23)	0.641 (0.22)
Kenya	0.588 (0.16)	0.773 (0.07)	0.645 (0.14)	0.653 (0.21)	0.655 (0.19)
Tanzania	0.650 (0.13)	0.510 (0.19)	0.506 (0.19)	0.519 (0.22)	0.528 (0.25)
Zambia	0.657 (0.13)	0.668 (0.11)	0.416 (0.21)	0.645 (0.17)	0.766 (0.12)
Zimbabwe	0.682 (0.12)	0.670 (0.12)	0.588 (0.14)	0.719 (0.12)	0.780 (0.08)
By Sector					
Food	0.630 (0.15)	0.655 (0.14)	0.496 (0.22)	0.610 (0.21)	0.732 (0.15)
Metal	0.637 (0.14)	0.618 (0.17)	0.537 (0.19)	0.639 (0.21)	0.730 (0.14)
Textile	0.636 (0.14)	0.630 (0.18)	0.537 (0.21)	0.695 (0.14)	0.734 (0.18)
Wood	0.645 (0.12)	0.584 (0.21)	0.507 (0.22)	0.641 (0.20)	0.690 (0.21)
Observations	770	702	298	282	255
Overall	0.638 (0.14)	0.623 (0.18)	0.519 (0.21)	0.653 (0.19)	0.726 (0.17)

Note: The values in parentheses are standard deviations.

Determinants of Technical Efficiency across Countries

In this section, we enhance our earlier model of the Africa frontier (Table 10.10) by adding firm level characteristics contributing to the technical efficiency in Africa. As discussed earlier, we classify these determinants into three main groups; structural parameters captured by firm size and firm age, representing the effect of development process as manifested by learning by doing and survivorship factors; human capital variables; and learning channels. Like in the previous section, we first estimate the Africa frontier model including only firm size and firm age as additional explanatory variables, both with and without country dummies. Thereafter, we add firm level characteristics, and re-estimate the model, again both with and without country dummies. These four frontiers as presented in Table 10.14. Table 10.15 presents the resulting distribution of estimated technical efficiency, while Table 10.16 provides the likelihood ratio tests for each group of factors.

Table 10.14: Africa Frontier Estimation – Including Determinants of Technical Efficiency

	Model 1	*Model 2*	*Model 3*	*Model 4*
Constant	4.31 (0.49)	4.91 (0.51)	4.35 (0.46)	5.01 (0.54)
Ln(K)	0.93 (0.09)	0.79 (0.09)	0.95 (0.08)	0.81 (0.01)
Ln(L)	0.24 (0.13)	−0.03 (0.14)	−0.32 (0.12)	−0.17 (0.13)
T	−0.71 (0.26)	−0.83 (0.26)	−0.79 (0.23)	−0.82 (0.30)
Ln(w)	0.24 (0.12)	0.35 (0.12)	0.26 (0.12)	0.33 (0.13)
Ln(K)*Ln(K)	−0.05 (0.005)	−0.04 (0.01)	−0.05 (0.005)	−0.04 (0.006)
Ln(L)*Ln(L)	−0.09 (0.02)	−0.08 (0.02)	−0.08 (0.02)	−0.07 (0.02)
T*T	0.20 (0.06)	0.22 (0.06)	0.22 (0.05)	0.21 (0.06)
Ln(w)*Ln(w)	−0.001 (0.01)	0.01 (0.01)	0.001 (0.009)	0.008 (0.01)
Ln(K)*Ln(L)	0.13 (0.02)	0.12 (0.02)	0.13 (0.02)	0.12 (0.02)
Ln(K)*T	−0.01 (0.02)	−0.01 (0.02)	−0.01 (0.02)	−0.004 (0.02)
Ln(K)*Ln(w)	0.06 (0.01)	0.05 (0.01)	0.06 (0.01)	0.05 (0.01)
Ln(L)*T	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.01 (0.03)
Ln(L)*Ln(w)	−0.12 (0.02)	−0.12 (0.02)	−0.12 (0.02)	−0.12 (0.02)
T*Ln(w)	−0.001 (0.03)	−0.01 (0.03)	0.001 (0.03)	−0.004 (0.03)
Determinants of Inefficiency				
Constant	−5.74 (1.80)	−11.24 (2.39)	−2.83 (3.45)	−1.31 (0.92)
D_{1994}	−1.32 (0.28)	−2.26 (0.67)	−1.68 (0.61)	−1.27 (0.37)
D_{1995}	−1.34 (0.30)	−2.23 (0.67)	−1.11 (0.51)	−1.02 (0.28)
Ln(L)	1.65 (0.23)	2.07 (0.24)		
Ln(Age)	0.73 (0.53)	0.54 (0.32)		
Ln(L)*Ln(L)	−0.32 (0.02)	−0.31 (0.03)		
Ln(Age)*Ln(Age)	−0.13 (0.12)	−0.06 (0.08)		
Ln(L)*Ln(Age)	−0.03 (0.07)	0.01 (0.07)		
Import %			−3.27 (0.48)	−2.37 (0.60)
Export %			−2.33 (0.81)	−1.96 (0.66)
Technology Transfer			−1.10 (0.33)	−0.55 (0.40)
Foreign %			−3.11 (0.72)	−2.64 (0.71)
Inside Training			−2.49 (0.36)	−1.82 (0.47)
Outside Training			−1.32 (0.41)	−0.48 (0.21)
Manager Age			−3.84 (1.79)	−5.70 (1.58)
Manager Exp			2.02 (1.07)	6.78 (1.66)
Manager Age*Manager Age			0.84 (0.50)	1.18 (0.30)
Manager Exp*Manager Exp			0.71 (0.33)	−0.52 (0.25)
Manager Age*Manager Exp			−0.47 (0.77)	−1.21 (0.37)
Ghana		5.61 (1.37)		3.95 (0.83)
Kenya		0.79 (0.72)		1.26 (0.35)
Tanzania		4.73 (1.27)		3.35 (0.77)
Zambia		2.31 (0.76)		2.10 (0.52)
Variance Parameters				
$\sigma^2_s = \sigma^2 + \sigma_v^2$	4.77 (1.05)	5.07 (0.81)	5.37 (0.73)	3.67 (0.66)
$\gamma = \sigma^2/(\sigma^2 + \sigma_v^2)$	0.877 (0.03)	0.877 (0.02)	0.885 (0.02)	0.834 (0.03)
Log-likelihood	−3243.28	−3211.55	−3217.58	−3192.49
Mean TE	0.5827	0.6156	0.6012	0.6104

Note: The values in parentheses are standard errors. In all frontier functions, dummies for sector and location are added.

Table 10.15: Distribution of Estimated Mean Technical Efficiency

	Model 1	*Model 2*	*Model 3*	*Model 4*
By Country				
Ghana	0.53 (0.17)	0.50 (0.18)	0.56 (0.18)	0.51 (0.17)
Kenya	0.60 (0.16)	0.67 (0.13)	0.64 (0.16)	0.65 (0.14)
Tanzania	0.55 (0.19)	0.55 (0.19)	0.57 (0.19)	0.54 (0.19)
Zambia	0.58 (0.16)	0.62 (0.14)	0.62 (0.16)	0.61 (0.15)
Zimbabwe	0.63 (0.14)	0.69 (0.11)	0.68 (0.12)	0.69 (0.11)
By Wave				
Wave 1	0.55 (0.18)	0.57 (0.18)	0.57 (0.18)	0.57 (0.18)
Wave 2	0.59 (0.16)	0.64 (0.15)	0.63 (0.16)	0.63 (0.15)
Wave 3	0.60 (0.16)	0.64 (0.15)	0.63 (0.15)	0.64 (0.15)
By Size Groups				
Micro	0.56 (0.17)	0.62 (0.15)	0.59 (0.17)	0.58 (0.16)
Small	0.54 (0.18)	0.57 (0.18)	0.59 (0.18)	0.58 (0.18)
Medium	0.59 (0.15)	0.62 (0.16)	0.63 (0.16)	0.64 (0.18)
Large	0.64 (0.14)	0.65 (0.15)	0.66 (0.15)	0.67 (0.15)
Very Large	0.70 (0.11)	0.69 (0.11)	0.68 (0.12)	0.70 (0.12)
By Sector				
Food	0.59 (0.17)	0.61 (0.16)	0.60 (0.16)	0.60 (0.17)
Metal	0.58 (0.16)	0.61 (0.15)	0.62 (0.16)	0.62 (0.16)
Textile	0.60 (0.16)	0.63 (0.16)	0.62 (0.16)	0.62 (0.17)
Wood	0.57 (0.17)	0.60 (0.18)	0.60 (0.17)	0.60 (0.18)
By Ownership				
Domestic	0.57 (0.17)	0.61 (0.16)	0.60 (0.17)	0.60 (0.17)
Technical Assistance	0.64 (0.15)	0.67 (0.14)	0.68 (0.14)	0.69 (0.13)
Minority Fgn Ownership	0.65 (0.17)	0.66 (0.17)	0.69 (0.17)	0.68 (0.16)
Majority Fgn Ownership	0.64 (0.14)	0.65 (0.15)	0.71 (0.13)	0.71 (0.13)
By Age				
1–4	0.56 (0.16)	0.60 (0.16)	0.59 (0.15)	0.57 (0.17)
5–10	0.56 (0.17)	0.60 (0.17)	0.59 (0.16)	0.59 (0.17)
11–20	0.58 (0.16)	0.61 (0.16)	0.61 (0.16)	0.60 (0.17)
21–30	0.59 (0.17)	0.62 (0.17)	0.62 (0.16)	0.62 (0.17)
>30	0.64 (0.16)	0.65 (0.15)	0.65 (0.15)	0.66 (0.16)
By Trade				
No trade	0.57 (0.15)	0.60 (0.15)	0.54 (0.17)	0.56 (0.17)
Import Oriented	0.62 (0.15)	0.64 (0.15)	0.65 (0.15)	0.66 (0.14)
Export Oriented	0.65 (0.14)	0.67 (0.14)	0.69 (0.13)	0.69 (0.13)
By Training				
No Training	0.56 (0.17)	0.60 (0.18)	0.58 (0.17)	0.58 (0.17)
Inside Training	0.64 (0.14)	0.66 (0.14)	0.69 (0.13)	0.70 (0.13)
Outside Training	0.63 (0.15)	0.65 (0.14)	0.67 (0.15)	0.67 (0.4)
Overall	0.5827 (0.17)	0.6156 (0.16)	0.6012 (0.16)	0.6104 (0.17)

Note: The numbers in parentheses are standard deviations. The size groups are defined as before.

Table 10.16: Selected Tests of Hypotheses for Parameters of the Inefficiency

	Model 1	*Model 2*	*Model 3*	*Model 4*	*5% Critical Value*
H_o: No Efficiency Effect	114.47**	177.94**	165.87**	216.06**	33.93
H_0: No Time Effect	4.64*	17.86**	3.98	5.52	5.99
H_0: No Country		63.46**		33.98**	9.49
H_0: No Size	15.66**	10.8**			7.82
H_0: No Firm Age	7.54*	1.32			7.82
H_0: No Trade			17.10**	17.82**	5.99
H_0: No Foreign Ownership			12.28**	7.71**	5.99
H_0: No Management Effect			18.92**	9.60*	11.09
H_0: No Training Effect			23.16**	9.60**	5.99

Note: (**) indicates significance at 5% level whereas (*) stands for significance at 10% level.

We find that firm size is a significant factor irrespective of whether we add country dummies to our estimation or not. This indicates that irrespective of the country effect, size contributes to technical efficiency. In general, technical efficiency increases with firm size. The mean technical efficiency is 0.56 (0.62) for the micro firms versus 0.70 (0.69) for the very large firms. However, the difference between micro and small firms is consistently negligible. In other words, in general larger firms are found to be more efficient than smaller firms but our estimations do not unveil any significant difference in technical efficiency of micro and small firms, within the group employing less than 50 workers. This result is unchanged whether we add country dummies or not. Consistent with our likelihood ratio test, Table 10.16 also confirms that the relation between firm age and technical efficiency is rather weak. Age is only significant in the model without country dummies, namely *Model 1*. Older firms are on average more efficient as firms with thirty years or older have a mean technical efficiency of 0.64 (0.65) versus younger, one to four year old firms, have a mean technical efficiency of 0.57 (0.61). However, this relation is not significant enough to warrant a general conclusion that older firms are more efficient.

Model 2 also indicates that the technical efficiency of firms in Kenya is not significantly different from those in Zimbabwe, as the corresponding country dummy is not significant. This result is also confirmed in Table 10.15 where the distribution of technical efficiency is presented. Focusing on *Model 1* and *Model 2,* Zimbabwe appears to be the most efficient country, however the difference between the mean technical efficiency for Zimbabwe and Kenya (0.60 versus 0.63 or 0.67 versus 0.69) is negligible. This indicates that the observed difference in technical efficiency between

Kenya and Zimbabwe can be solely attributed to the differences in the size and age of the respective firms. This also confirms our earlier result where the deletion of the micro firms from our sample led to the equality of technical efficiency between Zimbabwe and Kenya.

We now turn our focus to *Model 3* and *Model 4.* It appears that learning channels such as trade orientation and foreign ownership are significant determinants of technical efficiency. Judging by the sign of the parameters in Table 10.14, one may conclude that irrespective of the country, those firms that engage in trade, either as importers or exporters, are significantly more efficient than other firms. Furthermore, both technology transfer/foreign licensing and foreign ownership add significantly to the efficiency of the firms irrespective of whether country dummies are added or not. We also find that, training contributes significantly to the efficiency of a firm. This result holds irrespective of which model we use and which variable we include as determinant of inefficiency. It is also interesting to note that, as one might expect, those firms offering inside training are slightly more efficient that those offering outside training. On the other hand, managers' human capital is significant only in *Model 3* where country dummies are not added. This in turn implies that management human capital is not a significant determinant of technical efficiency in all countries, consistent with our country-specific analysis provided earlier in this chapter.

The distribution of the estimated technical efficiency of *Model 3* and *Model 4* as reported in Table 10.15 also provides some further insight. The distribution by country and size here resembles that of *Model 1* and *Model 2* very closely. However, the distribution by trade orientation and foreign ownership (including licensing and technology transfer) provides a very clear distinction. The mean technical efficiency for domestic firms (those with no foreign ownership, technical assistance, or licensing agreement with a foreign firm) is 0.60 (0.60) versus 0.68 (0.69) for firms with technical assistance, 0.69 (0.68) firms with minority foreign ownership (<40%) and 0.71 (0.71), firms with majority foreign ownership (>=40%). Furthermore, those firms that do not engage in trade are by far less efficient than those that do. These firms have an average technical efficiency of 0.54 (0.56) versus 0.65 (0.66) for firms that engage in import and 0.69 (0.69) for those that engage in export. Hence, on average the export-oriented firms are more efficient than other firms including the import-oriented firms are.

These results demonstrate that the technical efficiency of firms is affected by many common factors such as size and ownership. However, we still need to address the question if these factors are sufficiently explaining the country differentials in terms of their technical efficiency.

To throw light on this issue we need to estimate the change in the mean value of technical efficiency with respect to each specific country, using the models without (Table 10.10) and with the efficiency-augmenting factors (Table 10.14, *Model 2* and *Model 4*). Since country dummies are discrete variables, in order to estimate the elasticity of technical efficiency with respect to each country dummy, we have estimated the values of technical efficiency, using equation (3), with and without each country dummy. The difference between each pair of values, then, is used as a proxy for the elasticity of technical efficiency with respect to the corresponding country dummy. It is also important to note that the elasticity of technical efficiency is a function of the corresponding variables and hence we have separate elasticity for each observation. Hence, to simplify the comparisons, the elasticity is calculated at the mean of the relevant variables. Table 10.17 presents the estimated elasticities. In this table the first column corresponds to the original model (Table 10.10) where only country dummies are used as determinants of inefficiency whereas the second column shows the elasticity of technical efficiency for the model with size and age as well as country dummies as determinants (Table 10.14, *Model 2*). The third column corresponds to *Model 4* in Table 10.14 which includes the effect of ownership and trade orientation.

Table 10.17 confirms our earlier finding that Ghana, which has the highest absolute elasticity, is the least efficient country followed closely by Tanzania. It also shows that Kenya follows Zimbabwe very closely and that Zambia is not far behind in terms of technical efficiency. The table also reveals that the introduction of firm age and firm size as determinants of inefficiency has led to a reduction in the pure country effect. This reduction has been most apparent for Kenya where the difference in technical efficiency between this country and Zimbabwe is almost eliminated. However, the differentials for the other countries remain mostly intact. This implies that the observed differences in technical efficiency of different countries in our sample are not a phenomenon that can be attributed solely or even mainly to differences in the size and age of the corresponding firms.

Comparing the first and third columns in Table 10.17 also reveals that the introduction of the firm and management attributes as determinants of inefficiency has led to further reduction in the country effect in both Ghana and Tanzania. This finding suggests that for the two countries that are incidentally the least efficient, firm attributes are significant contributors to their inefficiency. A smaller proportion of firms with characteristics that are associated with higher technical efficiency, such as foreign ownership and export-orientation, has been partly responsible for Ghana and Tanzania to be perceived as the least efficient countries. But at the same time, comparing the results of column (1) with those of the other two columns, we find that the part of the inter-country differences in efficiency which can be attributed to firm characteristics is only a small part of the total. Differences in technical efficiency are mainly attributed to country specific factors – whether emanating from geographical and political factors or from differences in economic policies.

Table 10.17: Country Specific Effect on Technical Efficiency

	Model 1 (*Table 10.10*)	*Model 2* (*Table 10.14*)	*Model 4* (*Table 10.14*)
Ghana	−0.341	−0.327	−0.300
Kenya	−0.051	−0.031	−0.053
Tanzania	−0.274	−0.240	−0.228
Zambia	−0.096	−0.089	−0.104

Conclusions

The first part of this chapter studied the determinants of technical efficiency within each of the five RPED countries considered. The analysis of technical efficiency within each country produces some interesting results.

- The correlation between firm size and technical efficiency and firm age and technical efficiency differ from country to country. While there is strong evidence suggesting that larger firms in both Zimbabwe and Kenya are more efficient, this positive relationship was not supported for other three countries. In fact, the data in Ghana and Tanzania and in particular in Tanzania suggests an inverse relation between size and efficiency. Furthermore, the results only supported a strong relationship between age and technical efficiency in Zimbabwe and hence the positive age-efficiency relationship as proposed by Johanovic's learning model found little support.
- There might indeed be an interaction between size and age in the joint impact on technical efficiency. We allowed for this interaction in an extension of the model, and studied the *marginal* impact of size on technical efficiency, controlling for age. Ghana and Zambia are the two countries which show significant

interaction of age and size on firm efficiency. In these samples, the non-significance of the two variables could probably be traced to the age-size interaction. Figure 10.6, depicting the marginal effects of size on technical efficiency in Ghana, suggests that only large and older firms in Ghana fall in the (−) area where the marginal impact of size on technical efficiency is *positive*. In the case of Zambia the (+) space, i.e. with *negative* marginal effect of size on efficiency, is occupied by older and smaller firms.

- Trade orientation is the strongest factor affecting the technical efficiency. Firms that engage in trade are found to be more efficient in all five countries. Furthermore, the export oriented firms are found to be significantly more efficient than the others – including those that engage in no trade and those that engage in import only. Foreign ownership, *per se* was only significant for Zimbabwe although on average the foreign owned firms were more efficient in all countries. This may be attributed partly to the fact that the majority of these firms engage in export. In fact, when the trade variables, and in particular when the export orientation variable, was deleted from the inefficiency effect, foreign ownership was found to be significant for most countries. This implies that the foreign ownership effect is, to a large extent, a proxy for trade orientation.
- The overall impact of managerial human capital on technical efficiency, albeit positive for most of countries, was not statistically significant. We found some mild evidence that more experienced managers tend to increase efficiency of their firm.

The second part of the chapter sought to compare efficiency levels of the sample firms across countries by pooling the data together. The principal results might be summarized as follows:

- The estimated parameters of the country dummies in the estimated Africa frontier function were all significant. Zimbabwe was found to be the most technically efficient country, followed by Kenya, Zambia, Tanzania and Ghana. The differences in the mean efficiency levels were substantial – Ghana at 0.542 and Zimbabwe estimated at 0.728 (Table 10.11). We estimated the differences by sector and by firm size. The ranking by efficiency levels were the same for two of the four sectors – textiles and wood (which were incidentally the tradable sectors in these countries), but there was no significant inter-country differences in the food sector, while in metals Zambia turned out to be the most efficient. Classified by firm size groups, the country differences were significant for all size groups except the micro. The overall ranking, with Zimbabwe at the top and Tanzania and Ghana at the bottom, held for the large and very large size groups, but were slightly different for the small and medium groups.

- The model of the Africa frontier is subsequently enhanced by adding additional firm level characteristics which can be expected to contribute to technical efficiency. These include firm age, manager's human capital attainments, and outward orientation. (The results of the four models are given fully in Table 10.14.) The most important of these turn out to be outward orientation. We get the strong result that firms that engage in trade, either as importers or exporters, and those with technology transfer/foreign licensing or foreign ownership are more efficient, irrespective of whether country dummies are added or not.
- The question arises: are the firm characteristics discussed above sufficient to account for inter-country differences observed earlier? To answer this we estimate the elasticity of technical efficiency with respect to each country dummy, with and without the efficiency-augmenting firm characteristics, and calculated at the mean values of the relevant variables. The results as set out in Table 10.17 show that there is undoubtedly a reduction in the country effect when the firm characteristics are added, but a substantial part of the inter-country differences remains.

11 Investment

This and the following chapter discuss the central issues in the behavior of African firms over time. Since the prime mover in the growth of firms is investment, our analysis begins with a study of the patterns of investment in different classes of firms and of their determinants. To date, analyses of investment in sub-Saharan Africa have typically been based on aggregate investment series. Many studies such as those by Noorbaksh and Paloni (1999), Jenkins (1996) and Malmbo and Mholphe (1995) are based on aggregate time series, whereas those by Kumar and Malmbo (1995) and Hadjimichel *et al.* (1995) use aggregate cross sections data. While these studies shed some light on the macroeconomic performance of the economy, they fail to provide insight into the factors that affect the investment decision of the firms. Using RPED surveys several recent papers have analyzed the determinants of investment in sub-Saharan Africa. The Bigsten *et al.* (1998a) analyzed the determinants of investment in four African countries using the RPED three-year panel, whereas in another study (Bigsten *et al.* 1998b), they discussed capital adjustment cost. In another attempt, Raturi (1998) estimates the effect of financial constraint on firm investment behavior using the accelerator investment function for Kenya.

This chapter intends to pursue the process of investment in the seven sub-Saharan countries in more detail. The first section provides a comprehensive analysis of how investment is distributed, why it is undertaken, and how it is financed. The second section goes on to analyze the determinants of investment using the more traditional investment theories.

The Data in the RPED Surveys

The RPED surveys provide data on two aspects of investment: first, they have a question on the value of the "initial plant investment installed and how much it cost." If acquired, the valuation entered is that at the time of purchase or inheritance (Section 3, Part B, Q.1). The data, apparently, pertain only to machinery; land and building are excluded.

Secondly, in Part C the surveys obtained data on "most recent addition or change in plant and equipment." It is not clear how many recent investments were recorded in this part of the questionnaire. A Ghana Report says that "the survey records (and dates) only three most recent investments post-foundation."[30] It also adds that, in fact, most firms recorded less than three investments, so that unless there is a lapse in memory on the part of the respondent, the data should provide an investment history back to the firm's foundation.

It might then be possible to calculate the capital stock of the firm at the start of its investment history. We arrive at this figure by the inflation adjusted figures for the current capital stock (which is available) minus the reported investments. This is presumably a more accurate figure than by merely adjusting the figure reported by the respondent for the initial installed investment – which he has to provide from memory. The rate of investment is then the average growth rate of the capital stock over the period under consideration.

An alternative and less time-consuming method of calculating the rate of investing is to simply confine ourselves to the years of the survey – the three waves in the mid 1990s and to note the investments recorded by the interviewers in those years. The difference with the previous method are two: first: the period of time over which we calculate the rate of investment is the period covering the three waves – not the longer period since the inception of the firm. Second, we should be sure that the investment did indeed take place in the years of the survey, and not in the "most recent year" which could be sometime ago. The rate of investment then could be calculated by reference to the value of the current capital stock.

The Role of "Start-up" Investment versus Additional Investment

The RPED data on investment available for the three waves recorded, as we saw, include new investment by existing firms. The data set is less suited to tracking new firms coming into the picture, year by year. For this reason much of the analysis in subsequent sections would concentrate on investment by existing firms. But in order to put the investment scenario in perspective, we shall refer to the example of Ghana provided by the RPED

[30] *Economic Reform and the Manufacturing Sector,* RPED Country Study Series, August 1993, p. 171.

Report of 1993. The investment rate for the period 1983–91 calculated in this Report was a mere 0.4 % per annum whereas the average annual contributions of start-ups was as much as 9.3% per annum. This figure is, of course, exaggerated, since we do not know how many firms exited and therefore should be responsible for dis-investments (*ibid.*, p. 175). But the point remains that in the situation of a great deal of churning of firms at the lower end of the scale, net start-up investment might very well be an important source of capital formation. A relevant variable, of course is the distribution of firms by the size of the total capital stock. The Ghana Report concluded, after weighting the survey sample by the relative size distribution of firms in the universe of the registered manufacturing sector, large firms accounted for 45% of the capital stock, medium firms for a further 15%, small firms for 24%, and micro firms for a mere 3% (p. 174). The importance of the small and micro sectors, which can be expected to account for the bulk of new entry, would differ among the economies considered, and so would the contribution of start-up investment to the growth of capital stock.

A Descriptive Account of Investment in the Sample Firms

Table 11.1 provides the basic information on levels of investment in the sample for each country and each wave of the survey. These data have not been weighted by the size distribution of firms in the universe, and hence they give only an approximate idea of the investment scenario for the economies concerned.

The first column shows the percentage of the firms investing in each year of the survey. Overall, taking all three waves together, around 39% of all the firms invested. However, this percentage varies considerably from country to country. Firms in Zimbabwe are the most likely to invest whereas those in Tanzania are the least likely. The amount of investment also varies significantly from country to country. Overall, the ratio of investment to capital is around 0.05 for all firms and 0.15 for those that actually undertook investment. Interestingly, the countries with firms most and least likely to invest are at opposite ends of the spectrum when we consider the ratio of investment to capital for those *firms who did invest.*

Table 11.1: Investment in Seven sub-Saharan Countries

	Percentage Investing	*IK*	*IK (If Invested)*	*IV*	*IV (If Invested)*
Cameroon					
1992/93	25%	0.06 (0.15)	0.25 (0.23)	0.07 (0.29)	0.20 (0.22)
1993/94	27%	0.06 (0.15)	0.20 (0.24)	0.06 (0.21)	0.15 (0.20)
1994/95	36%	0.05 (0.13)	0.15 (0.18)	0.09 (0.34)	0.18 (0.25)
Côte d'Ivoire					
1995	42%	0.08 (0.17)	0.19 (0.21)	0.07 (0.27)	0.16 (0.43)
1996	61%	0.11 (0.18)	0.17 (0.18)	0.06 (0.26)	0.13 (0.39)
Ghana					
1991	36%	0.04 (0.12)	0.13 (0.19)	0.07 (0.29)	0.26 (0.52)
1992	46%	0.09 (0.20)	0.19 (0.26)	0.07 (0.18)	0.18 (0.16)
1993	46%	0.07 (0.15)	0.15 (0.20)	0.04 (0.11)	0.12 (0.17)
Kenya					
1992	35%	0.04 (0.08)	0.11 (0.11)	0.07 (0.21)	0.22 (0.34)
1993	39%	0.04 (0.10)	0.10 (0.15)	0.07 (0.23)	0.12 (0.34)
1994	47%	0.04 (0.09)	0.10 (0.12)	0.06 (0.20)	0.14 (0.30)
Tanzania					
1992	23%	0.06 (0.15)	0.24 (0.24)	0.12 (0.48)	0.25 (0.25)
1993	19%	0.03 (0.13)	0.16 (0.25)	0.05 (0.11)	0.15 (0.24)
1994	20%	0.04 (0.12)	0.19 (0.22)	0.05 (0.29)	0.28 (0.08)
Zambia					
1992	30%	0.04 (0.11)	0.12 (0.17)	0.09 (0.39)	0.35 (0.69)
1993	33%	0.03 (0.09)	0.10 (0.15)	0.04 (0.11)	0.12 (0.18)
1994	32%	0.05 (0.15)	0.16 (0.24)	0.07 (0.31)	0.23 (0.52)
Zimbabwe					
1992	70%	0.13 (0.18)	0.18 (0.20)	0.16 (0.26)	0.20 (0.21)
1993	72%	0.07 (0.13)	0.11 (0.14)	0.09 (0.15)	0.12 (0.13)
1994	58%	0.08 (0.14)	0.14 (0.16)	0.10 (0.29)	0.12 (0.14)
Total	39%	0.05 (0.13)	0.15 (0.19)	0.07 (0.20)	0.13 (0.29)

Note: IK and IV represent the Investment–Capital and Investment–Value-added ratios respectively.

In Tanzania, where only around 20% of the firms invested, the investment rate among those who invested stood at an average of nearly 20%. Zimbabwe with the most investing firms had a considerably lower investment rate of 15%. Although we cannot say that there is a statistically significant negative relationship between the percentage of firms investing and the investment ratio of the firms who do invest, the data for some other countries also hint at the existence of such a relationship. The highest investment ratio is found in Cameroon, and the percentage of firms investing in this country is lower than in Kenya – which has the lowest. Table 11.1 also presents the distribution of the investment/value added ratio. This ratio for all countries pooled together is 0.18. However there appears to be a considerable difference among these countries.[31]

It is also interesting to investigate how investment behavior varies with the size of the firm. Table 11.2 provides the relevant statistics for different size groups. Larger firms appear to be more likely to invest. Overall, 55% of very large firms invested in the survey period compared to 34% of the micro firms. But this relationship is not generally prevalent for all countries, and in particular not for Zimbabwe and Tanzania. For most countries, and for the pooled sample as a whole, the investment/capital ratio diminishes with the increase in the firm size indicating that on average larger firms are under-investing. In other words, although larger firms are more likely to invest, when they do so they usually undertake relatively smaller investments. This result should not be surprising and can be attributed to the fact that the value of physical capital for the micro and small firms is relatively small, a fact that tends to exaggerate the ratio of investment–capital. The investment–value-added ratio, however, as before does not show any specific pattern.

Other firm characteristics also may affect the investment behavior. Table 11.3 replicates the results of Table 11.2 for different firm characteristics namely, foreign ownership, export and import orientation, and capital location. Here again it appears those firms that enjoy each of these characteristics are more likely to invest. In fact, this result holds and to a good extent for all countries. However, it appears that the export-oriented firms are by far more likely to invest than other firms. To our surprise, foreign firms show only a marginally higher propensity to invest. This result might imply that inadequate internal market forces the foreign owned firms to cut down on their investment plans whereas export oriented firms have the opportunity to tap into foreign markets that are less demand-constrained.

[31] Firm level studies for developed countries have found relatively higher investment ratios, taking investing and non-investing firms together. Bond found a mean investment/capital ratio of 0.13 for Belgium, 0.11 for France, 0.12 for Germany, and 0.09 for UK (quoted in ISA 1998a, Table 5, p. 495).

Table 11.2: Distribution of Investment by Size Groups

	Micro	*Small*	*Medium*	*Large*
Cameroon				
% Investing	27%	24%	30%	54%
IK	0.23 (0.24)	0.24 (0.24)	0.09 90.08)	0.12 (0.014)
IV	0.37 (0.67)	0.39 (0.55)	0.07 90.03)	0.11 (0.14)
Côte d'Ivoire				
% Investing	32%	51%	54%	71%
IK	0.21 (0.25)	0.23 (0.24)	0.20 (0.25)	0.13 (0.13)
IV	0.22 (0.58)	0.14 (0.46)	0.14 (0.37)	0.05 (0.10)
Ghana				
% Investing	36%	47%	49%	54%
IK	0.17 (0.23)	0.16 (0.23)	0.14 (0.20)	0.12 (0.17)
IV	0.07 (0.16)	0.14 90.21)	0.09 (0.15)	0.26 (0.55)
Kenya				
% Investing	35%	33%	45%	57%
IK	0.08 (0.11)	0.13 (0.13)	0.11 (0.17)	0.08 (0.09)
IV	0.10 (0.16)	0.22 (0.43)	0.18 (0.33)	0.12 (0.21)
Tanzania				
% Investing	24%	16%	29%	27%
IK	0.22 (0.26)	0.20 (0.21)	0.15 (0.25)	0.12 (0.19)
IV	0.25 (0.44)	0.69 (1.14)	0.19 (0.29)	0.26 (0.53)
Zambia				
% Investing	37%	29%	19%	38%
IK	0.14 (0.21)	0.12 (0.15)	0.16 (0.80)	0.08 (0.14)
IV	0.10 (0.14)	0.24 (0.33)	0.36 (0.28)	0.25 (0.57)
Zimbabwe				
% Investing	67%	65%	56%	71%
IK	0.15 (0.14)	0.16 (0.21)	0.14 (0.17)	0.13 (0.16)
IV	0.13 (0.21)	0.19 (0.35)	0.13 (0.22)	0.20 (0.40)
Total				
% Investing	34%	33%	40%	55%
IK	0.15 (0.19)	0.15 (0.20)	0.13 (0.19)	0.11 (0.15)
IV	0.17 (0.37)	0.15 (0.20)	0.14 (0.24)	0.18 (0.41)

Note: IK = Investment–Capital, IV = Investment–Value-added.

Table 11.3: Distribution of Investment by Firm Characteristics

	All	*Foreign*	*Exporting*	*Importing*	*In the capital*
Cameroon					
% Investing	31%	40%	45%	31%	24%
IK	0.18 (0.18)	0.11 (0.10)	0.15 (0.12)	0.18 (0.20)	0.21(22)
IV	0.24 (0.24)	0.12 (0.21)	0.14 (0.21)	0.23 (0.41)	0.24 (0.32)
Côte d'Ivoire					
% Investing	52%	58.0%	65%	56%	56%
IK	0.18 (0.21)	0.17 (0.19)	0.18 (0.21)	0.16 (0.21)	0.17 (0.20)
IV	0.12 (0.37)	0.06 (0.14)	0.13 (0.41)	0.13 (0.42)	0.10 (0.30)
Ghana					
% Investing	44%	49%	48%	51%	48%
IK	0.16 (0.22)	0.17 (0.27)	0.10 (0.21)	0.14 (0.20)	0.20 (0.24)
IV	0.14 (0.29)	0.21 (0.56)	0.21 (0.56)	0.19 (0.38)	0.20 (0.38)
Kenya					
% Investing	41%	45%	56%	42%	43%
IK	0.10 (0.13)	0.08 (0.10)	0.10 (0.13)	0.09 (0.10)	0.09 (0.12)
IV	0.16 (0.31)	0.07 (0.12)	0.18 (0.32)	0.12 (0.22)	0.13 (0.29)
Tanzania					
% Investing	22%	15%	36%	24%	28%
IK	0.20 (0.24)	0.39	0.19 (0.21)	0.17 (0.19)	0.21 (0.23)
IV	0.31 (0.56)	0.15	0.30 (0.59)	0.36 (0.67)	0.32 (0.53)
Zambia					
% Investing	32%	31%	45%	32%	33%
IK	0.12 (0.19)	0.15 (0.28)	0.09 (0.14)	0.14 (0.21)	0.12 (0.20)
IV	0.19 (0.40)	0.35 (0.68)	0.62 (0.95)	0.20 (0.40)	0.15 (0.24)
Zimbabwe					
% Investing	62%	70%	68%	67%	68%
IK	0.14 (0.17)	0.15 (0.19)	0.12 (0.15)	0.13 (0.16)	0.13 (0.16)
IV	0.17 (0.28)	0.19 (0.35)	0.17 (0.24)	0.19 (0.32)	0.16 (0.29)
Total					
% Investing	39%	47%	57%	43%	43%
IK	0.15 (0.19)	0.13 (0.18)	0.13 (0.17)	0.14 (0.18)	0.15 (0.19)
IV	0.18 (0.39)	0.16 (0.33)	0.18 (0.38)	0.19 (0.38)	0.16 (0.32)

Note: IK = Investment–Capital, IV = Investment–Value-added.

The Skewness of the Distribution of Investment

While means of the variables give an idea of differences between the categories of firms and/or countries, they can be misleading if the distribution of investment among firms is strongly skewed. The mean value of investment to capital in many African countries in the samples reported above are no doubt lower than those reported for some advanced countries like the UK. But the data from the UK for 1983–86 show that the mean and median values are fairly close together since the distribution of the investment ratio is fairly normal.[32] This is, however, not so in the African case. Table 11.4 gives the value of the ratios for different parts of the distribution for the invested firms. Data on other investment related ratios are also given in this table.

Table 11.4: Distribution of the Investing Firms in Seven sub-Saharan Countries

		Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
I/K	M25	0.03	0.04	0.04	0.02	0.02	0.04	0.02	0.02
	M50	0.08	0.10	0.09	0.05	0.05	0.08	0.08	0.05
	M75	0.16	0.21	0.22	0.17	0.14	0.16	0.23	0.13
	Mean	0.13	0.17	0.16	0.14	0.10	0.13	0.18	0.12
I/V	M25	0.02	0.04	0.01	0.01	0.02	0.03	0.02	0.02
	M50	0.06	0.09	0.11	0.04	0.05	0.07	0.05	0.06
	M75	0.14	0.21	0.20	0.12	0.12	0.17	0.21	0.14
	Mean	0.13	0.18	0.16	0.10	0.11	0.14	0.18	0.14
C/K	M25	0.11	0.06	0.31	0.22	0.16	0.24	0.20	0.11
	M50	0.46	0.21	1.64	0.62	0.31	0.64	0.42	0.40
	M75	1.10	1.11	3.84	1.55	0.83	1.26	1.00	0.81
	Mean	1.50	1.06	3.73	2.61	1.06	3.57	1.14	0.78
V/K	M25	0.33	0.30	1.04	0.39	0.33	0.15	0.22	0.45
	M50	0.92	0.88	2.08	1.36	0.81	0.66	0.63	0.88
	M75	2.58	1.96	6.54	3.60	2.29	2.75	1.89	1.99
	Mean	2.44	1.89	4.81	3.17	2.13	2.71	1.90	1.84
B/K	M25	0	0	0	0	0	0	0	0
	M50	0	0.02	0	0	0	0	0	0
	M75	0.04	0.20	0.02	0	0.04	0.03	0	0.05
	Mean	0.12	0.23	0.28	0.02	0.05	0.29	0.03	0.15

Note: C/K is the profit rate, and B/K is the ratio of indebtedness.

The very large difference between median and mean values of the key variables highlights the extremely skewed nature of the distribution of investment rates and related variables in African countries. The mean profit rate is very high, compared to the figures usually seen for developed countries. However, this variable too is highly skewed with the mean being

[32] The mean investment ratio for the UK in 1983–6 was reported to be 0.09 and the median 0.07 (Bigsten *et al.*, 1998a, table 5, p. 497), quoting Bond and Meghir (1994).

several times higher than the median value.[33] The past debt to the formal banking system is negligible for a majority of the firms. Taken in conjunction with the high rates of profits for some, the picture is one of a sector which is financially constrained in a severe way, and depends for fixed investment mostly on internal sources.

We have already seen in Table 11.2 above that the skewed distribution of the investment rate in the African countries is *not* due to the large firms having a high rate of investment, and the others a very low rate. But the data presented in Table 11.5 show that although the investment rates undertaken by the sample firms are fairly evenly distributed, when we look at the value of investment undertaken, the bulk of the total investment does come from the very large firms. This is, of course, because the capital stock of the very large firms is so much higher than that of the other size groups.

Table 11.5: Distribution of the Value of the Investment in Seven sub-Saharan Countries

	Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Investment Rates								
0–0.05	0.12	0.24	0.10	0.22	0.25	0.01	0.11	0.23
0.05–0.1	0.11	0.19	0.18	0.08	0.12	0.01	0.01	0.22
0.1–0.2	0.22	0.30	0.14	0.45	0.37	0.19	0.24	0.13
0.2–0.3	0.15	0.09	0.34	0.01	0.02	0.01	0.04	0.01
0.3–0.4	0.20	0.06	0.03	0.01	0.09	0.76	0.01	0.11
> 0.4	0.20	0.13	0.22	0.24	0.16	0.03	0.59	0.31
Size								
Micro	0.003	0.006	0.001	0.002	0.003	0.002	0.003	0.00
Small	0.05	0.09	0.04	0.05	0.05	0.007	0.06	0.006
Medium	0.03	0.04	0.04	0.03	0.17	0.02	0.02	0.01
Large	0.09	0.23	0.05	0.21	0.24	0.03	0.04	0.08
Very Large	0.83	0.65	0.87	0.71	0.53	0.95	0.87	0.91

Lumpiness of Investments

The above data have relevance to the problem of lumpiness of investment. Lumpiness implies that firms go through substantial periods with zero or near-zero investments, but then make investments in large lumps. The evidence for lumpiness is the existence of "spikes" in the firm's history of investment. Lumpiness may occur because of high adjustment costs. First,

[33] ISA 1998a quotes figures for average C/K ranging from 0.12 for Germany to 0.18 for Belgium. For the UK the mean was 0.16 and the median 0.14.

there are search and decision costs, which are high if local markets for capital goods are shallow. Government regulations and licensing requirements impose costs that are independent of the size of investment. Finally, cost of *organizing and obtaining* finance can be high in constrained financial markets, quite apart from the costs of capital. All these adjustment costs, encompassing many sources of "frictions" in the paths of adjustment are in the nature of "fixed costs," a large part of which have to be incurred regardless of the size of a particular investment. We would expect such costs to be high in developing countries generally and in sub-Saharan Africa in particular.

An alternative hypothesis to fixed costs might be that lumpiness of investment is due to indivisibilities. Indivisibility leaves the firm with a choice of making a large investment or no investment at all. This could also be considered to impose a kind of adjustment cost, but it is distinguished from the other types discussed in the last paragraph in setting a lower limit to an absolute rather than a relative value of investment. Thus we can expect indivisibilities to be less, not more, important in developing countries which employ less capital-intensive techniques. However, they might still be very significant for small firms.

Taking the two hypotheses together we have the prediction that lumpiness would be more pronounced in small firms (where higher fixed costs are reinforced by non-divisibility) than in large firms (where only fixed adjustment costs exist, perhaps at a lower level).

The data on frequency of investment and time elapsed between investments provide mild, but not universal, support for the prediction. As Table 11.6 reveals, firms on average have undertaken 1.03 investments since 1990. This value differs significantly across different countries with firms in Tanzania showing the least frequent investment behavior (0.63) and firms in Zimbabwe the most frequent (1.83). The frequency of investment does show a positive relation with the firm size, but it is not monotonic for individual countries. In all countries we do observe a larger frequency of investment in the very large firms, if we compare them with micro and small firms. But for Zimbabwe even this relationship is very mild. Much the same conclusion is arrived at if we look at the data for the average time elapsed between investments over the last ten years before the survey (Table 11.7). However, the expectation that the average time elapsed is negatively related to size does not hold monotonically even for all the countries pooled together. The very large group does have a lower time interval since the last investment, compared to the micro and small firms, in a majority of the countries and in the pooled sample. The exceptions are Zimbabwe, Zambia and Tanzania. The last has the highest value of elapsed time, even for the very large firms, in keeping with the evidence of Table 11.6 that the frequency of investment in this country is the lowest in our sample.

Table 11.6: Average Number of Investments Since 1990

	Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All Firms	1.03	0.89	0.93	1.16	1.06	0.62	0.87	1.81
	(1.03)	(0.94)	(0.74)	(1.02)	(0.99)	(0.74)	(0.89)	(0.95)
By Size								
Micro	0.93	0.85	0.95	0.96	1.05	0.63	0.91	1.73
Small	0.98	0.84	1.16	1.28	0.94	0.65	0.76	1.78
Medium	1.07	0.78	1.40	1.25	1.24	0.65	0.76	1.59
Large	1.42	1.33	1.23	1.40	1.22	0.87	1.0	1.89
Very large	1.63	1.57	1.44	1.78	1.54	0.85	1.32	2.18

Note: Standard deviation in parentheses.

Table 11.7: Average Time Elapsed (Years) between Investments (Last 10 Years)

	Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All Firms	2.21	3.2	1.82	2.01	2.23	2.93	2.09	1.62
	(1.96)	(2.8)	(1.66)	(1.78)	2.08)	(1.95)	(1.59)	(1.01)
By Size								
Micro	2.24	3.15	2.56	2.09	2.30	2.61	1.54	1.55
Small	2.46	3.67	1.39	1.04	2.50	3.00	2.63	1.56
Medium	2.46	2.50	1.13	2.73	2.11	3.50	2.28	2.13
Large	2.05	2.96	1.82	3.38	2.08	3.00	2.58	1.57
Very large	1.52	1.85	1.07	1.44	1.32	3.00	1.94	1.47

Note: Standard deviation in parentheses.

Lumpiness of investment would be revealed not only in the frequency of investment, but also in the distribution of total investment by the rates of investment. If smaller firms have more marked "spikes of investment" then this group will have a more skewed distribution by investment rates than the larger firms. Table 11.8 presents the data by size groups of firms, pooling the data for all countries and all three waves. (Note that these data are for the investing firms only.)

Table 11.8: Distribution of Investment Rates and Contribution to the Aggregate

Investment Rate (I/K)	*Micro and Small*		*Medium and Large*		*Very Large*		*ALL*	
	(I)	(II)	(I)	(II)	(I)	(II)	(I)	(II)
<0.05	37.1	0.07	42.6	0.05	42.9	0.16	39.7	0.13
0.05–0.1	16.0	0.06	18.1	0.06	23.0	0.16	17.8	0.13
0.1–0.2	16.9	0.15	18.1	0.08	19.5	0.18	17.7	0.15
0.2–0.3	9.0	0.17	5.0	0.05	2.7	0.05	6.7	0.05
0.3–0.4	5.1	0.07	5.0	0.03	4.9	0.16	5.0	0.13
>0.4	15.9	0.48	11.4	0.74	7.1	0.30	13.1	0.41

Note: (I) represents the percentage of number of investment and (II) represents the share of total investment.

The data do support the hypothesis that investment is more likely to take place in lumpy amounts in smaller firms.

Purpose of Investment and Methods of Investment Financing

It is often revealing to know why firms invest and how they finance the required capital. Decision to invest may include many obvious reasons. Firms invest primarily to replace existing capital or to expand their operation by introducing new product or adding to the current capacity. The RPED questionnaire, however, asks managers to reveal the purpose of their investment in a more detailed framework by giving them six different options. We have summarized those options in four categories: to improve the existing production process (Improve Process), to add to the current capacity (Expansion), to introduce new products (New Product), or to replace the existing capital (Replacement).[34] Table 11.9 summarizes the results. The majority of firms appear to invest in order to expand their capacity. A sizable percentage of firms (28.1%) also invest to improve their production process. Introduction of new product and replacement of existing capital contribute 15.9% and 16.0% respectively to the firm investment decisions. Table 11.9 also reveals that no significant difference can be distinguished between the small and large firms with regard to their decision to expand their production. However, it appears that smaller firms are more likely to improve their production process through new investment than larger firms are.

[34] The RPED questionnaire includes five specific options. We have combined two answers (Introduce New Products and Produce Different Variety of Similar Product) and called them *Introduce New Products*.

Table 11.9: Purpose of Investment

	Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All Firms								
Improve Process	28.1	25.3	42.5	19.7	26.8	31.3	28.3	24.9
Expansion	40.0	34.0	30.6	61.5	44.4	51.7	35.0	35.6
New Product	15.9	33.3	10.6	3.4	14.6	10.9	20.7	14.6
Replacement	16.0	7.3	16.3	15.4	14.1	6.1	16.0	24.9
Small Firms								
Improve Process	30.3	29.0	49.0	19.6	29.3	33.1	29.6	26.3
Expansion	40.8	29.0	25.5	61.9	44.7	51.2	38.1	37.1
New Product	14.4	35.5	11.2	2.1	12.7	8.3	16.9	13.1
Replacement	14.5	6.5	14.3	16.5	13.3	7.4	15.3	23.4
Large Firms								
Improve Process	23.4	16.3	32.3	20.0	20.0	23.1	22.9	23.5
Expansion	38.3	46.5	38.7	60.0	43.0	53.8	22.9	34.2
New Product	19.0	27.9	9.7	10.0	20.0	23.1	35.4	16.0
Replacement	19.3	9.3	19.4	10.0	16.4	0.0	18.8	26.2

Note: Small firms here are defined as firms that employ <100 versus large firms that employ >=100.

Table 11.10: Sources of Investment Finance

	Pooled	*Cameroon*	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
All Firms								
Earning	73.1	70.0	86.2	70.9	67.7	65.1	76.4	76.9
Saving	9.2	11.2	9.6	13.3	8.7	17.1	9.0	3.5
Friend	1.9	1.7	1.6	4.4	1.6	5.2	1.9	0.2
Loan	16.1	17.5	5.7	11.4	23.4	12.6	12.8	20.8
Small Firms								
Earning	71.7	69.4	80.1	68.3	65.3	65.3	74.2	78.6
Saving	13.6	15.0	13.8	16.1	12.7	21.4	12.4	6.8
Friend	2.7	1.9	2.3	5.3	2.3	6.0	2.6	0.05
Loan	12.0	13.5	3.9	10.2	19.8	7.3	10.9	14.6
Large Firms								
Earning	85.7	72.9	90.3	83.7	69.1	64.2	82.2	73.7
Saving	1.0	3.4	0.8	1.8	0.0	0.0	0.0	0.8
Friend	0.3	1.2	0.0	0.0	0.0	2.1	0.0	0.0
Loan	23.3	25.6	8.8	16.9	30.9	33.7	17.9	25.5

Note: Small firms here are defined as firms that employ <100 versus large firms that employ >=100.

Table 11.10 summarizes how firms finance their investment decisions. As Table 11.10 reveals, an overwhelming number of firms finance their investment decisions through internal channels including internal earnings

(73.1%), savings (9.2%), and through borrowing from friends (1.9%). The external financing which includes loans from banks, supplier credit, and draft (here summarized as loan) contribute 16.1% to the investment financing. It appears that firms in Cameroon, Kenya, and Zimbabwe have a better chance of financing their investment decisions through external channels. Not surprisingly, in all countries the larger firms use external finance more than the smaller firms do. This can both be attributed to more accessibility or greater need for liquid capital as larger firms invest more heavily.

The Determinants of Investment

The Model

The investment decisions of a firm in a world of certainty can be analyzed under the framework of the accelerator model. First, assume that it is costly to invest: for investment I, the cost of investment is convex, such that $C'(I) > 0$, $C''(I) > 0$ for all I >0. Next, assume standard production function relationships such that profits are a strictly concave function of the capital stock $\Pi = \Pi(K,t)$, where $\Pi_K > 0, \Pi_{KK} < 0$. If firms maximize the present value of their earnings stream net of investment, and the firms' discount rate is *r*, then the optimal path of investment can be characterized by the following Euler equation:

$$\Pi_K(K,t) = rC'(I) - C''(I)\dot{I} \tag{1}$$

This expression, assuming constant prices, implies the following flexible accelerator model:

$$I_t = \beta[K^* - K_t] \tag{2}$$

where K^* satisfies $\Pi_K(K^*) = rC'(0)$ and

$$\beta = -1/2\left\{r - \sqrt{r^2 - 4\Pi_{KK}(K^*)/C''(0)}\right\}.$$

The implications are straightforward. If credit rationing occurs (that is, firms are constrained), then the user cost of capital increases, implying higher marginal products of capital in the long run and more sluggish movement in adjusting their capital stocks over time.

The accelerator model describes the path of investment when there are costs to the firm of adding capital stock. In a world of liquidity constraints, the ability to access external funds is restricted and thus (1) is not entirely appropriate as a description of the investment process. That is, firms will only behave according to (1) if they have sufficient internally generated funds. If they do not, then the investment process will be determined by the availability of current funds, such as credit markets and/or cash flow.

The existence of cost and liquidity constraints can be built into an empirical specification of the accelerator model as follows. Assuming that firms can form expectations of future output Q*, (2) can be re-written to incorporate the potential affects of costs to investment and the effect of cash flow.

$$I_t = \beta\,[\alpha\, Q_t^* - K_{t-1}] + \eta\, \Pi_{t-1} \qquad (3)$$

Furthermore, if there are firm specific characteristics that may differentially affect access to credit markets, (3) can be augmented to account for this firm level heterogeneity.

$$I_t = \beta\,[\alpha\, Q_t^* - K_{t-1}] + \eta\, \Pi_{t-1} + \delta\, X_t + \varepsilon_t \qquad (4)$$

where the *X*'s are firm location, industry classification, owner education and socio-economic status and other firm specific characteristics.

Testable Implications

In a world characterized by perfect information and no uncertainty, the demand for funds would depend entirely upon the expectations of future investment opportunities and therefore estimating (4) should only produce significant relationships with respect to the adjustment cost of capital. That is, the demand for credit would not depend upon current or past measures of profitability, cash flow or net worth, nor would other firm characteristics that signal firm quality or creditworthiness matter. Under imperfect information, the accelerator posits that investment will be a function of changes in value added and profitability since these could imply future investment opportunities and the relaxation of liquidity constraints. Likewise, firm level characteristics should also matter if information is asymmetric in that they are signals of a firm's creditworthiness. That is, the *X*'s will capture the firm's ability to access credit, which directly affects the investment process. The testable implications of (4), under imperfect information are straightforward. On the demand side, the coefficient for changes in value added should be positive since improvements in value added should be a good proxy for future investment opportunities. Lagged profits should also be positively related to future investment if the investment process is “lumpy” and firms therefore need to accumulate sufficient internal funds in order to execute their investment plans. On the supply side, the coefficient for past profitability would also signal to the market at large the firm’s creditworthiness. Likewise, the leverage coefficient should be positive as past borrowing provides information to the lender regarding the firm’s future prospects. Lastly, if firm characteristics such as age, location, industry type or owner ability are seen as potential sources of information to the lender, then these variables should matter. That is, if firm characteristics can overcome information asymmetries, then those firms, which possess such characteristics, should have easier access to credit and therefore higher levels of investment.

An Empirical Model

The Industrial Surveys in Africa (ISA) group studies the investment decision in four countries namely, Cameroon, Ghana, Kenya, and Zimbabwe (Bigsten *et al.* 1998a). The study relies on the estimation of the accelerator-profit model as discussed in the last sub-section. They consider a logit model of the decision to invest as well as the determinants of the investment rate, with and without correcting for the selectivity of those firms who do make a positive investment in the survey period. The results of this exercise are reproduced in Table 11.11.

Two major points to note in this exercise are the following:

- The flexible accelerator model explains quite well the African survey data on the *rates* of investment. The value added variable is significant at rather less than the 10% level and the profit rate is highly significant at the 1% level – and this is true even after we correct for the selectivity of the firms with positive investment.
- For the equation for the decision to invest (column 1) both size and the age of the firm are significant in addition to the profit rate. But these variables are not significant in the investment rate equations. Country differences are important only for the decision to invest. All three countries other than Zimbabwe have lower propensity to invest at all in the survey period than the latter.

Table 11.11: Determinants of Investment in Four sub-Saharan Countries

	Logit Model 0=no investment, 1 if investment	*Investment/Capital$_{(t-1)}$ no selectivity*	*Investment/Capital$_{(t-1)}$ with selectivity*
Constant	−0.36 (0.8)	0.33 (3.0)	0.18 (0.5)
$(V_t-V_{t-1})/K_{t-1}$	0.01 (0.9)	0.008 (1.8)	0.008 (1.7)
$(C/K)_{t-1}$	0.04 (2.1)*	0.03 (6.8)**	0.03 (4.7)**
$\text{Ln}(\text{Size}_{t-1})$	0.46 (5.5)**	−0.03 (1.6)	−0.01(0.2)
$\text{Ln}(\text{Age}_{t-1})$	−0.02 (3.4)**	−0.002 (0.9)	−0.003 (0.9)
$(B/K)_{t-1}$	−0.42 (0.7)	0.02 (0.9)	0.26 (1.6)
$(B/K)^2_{t-1}$	−0.006 (0.02)	0.003 (0.003)	−0.10 (1.7)
Ghana	−0.74 (3.0)**	−0.04 (0.7)	−0.08 (0.8)
Kenya	−1.03 (4.2)**	0.04 (0.7)	−0.02 (0.1)
Cameroon	−1.94 (6.7)**	0.11 (1.5)	−0.04 (0.1)
Lambda			0.18 (0.5)
N	739	391	391
Adjusted R^2		0.16	0.15

Source: Bigsten *et al.* (1998a). The figures in parentheses are: values of the ratio of coefficients to its standard error. For equations in columns 2 and 3 White corrected standard errors are used.

It is also important to note that the estimation of accelerator model has produced some interesting results in several other individual country based studies that have used RPED surveys. For instance, Fafchamps and Oostendrop (2000) use a flexible accelerator model to estimate both the decision to invest and the investment rate in a framework similar to that reported in Table 11.11. Their flexible accelerator model explains the investment behavior quite well with profit a significant factor in both the decision to invest and the investment rate. They too found both size and age insignificant in the equation for the investment rate while size was found significant in the estimation for the decision to invest. Furthermore, Bigsten *et al.* (1994) in their study of investment in Kenya, found similar results where both size and age were significant in the investment decision but insignificant in the amount of investment.

The meaning of the significant explanatory variables requires comment. If firm size and the age of the firm are proxies for easier access to the capital market, then we would expect them to be significant for both the decision to invest as well as the amount of investment (relative to the capital stock) which is undertaken. But this is not so. They are significant only for the decision to undertake investment. Thus a more plausible explanation of the variables is that they proxy the role of indivisibilities of investment. We have seen in the previous section that smaller firms are more prone to undertake investment in "spikes." Similarly, the probability of the 'spikes" occurring within the period of the survey are higher the older is the firm.

The Meaning of the "Profit" Variable

It should be apparent from the discussion of the theoretical model above that if investment is found to be sensitive to the profit rate, its interpretation is ambiguous. The profit rate could proxy elements both on the demand side, predicting future market conditions for the firm, and the supply side, easing credit constraints facing the firm. We then have an identification problem here which cannot be solved without further exploration of the data. There are two ways of proceeding. First, we may introduce variables to represent future demand conditions facing the firm. If such variables are significant and the significance and/or the value of the coefficient of the profit term are not reduced too much, we can incline to the view that profits do indeed proxy the easier availability of finance. An alternative method is to group firms into categories where they are independently identified as more or less credit constrained. We would then expect that the profit variable would be more strongly significant for the group that is credit constrained. We now look at empirical work that has worked with these two approaches in turn.

Demand Variables and Investment

Among other studies, Pattillo (1998) investigates the process of investment in Ghana, including the effect of anticipated demand and its uncertainty, along with the profit rate. In this study, the author uses information, gathered in the firm surveys, on entrepreneur's subjective probability distribution of future demand for the firm's product, to construct indices for expected future demand as well as its variance.[35] The latter is used as a measure of uncertainty, which may affect firm's decision to invest. Furthermore, this study explores the extent to which the investment-uncertainty relationship is affected by the degree of irreversibility of a

[35] See Pattillo (1998, p. 19) and also Appendix 2 for details of the construction. The procedure was possible because "firm owners were asked about their one-year and three-year expectations of demand for their firms' products. However, rather than only asking for point estimates – what percentage demand change they expected – firms were asked to assign probabilities to a range of potential percentage changes in demand, so that the probabilities summed to 100" (*ibid.,* p. 19).

firm's capital expenditure. Irreversibility, in Pattillo's work, can be proxied by several alternative indices. The one reported here classifies firms as having more reversible investment if the firm either leased capital goods, bought used capital goods, or sold capital.[36] Pattillo's modeling of the investment decision is also more detailed than in most other studies. He argues that the firm allows the marginal revenue product of capital (MRPK) to fluctuate, and invests only when the MRPK hits an "optimally derived trigger." This trigger is an increasing function of the standard deviation of the demand process and hence greater uncertainty in demand will lead to less desire to invest. However, average investment in a given period depends on how soon and often the MRPK exceeds the trigger. Therefore, although more uncertainty will raise the trigger, a more volatile process may hit the trigger more often. Hence, the balance of these two factors decides the short-term investment decision.

In summary, this study intends to answer three distinct questions. First, can a method be developed to test the central prediction that investment's triggered only when the MRPK reaches a specific hurdle level? Second, does uncertainty increases the investment trigger, and is this effect larger for firms with more irreversible investment? Third, does uncertainty have a greater negative effect on the investment rate of firms with more irreversible investment?

To answer these three questions, Pattillo (1999) develops an econometric model based on Bertola (1988). In this model, investment is irreversible, production function is Cobb-Douglas, the firm faces a constant elasticity demand function so that different degree of market power can be studied, and uncertainty arises since the demand curve, the wage rate, and the productivity are stochastic. The model maximizes the present discounted value of the profit by choosing the optimal investment path.

The study, then, uses three rounds of survey provided by RPED and two extra rounds as provided by Ghana Manufacturing Enterprise Survey (GMES) to estimate the model and provide answers to the aforementioned three questions. To address the first question i.e. if investment is triggered when MRPK reaches a particular hurdle, since the trigger is not observable the author assumes that the theory is correct and that firms invest when the MRPK hits the trigger. Thus, when a firm invests a first-stage proxy for the trigger is the measured MRPK. Using this first stage proxy for the trigger,

[36] Another proxy used by Pattillo is approximated by the ratio of the real sales value of the capital stock to its replacement value. This measure approximates the discount value of capital goods in the second-hand market. The results with alternative specifications of this variable do not vary that much.

the author explores its determinants, including the effects of uncertainty variable. As already mentioned, the uncertainty variable is estimated using the management observed expectation about the demand for the firm's product. The estimates of one of the models (Pattillo, Table 8) are reproduced in Table 11.12.

Table 11.12: A Model for Investment under Uncertainty with Irreversibility in Ghana, Pattillo (1998)

	Reduced-form Probit, INVDUM=1	*MRPK= Trigger (Selection Model)*	*Reduced-form Probit INVDUM=1*	*I/K_{t-1} Selection Model*
Constant	1.170 (0.06)	−0.76 (0.69)	−0.027 (0.18)	1.727 (5.08)
$(V-V_{t-1})/K_{t-1}$	0.031 (2.80)		0.028 (2.11)	0.263 (1.76)
$(C/K)_{t-1}$	0.024 (2.65)	0.003 (0.18)	0.032 (2.34)	0.031 (2.40)
Ln (Size)	0.060 (1.70)		0.067 (1.62)	0.022 (0.48)
Firm age	−0.003 (0.47)		−0.002 (0.47)	−0.002 (0.40)
MRPK	0.048 (2.39)			
Expected Mean Demand Growth	0.009 (1.048)	−0.001 (0.15)		0.002 (1.48)
Variance of Expected Demand	−0.002 (2.65)	0.008 (2.43)		−0.002 (2.49)
Variance* Reversibility	0.001 (1.2)	−0.008 (1.32)		0.001 (2.06)
Output/K		0.18 (8.18)		
K/L		−0.001 (0.19)		
Lambda		0.002 (0.31)		0.073 (0.45)
MRPK-h			0.121 (3.17)	
Observations	226	116	153	94
Log-Likelihood	−140.37		−95.33	
Adjusted R^2		0.54		0.25

Note: From Pattillo (1998), Table 8. Absolute value of t-statistics are in parentheses.

The first column of results reports the estimation of the reduced form Probit model for the decision to invest or not. It is seen that the accelerator, $(V-V_{t-1})/K_{-1,}$ and the profit rate are significant determinants of investment, as in the models discussed in the last section, but so is MRPK, confirming Pattillo's hypothesis. The expectation of higher demand growth is *not* significant, but high variance of expected demand does lower the propensity to invest significantly.

The second column reports the results of a selection-bias corrected least-square regression for the MRPK, conditional on a positive investment by the firm. The assumption is, it will be recalled, that investing firms are those that have reached the firm-specific investment trigger. The results of this least-square regression show that the expected mean and variance of demand, along with the profit rate, affect firm-specific hurdle level of the

MRPK that triggers investment. This result provides an answer to part of the second question and indicates that high levels of uncertainty increase the investment trigger. But the low significance of the variable when it is crossed with the reversibility proxy implies that there is only weak support for the hypothesis that the uncertainty effect is stronger if firms have more irreversible investment. It is, however, likely that the proxy used is not adequate.[37]

At the next step a structural Probit model is estimated on the full sample of firms, whether investing or not. The coefficients from column (2), together with the firm-specific value of the relevant variables, are used to create a predicted trigger (*h*) for firms with positive and zero investment. The model is then estimated to test whether the deviation of a firm's MRPK from the predicted trigger is a significant determinant of decision to invest. The results given in column (3) show that it is indeed so.

Column 4 of the table reports the estimated determinants of the investment rate of those who do invest, rather than the decision to invest. The results support the notion that for the sample of Ghanaian manufacturing firms, uncertainty has a greater negative effect on investment rates for firms with more irreversible investment. Other results stay much the same a in the case of the Probit models for decision to invest. The variance of demand is more important than mean expected demand.

The independent role of profit in the accelerator-profit model is confirmed in so far as the inclusion of demand variables, both the expected mean and its variance, still leaves the profit rate as a significant determinant of both the decision to invest and the rate of investment. This is a strong result which supports the notion that profits rate has a positive and significant effect on investment decision because it plays a role, not just as a proxy for future demand, but also as an indicator of the availability of internal funds for investment. In other words, this is in line with the predictions of the cash flow models, as discussed in the previous section, where the firms are financially constrained and hence rely on their cash flow for investment decisions.

Financially Constrained and Unconstrained Groups: (a) Small and Large Firms

As already indicated an alternative way of identifying the meaning of the profit variable in the investment function is to construct groups of firms

[37] The alternative proxy, the ratio of real sales value of the capital stock to its replacement value, did not perform any better.

that are separated by independent variables signifying different degrees of financial constraint. A traditional method in the literature has been to assume that small firms are financially more constrained, and hence we can seek to identify the role of profits by looking at the investment equation separately for small and large firms (see, for example Tybout 1983).

Bigsten *et al.* (1998a) attempt this approach in one part of their work for four countries. To ensure that the results are not affected by firm specific characteristics, firm fixed effects have been removed by differencing the variables. The results in Table 11.13 reports the fixed effect estimation of the accelerator-profit model for all firms and for the large and small firms separately. Firms are defined as large if their average number of employees over the three rounds of the survey was equal or greater than 100. The results indicate that the smaller firms are more responsive to profits, as well as to past value added growth than do larger firms. This result is consistent with the hypothesis that small firms are credit constrained, and that profits by augmenting internal funds ease the constraints for firms in this group.

Table 11.13: Determinants of the Rate of Investment (*I/K_{t-1}*)

	All Firms	*Large Firms*	*Small Firms*
Constant	−0.05 (1.3)	−0.04 (0.08)	−0.07 (1.0)
$(V_t - V_{t-1})/K_{t-1}$	0.01 (1.6)	−0.003 (0.4)	0.01 (1.9)
$(C/K)_{t-1}$	0.06 (3.5)**	0.04 (0.6)	0.06 (4.0)*
$\text{Ln}(\text{Size}_{t-1})$	0.04 (0.3)	−0.02 (0.1)	0.03 (0.2)
$\text{Ln}(\text{Age}_{t-1})$			
$(B/K)_{t-1}$	0.34 (1.7)	0.24 (0.7)	0.30 (1.2)
$(B/K)^2_{t-1}$	−0.14 (1.8)	−0.09 (0.5)	−0.13 (1.6)
Ghana	0.07 (0.8)	−0.27 (1.0)	0.12 (1.1)
Kenya	0.04 (0.6)	−0.05 (0.7)	0.08 (0.7)
Cameroon	0.09 (0.9)	0.10 (0.6)	0.09 (0.8)
N	223	73	150
Adjusted R^2	0.18	−0.02	0.21

Source: Bigsten *et al.* (1998a). The figures in parentheses are the robust one-step *t* statistics reported in the DPD program, Arellano and Bond (1988).

We have extended the above analysis to a larger sample of six countries. In our analysis, we have also attempted both no selectivity and fixed effect estimators but our results like that of Bigsten *et al.*, do not differ materially and hence to conserve space we have not reported those results. We include for completeness, in column 1 of Table 11.14, results of a Probit analysis of the decision to invest. It is reassuring to note that the conclusions reached from the Bigsten *et al.* results on the basis of the data from four countries (Table 11.13 above) are confirmed for this larger sample of countries, as far as both the decision to investment and the investment rates are concerned.

Turning to the results of the sub-samples, the size and age effects are found to be significant for the large firms but not for the small firms. However, the growth of value added is significant and positive for only small firms. The profits-rate is found to be significant for both small and large firms. However, it is much higher and more significant for smaller firms. Furthermore, the debt ratio is not significant overall and for the small firms; however it is both significant and positive for the large size firms. This finding can be interpreted to show that the small firms are not relying on external sources to finance their investment, a hypothesis that was suggested by the descriptive material earlier in the chapter. This is most likely because they are more credit constrained.

Table 11.14: Estimation of Accelerator-Profit Model for Six sub-Saharan Countries

	Decision to Invest	*Investment Rate: All firms*	*Investment Rate: Large Firms*	*Investment Rate: Small Firms*
Constant	0.13 (0.21)	0.18 (0.05)	0.14 (0.08)	0.18 (0.08)
$(V_t - V_{t-1})/K_{t-1}$	0.003 (0.006)	0.006 (0.003)	0.001 (0.004)	0.007 (0.003)
$(C/K)_{t-1}$	0.16 (0.06)	0.08 (0.02)	0.04 (0.02)	0.09 (0.02)
Ln(Size$_{t-1}$)	0.14 (0.03)	0.12 (0.12)	−0.01 (0.02)	−0.006 (0.02)
Ln(Age$_{t-1}$)	−0.17 (0.06)	−0.02 (0.04)	0.002 (0.001)	−0.002 (0.002)
$(B/K)_{t-1}$	−0.21 (0.39)	−0.01 (0.01)	0.30 (0.11)	0.04 (0.28)
$(B/K)^2_{t-1}$	0.12 (0.18)	−0.001 (0.001)	−0.15 (0.07)	0.007 (0.08)
Côte d'Ivoire	−0.18 (0.20)	−0.05 (0.05)	−0.05 (0.04)	−0.06 (0.09)
Ghana	−0.60 (0.13)	−0.04 (0.05)	0.06 (0.05)	−0.08 (0.07)
Kenya	−0.52 (0.13)	−0.04 (0.04)	−0.02 (0.04)	−0.05 (0.06)
Tanzania	−1.50 (0.19)	0.21 (0.08)	0.07 (0.10)	0.22 (0.10)
Zambia	−0.82 (0.13)	0.01 (0.05)	−0.05 (0.05)	0.02 (0.07)
Observations	1049	477	184	293
Adjusted R^2		0.170	0.108	0.178
Log-Likelihood	−617.44			

Note: The values in parentheses are the consistent standard errors calculated using Heckman's two-stage method. Large firms are defined as firms with number of employees equal or greater than 100, the small firms are those that employ less than 100. Location, Wave, Foreign ownership, and sector are used as control variables.

It is interesting to note that a stronger profit-investment relation for the smaller firms observed in both our analysis and that of Bigsten *et al.*, did not hold in the Fafchamps and Oostendrop (2000) study of investment in Zimbabwe. In fact, they found that the profit effect for small firms to be actually smaller than that of large firms, although the difference was not significant. They argue that if there are other factors that affect liquidity position of a firm, this counter-intuitive result might be due to omitted variable bias, but are unable to isolate those variables.

The results presented in Table 11.14 certainly provide a good indication as to how the process of investment shapes up in the sub-Saharan African countries under consideration. However, to investigate how firm characteristics may affect the investment behavior, over and above the standard accelerator model, we have added some additional variables to the accelerator-profits model. These firm characteristics include import orientation, export orientation, and foreign ownership. We found earlier in our descriptive analysis that firms with each of these characteristics tend to invest more. However, none of these characteristics was found to be significant in either the decision to invest or the rate of investment, implying that the standard accelerator-profit model can explain the differences observed among firms with different characteristics.

In sum, it appears that the accelerator-profits model enjoys a better fit for the small size firms. As indicated earlier this finding is consistent with the cash flow theory where smaller firms are more likely to be credit constrained and hence rely more on their ability to generate cash flow to finance their investment decisions. This finding will be further analyzed in the next sub-section where the relation between credit constraint and investment is studied explicitly.

Financially Constrained and Unconstrained Firms: (b) Cash Flow Problems

Another alternative in identifying the meaning of the profit variable in the investment function is to use the cash flow variable and separate those firms that have reported cash flow problems from the others. A significant investment-profit relationship does not necessarily reflect the impact of credit constraints, and hence independent information on credit constraints is needed to determine the relation between investment behavior, cash flow, and credit constraints. Fortunately, the RPED surveys do provide some independent information on cash flow problems that can be used in the investment analysis. In the second wave of these surveys, there has been a question posed to the managers to gauge their cash flow problems.

The question specifically asks if the firm has had any cash flow (liquidity) problems in the past year. This question can be then used to differentiate between those firms that face credit constraints and the others.

Fafchamps and Oostendrop (2000) follow this path and use this question to separate the credit constrained firms. They found that in the case of Zimbabwe a total of 69% of the firms in the sample reported cash flow (liquidity) problems in the previous year. Using this question and the fact that they know which firms had cash flow problems, they test whether those firms do exhibit greater investment–cash flow sensitivity. The estimations are reported in Table 11.15 where both the decision to invest and the investment rate have been estimated. Furthermore, in all estimated models, the cash flow problem has been used as a separate dummy variable and has also been crossed with the profit rate to capture the interaction between the profit rate and cash flow problems. If the observed positive relation between the investment and profit rate is due to the fact that those firms with higher profit rate can use it to finance their investment decisions even if they are credit constrained, then one might expect this interaction variable to be significant and positive implying more investment–cash flow sensitivity for the firms with cash flow problems.

Table 11.15: Cash Flow Management and Investment in Zimbabwe

	Logit Model No Controls [1]	*Logit Model Controls [2]*	*Logit Model Instruments [3]*	*OLS [4]*
Constant	−0.75 [1.61]	−1.55* [1.71]	−1.55 [1.19]	0.26 [1.38]
$(S/K)_{t-1}$	0.16** [2.58]	0.16**[2.34]	0.09 [0.93]	0.03* [1.93]
(C_t/K_{t-1})	0.09 [0.53]	0.11 [0.64]	−0.09 [0.64]	0.01 [0.86]
Ln(Size)	0.56** [5.66]	0.57* [3.94]	0.70***[2.82]	0.01 [0.55]
Firm Age	−0.01 [1.59]	−0.01 [0.92]	−0.01 [0.90]	−0.004***[3.08]
$(B/K)_{t-1}$	−1.22** [2.48]	−1.29 [2.46]	−1.38 [1.67]	−0.05 [1.47]
$(B/K)^2_{t-1}$	0.24* [1.71]	0.25* [1.85]	0.34 [1.41]	0.002 [0.96]
Wave 2	0.73** [2.17]	0.82**[2.22]	0.61 [0.99]	0.02 [0.62]
Wave 3	0.29 [0.86]	0.22 [0.58]	0.08 [0.14]	−0.04 [1.30]
Cash Flow Problems	−0.98***[3.11]	−1.04**[2.92]	−1.63***[3.11]	−0.12***[2.97]
Cash Flow Problems* (C_t/K_{t-1})	0.51** [2.20]	0.43*[1.71]	0.74*** [2.68]	0.09** *[4.37]
Control variables	No	Yes	Yes	Yes
N	392	319	179	226

Source: Fafchamps and Oostendorp (2000).
Note: S is sales, C profits, B indebtedness, K capital stock. Values in brackets are t-values. * indicates significance at the 10% level, ** at the 5%, and *** at the 1% level. Location, foreign ownership, ethnicity, ownership structure, and sector are used as control variables.

The results of Table 11.15 confirm this hypothesis. The first column of the table reports the results for the flexible accelerator model estimated to explain the decision to invest. It includes a dummy for the cash flow problems, and a cross term of cash flow problems with the profit rate. The interaction variable is positive and significant whereas the profit rate itself is insignificant. The investment of firms that do not report cash flow problems are unrelated with profits, which should be true if they face no credit constraints whereas the investment of those firms that do face cash flow problems depends on their profits rate which implies they do face credit constraints. Hence, the observed investment–profit sensitivities do provide a useful indication of credit constraints. To test for the robustness of the results, several control variables have been added in Model [2], but the results have not changed. Model [3] controls for possible endogeneity of the cash-flow variable. If the investment behavior of firms affect their liquidity position, for instance through financing needs or additional sales, the estimates in Models [1] and [2] will be inconsistent. To solve this problem, the authors estimate an instrumental variable logit model and summarize the results in model [3]. In this model, the number of times that a firm had problems with late/non delivery of inputs/services, and the number of times the firm had problems with late payment by a client are used as primary instruments for the dummy of cash flow problems. The results, again, do not change materially.

It is also interesting to note that the cash flow problems not only affect the decision to invest but also the investment rate. Model [4] estimates the investment rate rather than the investment decision and shows that the investment rate is a function of the profit rate only for those firms that face liquidity problems. For those firms that do not face cash flow problems, the investment rate does not appear to be sensitive to the profit rate. In other words, firms with cash flow problems are not only more likely to postpone their investment decisions, but also when they do decide to invest they tend to invest at a higher rate only if they are more profitable.

Using cash flow problems as a proxy for the credit constraints is to a good extent a valid approach for the least developed countries including those in our sample as those forms that face cash flow problems are most likely to be shut out of the credit market. However, an argument can be made here that firms that face cash flow problems can still have access to the credit market and may not be necessarily credit constrained. This combined with the ambiguity of the question about the cash flow problems, make it an unreliable indicator. This might also be reflected in the very high rate of cash flow problems reported by the surveyed firms. In fact, in response to the same question, over 73% of firms in Ghana, over 77% of firms in Tanzania, and 74% of firms in Zambia reported cash flow problems in the preceding year. Furthermore, when given the option in Kenya to report the number of times they have faced cash flow problems, 49% reported no cash flow problem whereas 10% reported only one cash flow problem and another 10% only two cash flow problems. Hence, one can argue that the cash flow problems in many cases might have been perceived as temporary and should not be equaled to financial constraints that hinder firm investment. In fact, using RPED surveys one can provide a more stringent definition for credit constrained firms, a task that will be undertaken in the next section.

Financially Constrained and Unconstrained Firms: (c) Groups Defined by the Survey

There is another way of distinguishing the financially constrained groups by the responses given by managers to the survey questionnaire. We have used this criterion in the chapter on Finance (Part III). To recapitulate: credit constraint is deemed to apply to the following groups: (i) those who had applied for a loan and had been rejected; and (ii) the "discouraged borrowers" consisting of those who had never applied because they said they had inadequate collateral, or the process involving collaterals was too difficult or that they just thought they would not get a loan. Those who said they did not want a loan, those who did not want to incur debt or who found the interest rate too high, were all excluded from the category of discouraged borrowers. Classified in this way, it will be recalled that the percentage of credit constrained firms were as follows:

Table 11.16: Access to Funds from Formal and Semi Formal Financial Institutions

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*All*
Credit Constrained	40.8%	49.8%	19.1%	35.7%	31.5%	23.0%	36.8%

Over a third of all firms or more specifically 36.8% of all firms are considered financially constrained. Close to 25.3% of those have seen their application rejected and the rest have never applied for a loan but consider themselves as financially constrained, either because they can get a loan or they do not possess adequate collateral. These percentages vary rather considerably from one country to another. Firms in Kenya and Zimbabwe are considered the least financially constrained as only 19.1% of firms in the former and 23.0% in the latter are credit constrained. This compares to 49.8% of firms in Côte d'Ivoire and 40.8% in Cameroon that are financially constrained. Interestingly enough, firms in the Francophone countries appear to have been most affected by the financial constraints. These results indicate a pervasive imperfect capital market in sub-Saharan Africa as more than the third of the surveyed firms are financially constrained.

An alternative approach to identifying the financially constrained firms would be to adopt another part of the RPED questionnaire. Firms were asked to identify their major obstacles to growth and had been given several options including credit constraint. Those firms that identify availability of finance as a major obstacle to their growth are also categorized as credit constrained. Table 11.17 reports the proportion of firms that consider lack of credit as a severe obstacle to their expansion. In this case, 45.4% of all firms consider lack of credit as a major obstacle to their expansion. This proportion is slightly higher than the 36.8% we found with the earlier criterion. In fact, as one may expect, the percentage of those who find credit constraint to be severe is higher in almost all countries than those that were found financially constrained in our earlier analysis.

Table 11.17: Firms that Consider Lack of Credit as a Major Obstacle to their Expansion (Percentage of total)

	Cameroon	*Côte d'Ivoire*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*All*
Severe Obstacle to Expansion	62.2%	46.3%	31.1%	54.4%	55.1%	37.63%	45.4%

To analyze the effect of the credit constraint on the investment decision, we have primarily used the first criterion to measure credit constraint. However, in the case of missing values, we have used the second criterion. In general, close to 40% of all firms were categorized as credit constrained. This ranges from 29% in Zimbabwe to 40–55% in Cameroon, Tanzania, and Zambia. To further investigate the effect of credit constraint on the decision to invest, we have not only re-estimated the accelerator-profit models after adding the dummy variable for credit constraint and crossing it with the profit rate, we have also estimated the model for both the constrained and non-constrained firms separately to show the effect on other variables. The results are summarized in the following two tables.

Table 11.18 incorporates the results for the accelerator-profit model for the decision to invest. Theoretically, as we indicated earlier, the credit constrained firms should rely more on their cash flow. This prediction is confirmed as both the credit constraint dummy and cross effect dummy are significant at 5% significance level. In fact, the likelihood ratio test for the corresponding effect returned a value over 7 which is significant at 2.5%. Furthermore, both coefficients returned the expected sign. The credit constraint dummy is negative which implies that the credit constrained firms are less likely to undertake investment decisions and the cross dummy is positive which indicates that if credit constrained firms do decide to invest, they tend to rely more on their generated profit. The overall profits rate, however is still positive but insignificant.

Table 11.18: Financial Constraint and Determinants of Decision to Invest

	Probit Model	*Credit Constrained*	*Not Constrained*
Constant	0.317 (0.245)	0.553 (0.402)	0.050 (0.304)
$(V_t-V_{t-1})/K_{t-1}$	0.001 (0.007)	−0.002 (0.008)	0.003 (0.018)
$(C/K)_{t-1}$	0.069 (0.090)	0.254 (0.111)	0.086 (0.090)
$\text{Ln}(\text{Size}_{t-1})$	0.118 (0.038)	0.026 (0.065)	0.181 (0.048)
$\text{Ln}(\text{Age}_{t-1})$	−0.168 (0.071)	−0.206 (0.122)	−0.168 (0.090)
$(B/K)_{t-1}$	−0.171 (0.410)	−0.095 (0.452)	−0.197 (0.516)
$(B/K)^2_{t-1}$	0.105 (0.189)	0.026 (0.155)	0.122 (0.224)
Credit Constraint	−0.284 (0.118)		
Credit Constraint*$(C/K)_{t-1}$	0.285 (0.135)		
Côte d'Ivoire	−0.135 (0.241)	−0.034 (0.469)	−0.187 (0.289)
Ghana	−0.664 (0.158)	−0.953 (0.307)	−0.588 (0.190)
Kenya	−0.626 (0.137)	−0.697 (0.272)	−0.620 (0.160)
Tanzania	−1.479 (0.206)	−1.656 (0.296)	−1.312 (0.325)
Zambia	−0.821 (0.170)	−0.828 (0.229)	−0.867 (0.185)
N	844	324	520
Log-Likelihood	−500.10 (3.65)	−173.17	−318.27

Note: The values in parentheses are standard errors. Large firms are defined as firms with number of employees equal or greater than 100, the small firms are those that employ less than 100. Location, Wave, Foreign ownership, and sector are used as control variables.

The results reported in Table 11.18 also imply that the overall likelihood of investment by credit constrained firms is 12% less than their unconstrained counterparts. This discrepancy, however, widens to around 17% if one forgoes the effect of profit rate. A financially constrained firm that has had zero profit rate is 17% less likely to invest than a typical unconstrained firm with the same profitability. When estimated separately, for the credit-constrained firms the coefficient of profits rate is 0.254 and highly significant, whereas it is 0.086 and insignificant for the non-constrained firms whereas the other coefficient remains close. This further confirms our conclusion that the credit constrained firms are relying heavily on their profit to finance their investment decisions.

These results, clearly, demonstrates the fact that the prevalent imperfect capital market has contributed significantly to the experience of capital formation in sub-Saharan Africa by forcing many firms to rely on their ability to finance their investment decisions internally. This coupled with the excessive profitability observed in sub-Saharan Africa points to the effect of the imperfect capital market on the ability of the firms to enter the market or to expand their business. We have found that while credit constrained firms are less likely to invest their investment decisions heavily depends on their ability to generate cash flow.

Table 11.19: Financial Constraint and Determinants of Amount of Investment

	I/K_{t-1}	*Credit Constrained*	*Not Constrained*
Constant	0.376 (0.075)	0.144 (0.102)	0.433 (0.089)
$(V_t-V_{t-1})/K_{t-1}$	0.022 (0.003)	0.011 (0.004)	0.014 (0.006)
$(C/K)_{t-1}$	−0.003 (0.021)	0.070 (0.022)	−0.002 (0.023)
$\text{Ln}(\text{Size}_{t-1})$	−0.019 (0.012)	−0.010 (0.018)	−0.022 (0.014)
$\text{Ln}(\text{Age}_{t-1})$	−0.047 (0.022)	−0.017 (0.038)	−0.060 (0.026)
$(B/K)_{t-1}$	0.016 (0.062)	0.106 (0.035)	−0.018 (0.128)
$(B/K)^2_{t-1}$	−0.003 (0.004)	−0.129 (0.286)	0.017 (0.042)
Credit Constraint	−0.078 (0.038)		
Credit Constraint*$(C/K)_{t-1}$	0.063 (0.032)		
Côte d’Ivoire	0.215 (0.064)	0.295 (0.110)	0.186 (0.075)
Ghana	−0.001 (0.051)	0.099 (0.086)	−0.028 (0.059)
Kenya	−0.037 (0.042)	0.044 (0.070)	0.049 (0.048)
Tanzania	0.284 (0.081)	0.136 (0.097)	0.596 (0.125)
Zambia	0.037 (0.048)	0.057 (0.065)	−0.023 90.062)
N	412	136	276
Adjusted R^2	0.217	0.263	0.201

Note: The values in parentheses are the consistent standard errors calculated using Heckman’s two-stage method. Large firms are defined as firms with number of employees equal or greater than 100, the small firms are those that employee less than 100. Location, Wave, Foreign ownership, and sector are used as control variables.

Table 11.19 repeats the same exercise for the investment rate. Here again the results confirm the earlier findings that credit constraint plays a major role in the firm’s decision to determine their amount of investment. Both the dummy variable for credit constraint and the cross dummy are significant with the expected signs. The reported coefficients in Table 11.19 indicate that the investment of the constrained firms is aided considerably by the internal profit and that if not for the effect of profit, the investment rate in the constrained firms would have been significantly below that of unconstrained firms. Furthermore, the results demonstrate that if evaluated at the mean values, around 18% of the profit is re-invested by the constrained firms. In summary, it appears that the credit constrained firms are not only less likely to invest but when they do, they significantly under-invest relative to other unconstrained firms. Furthermore, when the exercise is repeated for both sets of firms separately we found that while the profit rate is not significant for the unconstrained firms, it is positive and significant for financially constrained, hence reaffirming our conclusion.[38]

Conclusions

The first part of this chapter describes the pattern of investment in the seven RPED countries. Taking all firms together, and pooling the sample for all seven countries, 39% of the firms undertook some investment in the three years of the survey in the first half of the 1990s. But the rate of investment (as proportion of capital stock) was quite low, 5% of the total and 15% for the investing firms alone. Larger firms are more likely to invest, but for most countries the investment/capital ratio decreased by firm size.

The distribution of investment in the African firms surveyed is highly skewed. While the mean value of the investment rate is no doubt lower than that for advanced countries, when all firms both investing and not investing are taken into account, it is striking that the median is even so much lower than the mean. In the industrialized countries the median is quite close to the mean showing the more normal distribution of investment rates. Another important difference is the much higher profit rate observed in Africa (and the mean being so much higher than the median).

The skewed distribution in investment rates cannot be traced to the differences between small and large firms. The percentage of firms investing in the survey years does increase with firm size, but only in four of the seven countries, while the investment rate of the firms that do invest is *negatively* related to firm size. There is some evidence, however, to

[38] Table 11.19 is estimated with and without allowing for selectivity. The results do not differ materially and hence we have only reported those results that allow for selectivity.

support the theoretical expectation that investment in smaller firms would be more "spiked" contributing to the skewness of the distribution. Our judgment is that there are factors other than, or in addition to, firm size which contribute to the phenomenon that investment seems to be relatively concentrated in a limited sub-sample of the firms.

Another finding of interest is that the past debt to the formal financial system is negligible for a majority of firms. Taken in conjunction to the high rates of profits observed, the picture is one of a sector which is financially constrained for most and depend on internal finance for fixed investment. Our multivariate analysis did suggest that the probability of using external sources of finance does increase with firm size. But the distribution of the ratio of indebtedness to total capital (B/K) is strongly skewed, with the mean 0.12 and the median zero. The corresponding figures cited for the UK are 0.12 and 0.09.

Determinants of Investment and the Question of Credit Constraint

The later section of the chapter is devoted to an econometric analysis of the determinants of investment in sub-Saharan Africa, as revealed by the micro data gathered from manufacturing firms in the RPED survey. An important issue is the extent to which investment decisions are affected by credit constraints. The exercises are carried out within the framework of the "flexible accelerator" model. As formally worked out in the chapter, it is shown that under imperfect information, the model implies that investment will be a function of changes in value added (the capital adjustment stressed by the accelerator principle), profitability indicating both current and future market conditions, and liquidity constraints. Firm characteristics such as age, size, owner characteristics, location etc. could also be expected to influence the investment process.

There is an ambiguity about the interpretation of some of these variables when used as explanatory variables in the investment function. The most important one relates to the profit variable. The profit rate could proxy elements both on the demand side, predicting future market conditions, and on the supply side, easing credit constraints facing the firm. One way, to tackle this ambiguity is to explicitly introduce variables to indicate future demand conditions. This is the approach of Pattillo who used managers' responses from the Ghana survey to construct a probability distribution of expected demand. Thus the author was able to include variables to represent both the level of expected demand growth, and the degree of uncertainty surrounding it (the variance). These variables were significant in the models determining the decision to invest as well as the investment rate. But in spite of this, and notwithstanding a rather detailed modeling of the investment process to allow for both spikiness and irreversibility of investment as well as selectivity, the profit rate continued to be a significant determinant of investment. This strongly suggests that the rate of profit, providing opportunity for internal financing and hence easing the financial constraint, is critical in firm level investment.

A second approach to the problem is to divide the sample into sub-groups which are separated by independent variables signifying different degrees of financial constraint. One possible division of the sample is into small and large firms, following the plausible *a priori* expectation that smaller firms would be more credit constrained. The shortcoming of this approach is that the dividing line has to be set arbitrarily – which we do at 100 employees. Our results, from the pooled sample of six RPED countries show that the fit of the flexible accelerator model is much better for the smaller firms. The profit rate was found to be significant in the investment rate equation for both groups but it is more significant and has a much higher coefficient for the smaller firms. The debt ratio, however, is significant and positive for the large firms only. The results strongly suggest that while small firms primarily depend on their own profits for financing investment, the larger firms have access to the formal credit market.

A third approach in a study of Zimbabwe by Fafchamps and Oostendorp uses the response to questions on the existence of cash flow problems to distinguish between the credit constrained and other firms. Their results are as expected. The investment decision of firms which do not report cash-flow problems are unrelated to the profit rate, while the investment of the other group with cash flow problems is significantly and positively related to their profits, implying that the latter have to depend on internal sources of finance. There is, however, considerable ambiguity to the question on the cash flow problem in other RPED countries. In Ghana, Tanzania and Zambia three-quarter of the firms reported having such problems, and it is not clear if they are referring to short-term problems, or more persistent one.

In this chapter we have adopted a more objective way of distinguishing the credit constrained firms. We have used the criterion of the chapter on Finance in Part III. Using the responses to the finance part of the questionnaire, credit constraint is deemed to apply to two groups: (i) those who had applied for loans and had been rejected; and (ii) the discouraged borrower who had never applied, saying that they would not get a loan because of inadequate resources. In the case of missing values an alternative criterion was used selecting firms which identified "finance" as their major obstacle to growth. For the pooled sample the credit constrained firms, thus defined, accounted for 44% of the total. Models of both the decision to invest (a Probit model) and the investment rate were estimated for the two groups. The profit rate was a highly significant variable for the constrained firms in both models, but not for the unconstrained firms.

12 The Growth of Firms

The accumulation of physical and human capital, the efficiency of resource allocation, and the ability to acquire and implement the appropriate technology determine the rate of growth of an economy. Each of these factors depends heavily on the prevailing economic policies. Furthermore, the growth of enterprises in the private sector contributes to the process of job creation and the changing distribution of employment across sectors of economic activity. Hence, any change in policies such as the structural adjustment programs implemented in sub-Saharan countries not only determines the rate of growth and the sources of employment but also influences the quality of jobs created and ultimately the standards of living of the population This chapter discusses the pattern of growth revealed by the RPED surveys, and goes on to undertake an analysis of its determinants.

Several questions in the RPED surveys regarding firm growth enable us to carry out our analysis. Entrepreneurs and managers were asked about the year that the firm began operating, as well as about their initial employment and sales. Firms were also asked about their employment levels for the early and mid-1980s, which corresponds to the period during which several African countries had begun to implement major structural adjustment reforms. The data in the survey, particularly the recall data, are much more accurate for employment than sales for several reasons. Employment is not sensitive to inflation, which makes it easy to handle and much more reliable than the value based figures such as annual sales, that are inherently subject to many factors such as sector and firm specific price changes. Furthermore, employment is a primary target of many policy-making initiatives. Hence the analysis of firm growth is done using changes in employment as the dependent variable.

Many policy makers including the development agencies in particular have been interested in the growth of micro enterprises and have focused on the design of policies to increase the rate of growth of these enterprises. The success of these enterprises, however, depends primarily on the existing competitive landscape and the rate of entry into the market where the younger and more innovative firms find enough space to grow and prosper. Hence, in line with this concern the main question that we consider in this chapter is whether or not there is an "upper limit" on the growth of micro enterprises. In other words, are there barriers that prevent small firms from moving up the ranks? Furthermore, we look at patterns of growth through the period of structural adjustment in the 1980s, in order to address the question of whether firm growth in Africa is consistent with the predictions of standard models in the economics literature.

Growth of Firms: A Descriptive Analysis

In this section, we analyze in detail the descriptive statistics related to the firm's growth as provided by the historical data collected in the RPED surveys. Starting with statistics on annual growth rate as provided in Table 12.1, the overall average annual growth of employment for the firms surveyed in the RPED sample from the start to the present is 10.5%, with Ghana showing the highest growth rate of 15.3% per year. Cameroon has the lowest average annual growth rate at around 6.7%. It is interesting to note that this pattern does not change materially if one considers the sub-periods covering the structural adjustment programs implemented in 1980s; Ghana continues to grow the fastest, growth is slowest in Côte d'Ivoire and Zambia, while Cameroon suffers a net decline in manufacturing employment.

The overall growth rate, however, is very high and does not seem to be consistent with the prevailing macroeconomic environment (see Chapter 1 in particular). It is exaggerated when one considers the start-end horizon where the growth rates are calculated from the year of establishment to the present. The RPED surveys include many firms that have been established within the last 10–15 years. The inclusion of these firms in the calculation of the growth rates can cause significant upward bias as these firms can exhibit dramatic growth specially when starting from a very low base level. To this end, we have calculated the growth rate by age of the firms and summarized the results in Table 12.2. As expected, the younger and presumably smaller firms demonstrate a very high growth rate – those firms that are less than 5 years old have grown at an average of 26.9% annually, while the average growth rate of old firms – those in existence for more than 20 years – is only 4.4%. Furthermore, when one considers the most recent period since the early 1980s, the average growth rate of the old firms becomes almost negligible, in line with the macroeconomic picture provided in Chapter 1. However, whether the observed discrepancy in the growth rate between the old and the young firms, in particular in the post-1980s years, is a result of implementation of the structural adjustment programs or the difference in their size structure, is an open question that should be addressed later.

Table 12.1: Average Annual Growth Rate of Employment

	Start–End	*Early 1980s–End*	*End 1980s–End*
Cameroon	6.7	−3.1	−4.6
Côte d'Ivoire	13.7	0.7	3.7
Ghana	15.6	6.3	11.5
Kenya	8.7	2.6	2.5
Tanzania	9.8	2.6	3.8
Zambia	9.2	0.04	0.01
Zimbabwe	12.1	3.2	1.6
All Countries	10.5	1.5	2.4

Table 12.2: Growth Rates by Firm Age

	Start–End	*Early 1980s–End*
<5 years old	26.9%	N/A
5–0 years old	11.5%	.0%
11–20 years old	6.1%	3.9%
21+ years old	4.4%	−0.01%

The growth rates of firms by size groups are also demonstrated in Tables 12.3. As this table indicates, the results depend heavily on the definition of the size. Haltiwanger and Schuch (1998) have argued convincingly that the use of average size is the most appropriate when presenting growth statistics. The two other definitions – classifying firms by size at start, and classifying them by size at the end of the period, are biased. As Table 12.3 reveals, the observed growth from start to present is highest in the smallest size class, and tends to decrease as firm size increases, though not for all larger groups. This is particularly true when the initial size is used to categorize the firm, and the relatively high growth of the smallest size group persists when we change the classification to average size. However, when the final size is used no specific pattern could be found. Furthermore, when the post-1980 period is considered, there appears to be a negative relation between size and growth only when the initial size is used to classify the firm. In fact, in this case when the final size is used, Table 12.3 indicates that the larger firms exhibit stronger growth. This result, however, should not come as a surprise since those firms that were classified as micro firms (less than 10 employees) at the end of the sample should have shrunk over the years or were too young to show any growth. This argument indeed is part of the reason why the current size should not be used to classify the firms.

The overall negative relation between size and growth rate, although true in most cases, does not apply to every country. In fact, Bigsten *et al.* (1994) found evidence for an inverted U-pattern where the growth is highest in the intermediate size classes. In particular, they found an employment decline of about 1.4% per year for the smallest firms which is significantly less than the average growth of 1.11% for the 1981–92 sub period. However, the common finding of an inverse relation between size and growth is confirmed overall and for most of the countries. Hence, the descriptive statistics as it stands is in violation of the Gibrat's Law of random growth behavior. A more formal look at the implications of Gibrat's law will be presented later in the analytical section.

Table 12.3: Growth Rate of Firms Classified by Size Groups

	Start–End			*Early 1980s to Present*		
	Size at Start	*Average Size*	*Current Size*	*Size in beg.80s*	*Average Size*	*Current Size*
<10 Employees	17.8	16.2	9.5	5.4	1.9	−2.1
10–49 Employees	5.1	7.7	11.5	3.1	2.1	2.3
50–99 Employees	1.4	7.9	10.5	−0.1	2.9	2.9
100+ Employees	1.6	7.4	9.9	−1.1	1.3	3.5

Table 12.4: Average Annual Growth Rate by Sector

	Start–End	*Early 1980s–End*	*End 1980s–End*
Food	5.6	2.0	0.8
Textile	11.8	0.7	1.1
Woods	11.5	2.3	4.2
Metal	12.7	2.7	3.3

Table 12.4 shows the growth rate of firms by sector. Metal working firms exhibit the highest rate of growth overall, with an average growth rate of 12.7%, closely followed by the garments (11.8%) and wood sector (11.5%). It is apparent that at this level of aggregation the growth rate of firms in term of employment fell in every sector in the post-1980 period.

The data on growth rates by type of firm ownership (Table 12.5) demonstrate that the fully foreign owned firms grew faster than partially or fully locally owned firms. However, there is not much dispersion in the growth rates of the three groups in all time periods. Furthermore, entrepreneurial firms grew faster than non-entrepreneurial firms when the post-1980 periods are considered; the difference is particularly striking for the late 1980s to early 1990s period when these two type of firms appear to be heading into opposite directions, with the entrepreneurial firms showing accelerated rate of growth. In general, the impact of size might be responsible for a lot of observed sectoral differences and other differences. For instance, some of the difference between the entrepreneurial and non-entrepreneurial firms might be attributed to the fact that the entrepreneurial firms are on average smaller in size and that the structural adjustment has encouraged the entry and growth of small local entrepreneurs.

Table 12.5: **Average Annual Growth Rate by Ownership**

	Start–End	*Early 1980s–End*	*End 1980s–End*
Local	10.3	2.2	3.0
Partially Foreign	9.7	2.2	−2.6
Fully Foreign	12.9	1.5	3.2
Entrepreneurial	7.3	2.8	3.7
Non-Entrepreneurial	11.4	0.0	−0.9

Mobility of Firms

Whether firms can survive the difficulties of the early stages of their development and thrive into being an established firm in the developing countries has always been an interest. The data provided by RPED surveys does not allow for this type of analysis as it only includes the existing firms and hence suffers from the survivorship bias, commonly observed in many studies. However, these surveys allow us to study a firm's ability to move within different size groups which can shed some light on degree of success that the survived firms have had in penetrating their respective markets. For this, we have calculated the initial size distribution (at the start, the beginning of the 1980s, and the end of the 1980s) and the size distribution of the observed firms at the time of the survey, and summarized the results in Table 12.6.

Table 12.6: Mobility of Firms across Size Classes

	Size at Start			
Current Size	*<10*	*10–49*	*50–99*	*100+*
	Start to End			
1: <10	53.7	8.3	..	1.2
2: 10–49	32.9	49.9	29.0	7.0
3: 50–99	8.6	19.6	27.0	8.1
4: 100+	4.8	22.3	44.0	83.7
	Early 1980s to End of Sampling Period			
1: <10	69.2	9.6	2.3	0.0
2: 10–49	29.2	59.1	30.2	4.0
3: 50–99	0.77	21.7	37.2	14.0
4: 100+	0.77	9.6	30.2	82.0
	End 1980s to End of Sampling Period			
1: <10	74.5	10.5	1.0	0.5
2: 10–49	25.0	68.9	25.5	3.2
3: 50–99	0.53	18.0	51.9	10.5
4: 100+	..	2.6	21.7	85.8

As Table 12.6 reveals, when the whole period is considered, firms in the smallest size class (1–9 employees) demonstrates little mobility across different size classes. More than half the firms that were in size class 1 at the beginning of their operation remained in this class at the time of survey. Considering the fact that the average establishment period is between 12–14 years, this result indicates that most of the firms have not been able to move to higher class within that time period. Furthermore, about 33% of the firms have moved into the next size class (10–49) but only around 13% had managed to move to class 3 or class 4 and to have more than 50 employees. Combining the results of Table 12.3 where we found double-digit growth for the micro firms, with the results obtained here we find that more than half of the micro firms have not been able to show meaningful growth, one can see how uneven growth has been for these firms; with more than half of the micro firms not being able to penetrate higher size classes, the other half on average must have grown dramatically to account for the high rate of growth demonstrated in Table 12.6.

Table 12.6 also shows that only a few firms in size class 2 had decreased in size but in general this size class exhibits greater mobility with more than 22% of firms moving into the largest size class. There is also some mobility for firms in size class 3. At the time of survey, 44% of these firms had moved into size class 4, while about 29% had shrunk into size class 2. In contrast, the large size class appears to be more stable with only 16% moving to smaller size classes and the vast majority i.e. 83.7% remained in the largest size class. This, however, should not be considered as strong evidence against the mobility of larger firms as the large size class covers a very wide range of firms and the figures in Table 12.6 do not reveal the mobility within that size class. Table 12.6 also shows the mobility during two sub-periods that cover the periods of structural adjustment undertaken in the 1980s. The patterns are not significantly different from that described for the entire sample, indicating that structural adjustment programs have contributed little to increased firm mobility.

Several conclusions can be drawn from these tables. It should be, first, noted that some micro enterprises operating in the manufacturing sector of African economies do "graduate" into larger size classes. Over the economic life of the surveyed firms (which ranged from as much as 25 years to just a few months), about half of the firms which started as micro enterprises managed to grow out of the micro enterprise size class. This is a higher percentage than found in several previous surveys – for example, an earlier survey found that only about 20% of micro enterprises ever "graduate" (Liedholm and Mead, 1992). However, the graduation rate of micro enterprises is highly sensitive to several factors – the number of very small household producers in the sample, the sector from which the sample is selected, the length of the growth period selected for examination, and the range of the size class defined as micro enterprises.

In the other surveys like the one cited above, the enterprise sample includes many household "firms" with only one "employee" and includes firms outside the manufacturing sector. It is evident that a sample weighted heavily with household firms at the bottom of the range for a size class will have lower rates of graduation. Moreover, very small enterprises in the service sector, which might include street hawkers, one-person repair businesses and the like, have lower probability of growing than more highly skilled small manufacturers. The RPED sample, by contrast, does not include household producers and is limited to manufacturing firms with three or more employees. Besides, the RPED surveys include only the existing firms and hence do not by any means provide implications as to how the actual graduation rate may look like as many of micro firms have disappeared over the sample period.

The RPED data also show that almost no micro enterprises "graduate" to become medium and large enterprises. The probability of a micro enterprise ever growing up to the 100+ employee size class is typically less than 5%. It is even lower for the smallest spectrum of the size distribution, i.e., firms with less than 5 employees. Furthermore, only a negligible number of the current large firms in all of the countries surveyed in the RPED sample started up in the 1–4 employees segment of the micro enterprise size class, and only a few more grew up from very small beginnings in the 5–9 employee micro size class. This phenomenon has also been observed in other individual studies. In fact, Sleuwaegen and Goedhuys (1997) argue that "Despite the dynamism of micro-enterprises and small firms to survive and to operate in a very competitive environment, they have not sufficiently evolved into more productive formal activity firms and have seldom graduated into larger-scale operations."

The issue of employment growth and patterns of transition have also been addressed in a more detailed analysis by Van Biesebroeck (2001) who uses a sample of nine sub-Saharan countries that also includes Ethiopia and Burundi from the entry to the end of the sample period and finds that most firms start out small. According to him, micro and small firms make up 90% of entrants, but only 75% of firms at the end of the sample period. A third of the micro enterprises crossed the threshold of 10 employees and a tenth employed over 50 workers at the end of the period. He also finds that small firms are twice as likely to become medium or large than they are to drop below 10 employees whereas growth is diminished for medium firms which are as likely to move up as down, but none of the large firms dropped a size category. In order to explain the slow rate of graduation, Van Biesebroeck also shows that it takes a long time to grow, which is illustrated by the average age of firms in different size class. Micro firms in 1995 were on average 10 years old, large firms 20 years old, and small and median firms are in between. Furthermore, the recent past illustrates that almost every country in the sample experienced a major economic decline in the last 15 years and that smaller firms suffer most during these declines. Both facts combined with the slow transition rates, make it unlikely that the smallest firms make it to the next class before a recession wipes them out. As argued earlier the entire data is conditional on survival until the first interview year. This entails a serious selection bias, given the high mortality rate for small entrants. Only a fraction of the entrants will be included in the table and they are likely to be larger than the unconditional average.

To compare transition rates with results for the US, Van Biesebroeck details his analysis of transition further and focuses on time periods of approximately equal length. In each country four approximately equally spaced years were chosen. The average number of years between period 1 and 2 is 4.9, between period 2 and 3 it is 4.2, and between period 3 and 4 it is 3.1. Table 12.7 contains the transition probabilities between size classes for all possible period combinations. Here, micro firms make up 60% of entrants or, 40% of firms on average. They only make up 32% of firms that survive at least one period and 28% of firms surviving several periods. The counterpart is the higher proportion of large firms, conditional on survival for more periods. The bottom row reveals that large firms make up almost 20% of firms that survived at least three periods, and 12% of firms surviving at least one period.

Moving up a size class becomes less likely in later periods. Summing the upper-right off-diagonal percentages reveals that for the 1–2 transition 14.9% of firms moved up and this percentage declines to 12.7% for the 3–4 transition. The two period transitions show an even larger decline from 22.9% (1–3) to 16.1% for the 2–4 transition. Downshifts have the reverse pattern, becoming more likely in more recent years. They increase from 4.5% to 10.6% in one period transitions and from 11.5% to 12.8% in two period transitions. As a result, the "Total" column becomes gradually more weighted towards smaller firms moving from left to right.

Using Table 12.7, Van Biesebroeck shows that as one might expect, more firms change size class if transition spells are longer, but the difference between the 1–3 and 1–4 transitions is only marginal. Another way of measuring (im)mobility is by summing the probabilities on the diagonal in each box. For the one period transitions, between 76% and 80% of firms do not move. Over two periods between 66% and 71% of firms stay put and it declines to only 62% of firms over three period transitions. In the latter case, moving up is much more likely (23.1%) than moving down (14.9%), but this is partially the result of the larger group of firms that are able to move up (micro, small and medium). Only considering potential movers the probability becomes 27.8% for up-shifts versus 20.7% for down-shifts. In the most recent transition, on the other hand, 15.4% of the firms that could move down did so, versus only 14.4% moving up. Given the importance of large enterprises, one of the most important patterns is how many of the medium firms graduate to the large size class. Towards the end of the sample period – transitions 3–4, 2–3 and 2–4 – medium firms are twice as likely to become small than to become large. Over the first one period transition (1–2), 14.0% of the medium firms show transition to large but it decreases to 9.9% and 7.7% in later periods. Over two periods, these crucial transitions slump from 15.8% of the medium firms (in 1–3) to only 10.7% (in 2–4).

Table 12.7: Transition between Size Classes (Percentages)

	Period 2																
Period 1	***1***	***2***	***3***	***4***	***Total***												
1	21.9	6.4	0.6		28.9		***1= Micro (#10 employee)***										
2	1.2	24.8	4.5		30.6		***2= Small (11–50 employee)***										
3	0.2	1.4	19.4	3.4	24.4		***3= Medium (51–250 employee)***										
4			1.7	14.4	16.1		***4= Large (> 250 employee)***										
Total	23.7	32.6	26.2	17.9	(644)												
	Period 3						***Period 3***										
Period 1	***1***	***2***	***3***	***4***	***Total***	***Period 2***	***1***	***2***	***3***	***4***	***Total***						
1	14.0	9.2	1.2		24.3	***1***	18.2	6.8	0.5		25.5						
2	3.1	18.1	7.5	0.7	29.4	***2***	2.2	23.4	5.5	0.2	31.4						
3	0.7	4.1	18.1	4.3	27.2	***3***	0.3	4.2	21.0	2.8	28.3						
4		0.5	3.1	15.4	19.0	***4***			1.2	13.7	14.9						
Total	17.8	31.8	29.9	20.5	(415)	***Total***	20.7	34.5	28.3	16.6	(644)						
	Period 4						***Period 4***						***Period 4***				
Period 1	***1***	***2***	***3***	***4***	***Total***	***Period 2***	***1***	***2***	***3***	***4***	***Total***	***Period 3***	***1***	***2***	***3***	***4***	***Total***
1	16.9	9.9	1.3		28.1	***1***	20.1	7.4	0.6		28.1	***1***	24.8	6.6	0.2		31.7
2	4.9	17.4	6.0	0.6	28.9	***2***	4.4	21.1	5.4	0.1	30.9	***2***	5.0	25.3	4.1		34.4
3	1.1	5.1	14.6	5.3	26.1	***3***	0.6	5.1	16.6	2.7	25.1	***3***	0.2	3.7	16.5	1.7	22.1
4		0.2	3.6	13.1	16.9	***4***			2.7	13.2	16.0	***4***			1.7	10.1	11.8
Total	22.9	32.6	25.5	18.9	(533)	***Total***	25.1	33.5	25.3	16.1	(802)	***Total***	30.0	35.8	22.5	11.8	(908)

Source: Van Biesebroeck (2001).

Note: Each box contains the transition frequencies between two different periods. The total number of firms included is at the right bottom.

Some of the micro and small firms that were active in the first period became medium or small firms, but few of the micro and small firms active in the second period performed the same feat. In the last transition almost none of the micro firms became medium and none of the small ones became large. Dividing each diagonal element with the corresponding row total shows that over one year transitions about 76% of the micro, small or medium enterprises remain in the same class over a single period transition. For large enterprises this number climbs to almost 90%. The difference increases to 20% (58% versus 78%) for the three period transition. The class of large enterprises is very hard to get into and it is becoming harder.

Impact of Firm Turnover on Employment Growth During Structural Adjustment Periods

Theoretically, shifts in employment from one firm to another constitute the major portion of overall turnover in an industry, leading to changing market shares. Turnover is also affected, but only at the margin, by the overall entry and exit of firms. In this section we examine patterns of employment shifts during the post-1980 period for those firms that existed before this period.

The post-1980 period is selected because many African economies, faced with deteriorating growth rates, embarked on structural adjustment programs in the 1980s with emphasis on trade liberalization, deregulation and privatization. There is, however, an ongoing controversy on whether these programs have in fact had the beneficial effects on the employment in the manufacturing sector as the policy makers had hoped for. In this section we attempt to shed light on this issue using the RPED surveys.

Table 12.8 demonstrates the net employment changes of the RPED sample firms during the period 1982–92. As Table 12.8 reveals, the overall net employment growth of continuing firms was only 1.9% during the entire period. This statistic, however, masks the differences between the expanding and contracting sectors. Dividing firms into two groups based on whether they increased or decreased their employment level during these years, we see that for the expanding firms, the overall growth rate was 8.2%, while the average contraction rate was 5.6% for the declining sector. We conclude that while some firms rapidly grew during this period others contracted although at a slower rate; hence the overall employment growth remained positive. It is also interesting to note that the mean size of expanding firms was 104 employees, while that of the contracting firms was 381 employees. This indicates some regression to the mean size where the larger firms contract and the smaller firms expand.

Table 12.8: Employment Changes during Structural Adjustment, 1982–92

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*All*
Average Net Growth	−3.0	0.7	6.3	2.7	2.6	0.0	3.2	1.9
Growth –Expanding	8.7	8.6	13.3	6.9	9.2	6.4	6.1	8.2
Decline –Contracting	7.0	6.5	4.5	4.8	5.7	6.7	2.9	5.6
Average Size –Expanding	49	90	37	87	63	75	251	104
Average Size –Contracting	799	914	69	41	128	189	360	381
Percentage –Expanding	25	48.1	60.9	63.8	56.1	51.3	67.8	54.8

Examining differences across countries, as presented in Table 12.8, we conclude that the net growth rates are highest in Ghana, followed by Zimbabwe, Kenya, and Tanzania.[39] Total manufacturing employment declined in Cameroon during the structural adjustment period, while there was no net gain or loss in Zambia and only minimal gain in Côte d'Ivoire. In all countries, we see the "regression to the mean" effect with small firms expanding, and large firms contracting. In all Anglophone countries, we also observe that the percentage of firms with declining employment is less than the percentage that have added employees over this period, indicating that structural adjustment has perhaps been beneficial to firm growth for these countries. In brief, at least when examining existing firms, we do not see any clear evidence of "de-industrialization."

Similarly, when examining differences across sectors as reported in Table 12.9, we find that the metal working and wood and furniture sectors have exhibited positive net employment growth during the period of structural adjustment, and textile and garments has had the slowest growth. However, these differences do not appear to be significant. Furthermore, when examining expanding and contracting sectors separately, we find that the wood sector has the highest growth rate and the highest rate of decline, indicating a lot of churning mobility in this sector. The size of contracting firms is again larger than the size of expanding firms, indicating a

[39] The numbers for Ghana are driven by a couple of firms expanding rapidly during the period being considered in this analysis.

regression to the mean. The textile sector has the smallest percentage of firms in the expanding sector – only 47.4% – compared to 60.5% in metal, 57.2% in food and 54.5% in wood and furniture. These percentages reveal that the structural adjustment programs might be having their desired impact, with the expansion in the exportable sector i.e. woods and furniture and decline in the import substitution sectors namely textiles and garments. Overall, there is some evidence that the structural adjustment programs have caused the rapid growth of some firms, and the slow decline of others. These changes are occurring in the right direction, with resources flowing into the exportable sector, and away from import substitution sectors.

Table 12.9: Employment Changes During Structural Adjustment by Sector

	Food	*Textile*	*Wood*	*Metal*
Average Net Growth	2.0	0.7	2.3	2.7
Growth of Expanding Firms	7.1	7.5	9.6	8.4
Decline of Contracting Firms	4.8	5.4	6.4	6.1
Average Size of Expanding Firms	99	209	63	64
Average size of Contracting Firms	991	299	112	176
Percentage of Firms Expanding	57.2	47.4	54.5	60.5

The Drivers of Job Creation

What types of firms create the most jobs in the economy? This has been an important question for policy makers seeking employment generation. It is also a controversial issue empirically. Much has been written in developed countries about small enterprises being the "engine of job creation." Some studies analyze employment growth across enterprises of various sizes in developed countries during the 1970s and 1980s, and found that job growth had been disproportionately concentrated in small firms. (Birch, 1987; Brown, Hamilton and Medoff, 1990). Although the results of these studies were vigorously disputed, they inspired a folk wisdom that small enterprises are the only vibrant part of the economy.

In addition, for those interested in promoting public policies in favor of job creation, these results served to support arguments for employment policies aimed at small firms. In Africa, as in other developing areas, larger firms in the private manufacturing sector of the economy have been criticized for not creating enough jobs, while micro and small firms have been held up as paragons of employment generation. Is this, in fact, the case?

To examine sources of employment growth at the firm level, we need a methodology to track job creation within firm size cohorts and between size cohorts as firms add employees and "graduate." In order to make the analysis tractable, we break the calculations into two components. First, we look at employment growth within older firms, large and small, which have been in existence prior to and throughout the different policy reform periods in each of the countries. Second, we assess the increase in employment caused by entry of new firms created during the policy reform period. Two measures of growth are examined: (a) percentage employment growth within size class; and (b) percentage of overall employment growth contributed by each size class.

Table 12.10: Employment Changes during the Entire Structural Adjustment Period (Old Firms)

	Total	*Micro*	*Small*	*Medium*	*Large*
Cameroon	−10341	−14/68	17/463	−283/787	−10061/37834
Côte d'Ivoire	−21984	1/54	71/760	424/418	−22680/40642
Ghana	1096	66/69	69/603	348/355	613/2110
Kenya	5181	−2/102	423/996	394/1565	4366/5483
Tanzania	1298	57/165	118/1149	272/766	851/8390
Zambia	−1169	−4/67	124/907	117/675	−1406/8275
Zimbabwe	9487	9/58	79/269	318/1042	9081/24409

Note: Overall, Net employment change/total initial employment WITHIN size class.

Table 12.10 examines employment growth within each size class for older firms. Growth rates can be calculated by examining the net job creation within each size class, divided by the total initial jobs within that size category. Size is defined using the average employment between early 1980s and present. For example, in Ghana, the micro category in 1983 employed 69 workers. These firms added a net of 66 jobs between 1983 and 1991, hence the growth rate of micro enterprises was 66/69 = 95.6% cumulative, over this period. Since interest attaches to the absolute number of job creation (destruction) the table presents the numbers of net employment change and of initial employment within each cell. These calculations show that micro firms have the fastest growth rate in several countries, while large firms grow slowest. In Cameroon and Côte d'Ivoire, the largest size has downsized significantly during the structural adjustment period. However, these growth rates can be misleading for two reasons. First, while growth rates of micro and small firm employment are high, one must keep in mind that part of the reason for this is the low base from which these growth rates are calculated. Second, a largely ignored fact in most studies of employment creation is that, while small enterprises created a lot of jobs, they were also responsible for most of the jobs lost. There is always a good deal of turbulence in employment in the lower tail of the enterprise size distribution.

A quick look at the share of each size class in total jobs created during the policy reform period as given in Table 12.11 reveals that the large firms emerge as the dominant source of job creation in manufacturing in all the countries where there has been net job addition. It is also interesting to note that these large firms are the primary source of job loss in both Francophone countries and in Zambia where there has been net employment loss. More specifically, as Table 12.10 demonstrates, of 9,487 total jobs created by the older firms during the period 1982–92 in Zimbabwe, micro firms contributed only 9, hence the share of overall manufacturing growth for micro firms was 9/9487, close to 0%. Overall, large enterprises outpaced the combined contribution of smaller rivals in almost every country. Large firms contributed 56% of overall job creation for older firms in Ghana, 84% in Kenya, 96% in Zimbabwe, and 66% in Tanzania.

Table 12.11: Employment Changes during Structural Adjustment – Share of Overall Manufacturing Employment Increase

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
<10	0.0	0.0	6.02	0.00	4.39	0.0	0.00
10–49	0.0	0.3	6.29	8.16	9.09	10.6	0.01
50–99	−2.7	1.9	31.75	7.60	20.95	10.0	3.35
100+	−97.3	−102.2	55.93	84.27	65.56	−120.3	95.72

Note: All values are in percentages.

Turning to new entrants, it is interesting to note that while micro firms contribute significantly to the of job creation of this sub-group, other size groups also contribute to the job creation process. In fact, it can be argued that the large entrants still dominate this process in many countries. For instance, as Table 12.12 demonstrates, in Ghana of the total 723 jobs created by new firms, micro entrants created 107 jobs and small firms added 69 jobs during this period. However, two large private firms, one via a joint venture, also started during this period, creating 180 jobs at start and adding another 400 jobs over the period during policy reforms. This shows that while there may be a large number of new entrants in the small firm sector, a single large firm entering the market can create many more jobs than the total of all small firms combined.

The dominance of large firms in total employment growth is, however, not by any means universal. As far as old firms are concerned, while the larger proportion of job growth was accounted for by large firms, small-medium firms in Côte d'Ivoire and Zambia mitigated the negative effect by registering job gains. For new entrants small–medium firms had a larger contribution to employment growth in four of the seven countries – Cameroon, Côte d'Ivoire, Zambia and Zimbabwe.

Table 12.12: Employment Changes during Structural Adjustment (New Entrants)

	Total	*Micro*	*Small*	*Medium*	*Large*
Cameroon	443	80/96	29/1058	139/377	5/966
Côte d'Ivoire	402	79/99	256/399	21/238	46/107
Ghana	723	107/54	69/86	147/136	400/180
Kenya	1999	52/74	246/135	217/87	1484/705
Tanzania	876	76/95	17/229	119/147	664/1210
Zambia	969	117/111	397/255	−31/101	486/1067
Zimbabwe	889	59/50	301/208	438/48	86/488

Note: Overall, Net employment change/total initial employment WITHIN size class.

Econometric Analysis of Firm Growth

Theories of Firm Growth: What Determines Employment Growth?

Neoclassical theories of economic growth postulate that the size of a firm is decided by the same factors that affect firms' long term average cost. Profit-maximizing firms will decide their optimal size in their constant search for the minimum of the average cost curve, a U-shape curve where there is a unique optimum production point or an L shape curve where production is optimized above a specific level. Those factors that affect the cost of production will ultimately affect the size of the firms. Such factors primarily include those that impact the cost of capital adjustment. Technology advances facilitate the adjustment of capital over time and allows for the viability of smaller firms. However, many other factors may also affect the cost of capital adjustment and hence alter firm's growth path. Government regulations on capital are often of critical importance.

These factors include restrictions on import of machinery, restrictions on export, etc. Furthermore, firms' access to credits can also affect their investment decisions and hence affect their growth pattern.

The empirical models of firm growth, however, start with the Gibrat's Law of proportionate effect. According to these models, the growth patterns are considered stochastic where firms grow each year following a random drawing from a distribution of growth rates where "Lucky" firms are those firms that repeatedly draw high rates of growth over time. As a result, the expected value of the increment of a firm's size in each period is proportional to the current size of the firm and hence the growth of firm is not correlated with its size (Hart and Prais, 1956; Simon and Bonini, 1958; Haymer and Pashingan, 1962). In spite of the earlier success of these models, more recent empirical evidence for developed countries consistently indicates that firm growth is not a stochastic process and hence rejects Gibrat's Law (Mansfield, 1962; 1975, Hall, 1987).

In the light of the increasing evidence against the models based on Gibrat's law, more recent studies have resorted to a new set of models that are often referred to in the literature as "learning models" which describe a correlation between firm growth and firm efficiency. These models rely on the theory of "noisy" selection where managerial efficiency and learning by doing are the primary drivers of growth. Early versions of these learning models incorporate fixed or innate managerial capacity (Jovanovic, 1982), while subsequent theoretical models allow for human capital formation to impact managerial efficiency and hence firm growth (Pakes and Ericson, 1989). Thus, managers can enhance their abilities and the level of efficiency of the firm through various learning mechanisms such as formal and informal education and training. The learning models demonstrate that firm growth is higher for efficient firms which expand when managers' guesses about efficiency have understated their true efficiency. Hence, while efficient firms grow and survive the inefficient firms decline and fail. Therefore, as long as smaller and younger firms are more likely to find ways to enhance their efficiency, firm growth will be related to their size, their age, and their production efficiency.

In brief, in contrast to stochastic models, the learning models predict that firm age and firm size are both negatively correlated with firm growth. This is because as a firm ages, the predictions of the manager regarding firm performance become more accurate and consequently, the firm expands at a slower rate. After controlling for age, larger firms grow more slowly because they are already at a higher level of efficiency and consequently do not have the scope for large increases in efficiency (Evans and Leighton, 1989; Bates, 1990; McPherson, 1996; Sutton, 1997).

Following on previous firm growth studies that describe learning models of growth (Evans, 1987; Variyam and Kraybill, 1992; Hall, 1987), we use the functional form described below:

$$S_{t'} = \left[G(S_t, A_t)\right]^{\tau}(S_t)e^{u_t} \tag{1}$$

where $S_{t'}$ and S_t represents the firm's final and initial size respectively, τ denotes the time interval, *G* represents the growth function, A represents firm age, and *u* is the lognormally distributed error term. Taking logs, we obtain the following:

$$\frac{\ln(S_{t'}) - \ln(S_t)}{\tau} = \ln(G) + u_t \tag{2}$$

A first order expansion of the growth function after including a vector of entrepreneurial and firm characteristics as growth shift parameters, yields the final econometric specification to be tested, as follows:

$$Y_i = \frac{\log(S_{t'}) - \log(S_t)}{\tau} = \beta_0 + \beta_1 \log(S_t) + \beta_2 \log(A_t) + \sum_{i=3}^{n} \beta_i X_i + u_t \tag{3}$$

The empirical evidence suggests that other factors besides size and age also affect the growth. These factors include ownership structure (Variyam Krybill, 1992), research and development (Hall, 1987) capital structure (Lan, Ofek, and Stulz, 1996), human capital and exports (Liu, Tsou and Hammitt, 1999). Therefore, we can enhance the model by including several characteristics of entrepreneurs including ethnicity and other firm specific characteristics to test the importance of these variables in determining firm growth. The learning mechanisms that we control for include previous experience of the entrepreneur, whether the entrepreneur has a secondary education, whether the entrepreneur has a university degree, and whether the entrepreneur has had technical training.

The first set of regressions are run with the pooled sample, with dummies for whether entrepreneurs are European or Asian. We then disaggregate the sample into indigenous African firms and non-African firms in order to test for differences in the determinants of firm growth across these two types of firms. We also examine, in a separate regression, the determinants of initial firm size, to determine whether differences exist across ethnic groups. In these regressions, a measure of assets owned by the entrepreneur is also included, to test the hypothesis if wealthier entrepreneurs start bigger firms. A detailed analysis follows in the next sub-section.

Econometric Models and Empirical Results

Several econometric models of firm growth are tested with the RPED data in this analysis. The first model is a straightforward econometric test of Gibrat's Law. Firm growth is measured as a logarithmic function of change in employment. Firm growth is regressed upon age and initial firm size (as measured by the number of workers employed), along with sector and country dummies, in order to test the hypothesis that the rate of firm growth is independent of size and age. The second set of model tests the "learning mechanism" hypotheses suggested by the Jovanovic and Pakes-Ericson models. Thus, the following variables are included whether or not the manager or entrepreneur has a secondary education, whether or not he/she has a university degree, and whether or not he/she has had some technical training. By including these variables, we test the hypothesis that access to education results in better management skills which in turn leads to higher firm growth. We also look at whether firms grow faster if they have new equipment or foreign equipment at the start of production. The importance of access to finance in the initial stages of production is tested by looking at whether or not the firm started operations with a bank loan or an informal sector loan. Finally, the model controls for the effects of age and initial firm size, as well as for country and sector differences.

The third econometric model looks at the effect of structural adjustment on the rate of firm growth. Recall data from the early 1980s and the late 1980s are used to measure the rate of firm growth between each of these periods and the period of the survey (1991–92). This econometric model includes initial size and age, sector and country dummies, education variables and two measures of openness to the outside world – whether a firm exports more than 10% of its production and whether it imports more than 10% of its inputs. These measures are included to see whether exposure to international markets – a key feature of the structural adjustment plans – has resulted in higher rates of firm growth. Finally, models are estimated that test whether ethnicity of the entrepreneur significantly determines firm growth and whether foreign-owned firms grow faster than local firms.

Table 12.13: Test of Gibrat's Law; the Size Effect

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*	*All*
Intercept	0.23*	0.38*	0.54*	0.28*	0.32*	0.41*	0.43*	0.33*
	(0.03)	(0.04)	(0.05)	(0.03)	(0.03)	(0.04)	(0.45)	(0.017)
Log (Initial Size)	−0.04*	−0.03*	−0.04*	0.01*	−0.01*	−0.03*	−0.03*	−0.025*
	(0.01)	(0.009)	(0.01)	(0.006)	(0.006)	(0.007)	(0.008)	(0.003)
Log (Firm Age)	−0.03*	−0.07*	−0.14*	−0.06*	−0.10*	−0.10*	−0.08*	−0.08*
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.013)	(0.01)	(0.005)
Food	−0.004	−0.09*	0.08**	0.009	0.01	−0.009	−0.02	−0.02**
	(0.03)	(0.04)	(0.04)	(0.024)	(0.03)	(0.03)	(0.04)	(0.012)
Textile	0.01	−0.01	0.08	0.008	0.01	−0.009	−0.001	0.006
	(0.03)	(0.04)	(0.05)	(0.025)	(0.03)	(0.03)	(0.03)	(0.012)
Wood	0.007	−0.06**	0.04	0.012	−0.001	−0.02	−0.05	−0.003
	(0.03)	(0.036)	(0.04)	(0.025)	(0.02)	(0.03)	(0.04)	(0.012)
Ghana								0.057*
								(0.017)
Kenya								0.031*
								(0.015)
Zimbabwe								0.071*
								(0.016)
Zambia								0.023
								(0.015)
Cameroon								−0.02
								(0.016)
Côte d'Ivoire								0.024
								(0.016)
N	143	119	106	180	174	155	146	1029
Adj. Rsq	.18	.34	.49	.20	.31	.38	.31	0.31
F	7.47	13.36	21.50	10.14	16.36	19.62	14.10	42.64

Table 12.13 rejects Gibrat's Law as size is a significant determinant of growth while the negative relationship between age and growth is consistent with Johanovic's model. This has also been reported by others including several that have used RPED surveys. Sleuwaegen and Goedhuys (1997) found a significant and negative relationship between size–age and growth in Côte d'Ivoire. Their results are robust and hold over different

periods and samples of firms for which growth is measured. The results are also robust to the definition of growth as both sales and employment growth are used to measure firm growth and in both cases the size effect was found to be significantly negative. The authors conclude that "the observed negative relationship between a firm's growth and its age and size is consistent with efficiency maximization through learning which affects diminish as the firm expands." They also found that those firms that start at a large scale appear to benefit from a different regime with a stronger growth performance as they grow older, suggesting that other mechanisms are at work. They conclude that "the difference in regime is consistent with mechanisms of diffuse competition and legitimization, dynamic process emphasized in organizational ecology models." Risseeuw (2000) also found a negative and significant relation between firm growth and firm size for Zimbabwe and hence rejects Gibrat's Law.

Table 12.14 summarizes the results for the general model of firm growth, for the full sample of firms. Here, three measures of "learning mechanisms" are included to test the Pakes–Ericson–Jovanovic hypotheses regarding the effect of learning on firm growth. The managerial human capital is measured by the level of education of the manager. The dummies measuring secondary and university education are set to 1 if the manager or entrepreneur has completed secondary school or a university degree. The technical education dummy is set to 1 if the manager or entrepreneur has received any technical training. The results reported in Table 12.14 reveal that all these three measures of learning are significant at the 1% level of indicating that formal education and technical training are significantly and positively correlated with the rate of firm growth. In line with the predictions of the learning models, better educated managers and entrepreneurs are presumably able to manage workers better, keep accounts and other financial transactions in order, and consequently expand at a faster rate than their less educated counterparts.

The model in Table 12.14 also controls for whether initial equipment used by the firm was new and/or imported, and whether the firm began operations with a loan either from formal or informal sources. The inclusion of the new/imported equipment dummies in the model is an attempt to identify the effect of the possible restrictions on quality and quantity of capital accumulation. The use of imported equipment was found to be significant at the 5% level of confidence whereas the use of new equipment does not appear to impact the growth. This emphasizes the impact of quality of capital on firm growth where access to imported equipment allows firms to gain competitive advantage and hence facilitate their growth process.

Table 12.14: The Determinants of Growth

	Full Sample	*Entrepreneur Firms*
Intercept	0.27* (0.01)	0.30* (0.02)
Log (Initial Size)	−0.03* (0.003)	−0.05* (0.004)
Log (Firm Age)	−0.08* (0.005)	−0.10* (0.006)
Food	−0.022 (0.012)	−0.02 (0.02)
Textile	0.012 (0.012)	0.02 (0.014)
Wood	0.006 (0.011)	0.02 (0.014)
Ghana	0.06* (0.02)	0.75* (0.02)
Kenya	0.03* (0.014)	0.036** (0.02)
Zimbabwe	0.07* (0.02)	0.08* (0.02)
Zambia	0.012 (0.02)	0.02 (0.02)
Cameroon	−0.02 (0.02)	−0.03** (0.019)
Côte d'Ivoire	0.04* (0.016)	0.04** (0.02)
Corporation	0.05* (0.01)	0.06* (0.012)
Secondary	0.05* (0.01)	0.061* (0.013)
University	0.05* (0.013)	0.06* (0.02)
Technical Training	0.04* (0.013)	0.049* (0.017)
New Equipment	0.01 (0.01)	0.011 (0.01)
Foreign Equipment	0.02** (0.01)	0.026** (0.014)
Bank Loan	−0.01 (0.012)	−0.002 (0.015)
Informal Loan	0.023 (0.015)	0.016 (0.016)
N	1029	788
Adj. R^2	0.35	0.39
F	29.07	27.27

Note: The values in parentheses are standard errors. * indicates significance at 1% where ** stands for significance at 5%.

Furthermore, as mentioned earlier, access to credit can also be a significant factor in determining firm's growth process since better access to credit ultimately implies a lower average cost and hence ensures a competitive advantage. In an attempt to test the effect of access to credit market on firm's growth process, we have also included dummies indicating if the initial operation was aided by informal or formal loans. Neither of these two variables was found significant and hence, it appears that the initial sources of capital finance have little effect on firm growth. However, these two variables may not be good indicators for the ongoing credit constraint many firms are facing; a better proxy might be the title to their land as it can be used as a collateral in any credit request. To this end the estimations have been repeated after adding a dummy for whether firms have title to their land. When this dummy variable is included in the regression, the result is statistically significant at the 1% level of confidence indicating that firms with better access to credit market have indeed better growth prospects.

Table 12.15: The Determinants of Initial Size and Growth of Entrepreneurial Firms

	Initial Size	*Growth*
Intercept	−1.38* (0.071)	0.19 (0.02)
Log(Initial Size)		−0.05(0.005)**
Log(Firm Age)	0.53(0.19)**	
Food	0.36(0.15)*	
Textile	0.39(0.13)**	
Wood	0.21(0.13)	0.02(0.015)
Kenya	−0.22(0.13)	0.04(0.015)
Zimbabwe	−0.06(0.14)	0.09(0.02)**
Zambia	−0.6(0.13)	0.01(0.01)
Corporation	0.78(0.11)**	0.05(0.01)**
Secondary	0.24(0.12)*	0.07(0.01)**
University	0.68(0.16)**	0.07(0.02)**
Technical Training	0.59(0.16)**	0.06(0.02)**
New Equipment	−0.04(0.09)	0.004(0.011)
Foreign Equipment	0.29(0.13)*	0.031(0.015)*
Bank Loan	0.49(0.13)**	0.002(0.015)
Informal Loan	0.06(0.15)	0.01(0.017)
Land Title	0.39(0.10)**	0.033(0.011)**
N	514	516
Adj. R^2	0.33	0.31
F	17.43	14.95

Note: The values in parentheses are standard errors. * indicates significance at 1% where ** stands for significance at 5%.

In addition to the growth pattern, it is also important to see what determines the initial size of an entrepreneur firm. To this end, Table 12.15 looks at the determinants of initial size and growth of entrepreneurial firms in the Anglophone countries of Kenya, Tanzania, Zimbabwe and Zambia. Ghana is not included because we do not have information on land title for this country. In addition to the importance of education, the results show that access to foreign equipment at the start of operations is significant in determining initial size. In fact, as Table 12.15 reveals those entrepreneurs that establish a firm using imported equipment not only grow faster but also tend to start larger firms. Furthermore, it is interesting to note that despite our earlier finding implying that the use of bank loans do not ensure higher growth rates, those firms that have access to bank loans to start up their operation tend to start larger firms but that does not ensure a higher growth rate. In other words, many entrepreneurs find it necessary to use bank loans if they intend to start a larger firm but that does not imply they will form a relatively more successful firm. But, whether or not the firm has title to land (as a proxy for its access to credit market) is found to be a significant factor not only in determining the start-up size but also in the rate of growth.

Tables 12.16 look at the period when structural adjustment programs were undertaken by the countries in our sample. It includes two models both of which use age and initial size, as well as education variables to measure the effects of learning. However, we also include dummies for firms that export/import more than 10% of their product/inputs. The aim is to test if the structural adjustment programs have impacted firm's growth pattern and to see whether firms that are outward oriented are growing faster on the wake of structural adjustment programs than those that are not. Gibrat's Law is still rejected even when only sub-periods covering the structural adjustment programs are considered. In fact, the size effects reported in Table 12.14 where the whole sample is considered, and in Table 12.16, where only post structural adjustment is considered, are very close in value and both significant. However, it is interesting to note that the coefficient of age variable, although still significant in Table 12.16 is much smaller than that reported in Table 12.14 where the whole sample is used.

This result is surprising as one might expect the effect of age to increase with the introduction of the structural adjustment programs. In fact, Risseenu (2000) in his study of growth in Zimbabwe using RPED surveys found just that. He concluded:

> A most remarkable result is the absence of the commonly observed inverse relationship between age and growth in the years following independence, although the (as expected negative) coefficient is on the edge of significance. This implies the incumbent firms must have had a strong competitive advantage, either by knowing how to handle regulations better, or by fencing off the market by mutual agreements (or by both). Thus they were able to keep newcomers at a distance. . . . Firms were compelled to work together, and cooperation dominated competition. When the economy is not dynamic at all, firms have no need to change over time, and there is no reason why older firms should grow slower than younger ones. After 1986, but clearly before the introduction of the Structural adjustment programs, the pattern of young firms having larger growth rates is established.

Table 12.16: Growth Regressions, Effect of Policy Changes (Late 1980s to 1992)

	Full Sample	*Entrepreneur Firms*	*Full Sample*	*Entrepreneur Firms*
Intercept	0.17* (0.03)	0.24* (0.04)	0.012* (0.026)	0.16* (0.04)
Log(Initial Size)	−0.04* (0.004)	−0.04* (0.006)	−0.025* (0.002)	−0.03* (0.003)
Log(Firm Age)	−0.023* (0.01)	−0.04* (0.013)	0.022* (0.009)	0.03* (0.011)
Food	−0.006 (0.02)	−0.03 (0.02)	0.005 (0.01)	−0.002 (0.011)
Textile	−0.017 (0.14)	−0.04** (0.02)	−0.02 (0.01)	−0.03* (0.01)
Wood	0.002 (0.015)	−0.01 (0.02)	−0.005 (0.009)	−0.008 (0.012)
Ghana	0.08* (0.02)	−0.03 (0.02)	0.03* (0.013)	0.04* (0.02)
Kenya	0.001 (0.017)	0.004 (0.02)	0.007 (0.11)	0.02* (0.01)
Zimbabwe	0.028 (0.018)	0.028 (0.018)	0.04* (0.01)	0.05* (0.02)
Zambia	−0.02 (0.019)	0.017 (0.02)	−0.01 (0.013)	−0.007 (0.02)
Cameroon	−0.068* (0.019)	−0.08* (0.02)	−0.04* (0.013)	−0.06* (0.02)
Côte d'Ivoire	0.009 (0.018)	0.01 (0.02)	−0.011 (0.013)	0.0003 (0.02)
Corporation	0.02 (0.013)	0.03** (0.015)	0.023* (0.008)	0.03* (0.01)
Secondary	0.02** (0.01)	0.017 (0.016)	0.02* (0.009)	0.02** (0.01)
University	0.05* (0.02)	0.04* (0.02)	0.04* (0.01)	0.04* (0.01)
Technical Training	0.03** (0.02)	0.016 (0.02)	0.03* (0.01)	0.029** (0.01)
New Equipment	0.06* (0.02)	0.09* (0.02)		
Foreign Equipment	0.01 (0.013)	0.004 (0.013)		
Export Dummy			0.06* (0.011)	0.08* (0.01)
Import Dummy			0.02* (0.009)	0.02** (0.01)
N	814	814	604	417
Adj. R^2	0.19	0.19	0.25	0.25
F	11.96	11.96	12.89	9.18

Note: The values in parentheses are standard errors. * indicates significance at 1% where ** stands for significance at 5%.

The results reported in Table 12.16 also show that firms that are exporting more than 10% of their product are growing significantly faster; the export dummy is significant at the 1% level of confidence. It appears that the structural adjustment factors have benefited the outward oriented firms as they grow much faster than the import oriented firms. Finally, Ghana and Zimbabwe grow faster during the structural adjustment period than the other three countries; there is also evidence suggesting that these countries undertook more extensive adjustment programs than Tanzania, Zambia and Kenya.

Table 12.17 considers the effect of ownership on firm growth. It summarizes the results of the growth model for the sample of entrepreneurs, with dummies that are set to 1 if the firm is owned by

European or Asian entrepreneurs. The results suggest strongly that non-indigenous firms grow at a faster rate than indigenously-owned firms. Given the fact that the African firms have started at a much smaller size than their white or Asian owned counterparts, this result indicates that black firms have seriously under-performed in this period. We have also included variables to measure whether the entrepreneur owns another business and whether the entrepreneur's family is in the same business; the latter variable is weakly significant.

Finally, we have also estimated the growth model to see the effect of ownership by adding a dummy set to 1 if the firm is foreign-owned (not shown in the table). The results show that foreign-owned firms do not grow faster than local firms; this is presumably because foreign firms start out much larger than local firms in most African countries.

Table 12.17: Growth Regressions, the Effect of Ethnicity of Entrepreneurs

Intercept	0.29* (0.08)
Log (Initial Firm)	−0.04* (0.004)
Log (Firm Age)	−0.08* (0.007)
Food	−0.013 (0.014)
Textile	0.001 (0.013)
Wood	0.002 (0.013)
Kenya	0.023 (0.015)
Zimbabwe	0.069* (0.016)
Zambia	0.018 (0.015)
Cameroon	−0.02 (0.02)
Côte d'Ivoire	0.009 90.02)
Corporation	0.014 (0.02)
Secondary	0.044* (0.012)
University	0.05* (0.015)
Technical Training	0.035* (0.016)
Family Business	0.017 (0.01)
Other business	−0.01 (0.01)
African	−0.04* (0.01)
N	670
Adj. R^2	0.32
F	19.75

Note: Numbers in parentheses are standard errors.

Conclusions

The descriptive material on employment growth of the RPED sample firms show a high rate of growth of 10.5% per annum which is clearly at odds with the macro-economic climate and performance of African economies outlined in the opening chapter of this book. This large figure is partly due to the fact that our firms are all survivors and do not reflect the job loss due to the death of firms, and partly because we are dealing with firms which have survived over a very long period of time. If we recalculate the growth rates for only the post-1980 period the growth rate is cut down drastically.

Turning to growth rates by firm size it is seen that much depends on the basis on which we define the firm size – by its size at the inception of the firm, by its current size or by the average of the two. The consensus in the literature is that it is the average size which is the appropriate definition to use – the base of the initial size would, as indeed our tables show, exaggerate the growth rate of small firms, and the base of the current size would have a bias in the opposite direction exaggerating the growth rate of large firms. Classifying firms by average size, the relatively high growth rate of small firms persists, although at a reduced level, for the period spanning the period from start to end, but disappears when we consider just the post-1980 period.

The post-1980 period saw a number of countries undertaking "structural adjustment" policies, but our data show that these policies were not able to outweigh the effects of the macro-economic slowdown sufficiently to sustain the rate of employment growth of the sample firms. The post-1980 growth rate of employment was far below the growth rate registered when we consider the whole period. It is, however, possible to argue that one of the purposes of the adjustment program was in fact to reduce the over-manning of manufacturing firms, particularly in the parastatals sector. Our data in fact does show (Table 12.5) that in the post-1980 period entrepreneurial firms had a significantly higher growth rate of employment than non-entrepreneurial firms – reversing the trend observed when we consider the longer period since inception.

An important issue in the dynamics of firms is upward mobility – in particular the ability of micro and small firms to move up the scale. Mobility tables by size groups were constructed relating the present to the initial size of firms. When we considered the entire period between the firm's start-up date and the survey year, more than half the firms in the smallest size group (less than 10 workers) were unable to graduate to a higher group, and a third moved up to the next class (10–49). But the proportion of the small firms moving up in the RPED surveys is higher than that found in the Leidholm–Mead surveys of informal sector firms dominated by household enterprises. Firms of the next higher size class (10–49) showed somewhat higher mobility, particularly in their ability to jump two size groups up. But considering that the average age of the firms was about 13 years, and that we are dealing only with survivors, the experience of upward mobility can at best be considered to be moderate.

Net growth in employment is the result of expansion of employment in expanding firms and decline in contracting firms. It is interesting to consider the relative importance of each, particularly in the post-1980 period when many of our countries implemented structural adjustment programs. Overall a slight majority of the firms expanded, and the growth rate of expanding firms exceeded by a comfortable margin the rate of decline of contracting firms. But because the average size of the latter was significantly higher the net rate of growth was generally small, and even negative in Cameroon, and zero in Zambia. The big exception is Ghana where structural adjustment programs, at least until 1992 (the terminal year of our period), has been known to have had a successful impact on recovery and growth. It should however be emphasized that overall there is no evidence of "de-industrialization" in terms of employment.

We next ask the important question: what size-group of firms are the drivers in job creation in manufacturing? While the rate of growth of employment of small firms is generally high, the larger proportion of net increase in employment might still be provided by large firms. We divided our sample between old (existing) firms and new entrants during the 1980–92 period. As far as old firms are concerned the lion's share of net employment growth in the four countries which registered positive growth was accounted for by large firms. Employment growth was, however, positive in all countries among the new entrants. The small–medium firms had a much bigger role to play in this group.

Determinants of Growth Rates

The penultimate section of the chapter contains a detailed econometric analysis of the determinants of growth of the sample firms. The analysis rejects the hypothesis of independence of growth rates and the size or age of the firm as suggested by Gibrat's Law of random growth. On the contrary there is considerable support for a significant *negative* relationship between size and growth rate, and as well as between age and growth. Both results are predicted by the theory contained in the models of Jovanovic and Pakes and Ericson which emphasize the importance of learning in the firm's expansion. As a firm ages, the predictions of the manager regarding the firm's output and input levels become more accurate, and consequently the firm expands at a slower rate. After controlling for age, larger firms grow more slowly because they are already at a higher level of efficiency and hence do not have large efficiency gaps to exploit.

The basic model of learning can be expanded to include the manager's human capital attainments, the initial conditions of the firm in its ability to use imported or new equipment (presumably of better quality), and its access to the credit market. The results presented in Tables 12.14 and 12.15 show that several of these hypotheses are supported, though in the case of credit, possession of title to the land is more significant determinant of growth than access to formal bank loans.

We looked specifically at the post-1980 period to see if there are any particular features of the growth of firms that stand out when the experience of countries undergoing structural adjustment reforms is considered separately. The negative value of the size coefficient is almost the same in this period as in the start-end span, but the negative value of the age co-efficient is drastically reduced. The full RPED sample thus does not support the hypothesis of Risseenu (2000) based only on the Zimbabwe data, suggesting that structural reforms were instrumental in releasing the constraints on young firms to grow faster. However, outward-oriented firms do show significantly greater tendency to grow faster in the post-1980 sub-sample.

Finally, the last model tests for the impact of the ownership variable on firm growth. It is seen that controlling for other factors, African owned firms had a significantly lower rate of growth, but foreign ownership did not suggest any significant difference (Table 12.17).

Part V
Competitiveness and Exports

13 African Competitiveness in World Markets

The Kravis (1970) hypothesis asserting that international trade provides an avenue for sustained growth has found much support in a large number of studies. Hence, attention has focused on identifying factors that can hinder a country from fully utilizing its capacity in international trade. While many developing countries have used international trade to further their economic growth, sub-Saharan countries have shown little progress in their effort to penetrate the world markets. In fact, sub-Saharan Africa accounted for only 3.1% of global exports in mid 1950s, whereas this share has plunged to only 1.2% by 1990, a reduction of approximately $65 billion in annual export. We have already summarized the evidence in the opening chapter of this book suggesting that this loss of trade can be primarily attributed to the loss of the international market for traditional exports. However, the critical point remains that this loss was not compensated for by the substitution of non-traditional exports, including labor intensive manufactured exports.

It is widely believed that manufactured exports are more capable than traditional primary exports in supporting sustained overall growth for several reasons. This as, Elbadawi (1999) argues, can be attributed to three main factors. First, higher income elasticity of manufactured goods leads to a higher potential growth rate when the world economy is expanding. Second, higher demand and supply price elasticity of manufactured goods lead to lower price fluctuation and hence carries lower risk of economic shocks. Third, manufacturing exports can lead to a much higher dynamic productivity gain as they rely on higher embedded technology. However, sub-Saharan Africa's experience in enjoying the benefits of expanding such exports has fallen very short of that of other developing countries, particularly those in Asia. In this chapter we start by providing a summary of the trends in manufacturing exports in the seven RPED countries.

Performance of Manufactured Exports in sub-Saharan Africa

The low level of development implies that manufacturing contributes comparatively little to GDP in sub-Saharan Africa. For instance, in 1994 the weighted share of manufacturing in GDP in sub-Saharan countries was 15% (compared to 13% in 1980); considerably lower than the corresponding shares of 21% and 30% in, respectively, Latin American and East Asian countries. Furthermore, as Table 13.1 illustrates, the movements in the average share of manufacturing value added over 1970–95 for our seven RPED countries do not reflect a clear overall pattern indicating a lack of clear path towards industrialization. The continuous rise in the share of manufacturing value added relative to the GDP in some countries, indicates the success of these countries in promoting manufacturing industries. This is true particularly in the case of Côte d'Ivoire in the CFA zone, and Zimbabwe and Zambia among the non-CFA countries whereas most other countries have witnessed a stationary trend of manufacturing production relative to their GDP. Some countries, however, have experienced a downward trend during the 1980s, resulting in the so-called de-industrialization: in Tanzania, a typical example, the share of manufacturing has consistently dropped over the period. This phenomenon can be attributed to the fact that in most sub-Saharan countries industrialization after independence was achieved through import substitution, which in turn reduced export capacity. Combined with the deterioration in the terms of trade, the limited export capacity induced a drastic fall in import capacity of intermediate inputs that severely constrained expansion in manufacturing. Hence, the import compression phenomenon, which induced sharp cuts in industrial production led to severe de-industrialization.

Among other factors that hampered the development of the manufacturing sector especially in the CFA zone countries, one can mention, non-competitive labor costs in particular against East Asian competitors, labor market rigidities, and a poor regulatory and institutional environment. A similar phenomenon of de-industrialization also happened in Ghana in the first half of the 1980s, before the implementation of the Economic Recovery Program. Economic liberalization and the subsequent capital inflows in the second half of the 1980s initially almost doubled the share of industrial sector in GDP. However, due to limited technological capabilities, as trade liberalization became widespread, import substitution caused severe damage to large parts of the manufacturing sector and resulted in significant erosion of the share of industrial sector in GDP from 10.43% in 1985–89 to 7.45% in 1990–95.

Table 13.1: Average Share of Manufacturing Value Added in GDP

Country	*1970–79*	*1980–84*	*1985–89*	*1990–95*
Cameroon	9.71	7.42	12.59	12.54
Côte d'Ivoire	12.15	14.16	18.37	19.34
Ghana	11.09	5.53	10.43	7.45
Kenya	11.95	12.21	11.67	10.96
Tanzania	10.17	9.17	7.73	8.22
Zambia	14.69	19.81	26.60	29.86
Zimbabwe	22.69	25.34	25.56	28.64

Source: World Bank.

Table 13.2 provides the share of manufacturing in total exports. This share remains extremely low in most sub-Saharan countries, although some have made considerable progress in this respect. Most remarkable examples are Côte d'Ivoire in the CFA zone and Ghana, and Tanzania (during the 1990s) in the non-CFA zone, which achieved a steady increase in their manufacturing export. On the contrary, countries like Kenya and Zimbabwe, which had a comparatively good performance in the past, have lagged behind, although the post-1990 period shows improvement in both countries.

Table 13.2: Average Share of Manufactured Exports in Total Exports

Country	*1970–79*	*1980–84*	*1985–89*	*1990–94*
Cameroon	3.45	2.75	2.76	2.64
Côte d'Ivoire	4.35	6.11	7.63	10.43
Ghana	3.87	5.65	8.77	18.24
Kenya	16.15	17.17	14.49	18.57
Tanzania	10.18	11.39	10.41	13.74
Zambia	2.16	3.23	3.99	4.47
Zimbabwe	33.08	30.42	28.19	31.29

Source: World Bank.

Table 13.3 shows that textiles are probably the most dynamic element in manufacturing export expansion. This is because the low-skill-intensive character of the textile industry makes it particularly suitable for first-stage international specialization in developing countries with a relatively large supply of low-skill labor. It is interesting to note that in countries such as Tanzania and Kenya where manufacturing export has shown an upward trend especially after 1985, the share of textile in total export has grown dramatically. Even when total share of manufacturing export has not shown much improvement, in some other countries the exports of textile sector have exhibited significant increase. For instance, in Zimbabwe the relative manufacturing export has not changed much whereas the textile sector has more than doubled its share since mid 1980s.

Table 13.3: Composition of Manufacturing Exports Relative to Total Export (Percentage)

Country	*1970–79*	*1980–84*	*1985–89*	*1990–94*
Cameroon				
Textile	0.69	0.85	0.82	0.52
Chemical	0.06	0.26	0.08	0.07
Metal	0.12	0.06	0.04	0.03
Côte d'Ivoire				
Textile	1.28	1.94	1.65	1.98
Chemical	0.73	0.85	0.52	0.48
Metal	0.17	0.19	0.17	0.27
Ghana				
Textile	0.29	0.09	0.04	0.10
Chemical	0.18	0.09	0.12	0.17
Metal	0.06	0.04	0.03	0.04
Kenya				
Textile	1.03	0.54	0.80	3.13
Chemical	4.28	4.63	3.12	4.11
Metal	0.85	1.01	0.23	0.70
Tanzania				
Textile	3.44	3.90	4.25	6.94
Chemical	0.93	0.61	0.86	1.14
Metal	0.14	0.42	0.14	0.30
Zambia				
Textile	0.15	0.02	0.42	1.33
Chemical	0.58	0.11	0.13	0.26
Metal	0.10	0.50	1.26	0.30
Zimbabwe				
Textile	3.21	1.12	3.11	7.16
Chemical	2.30	0.62	0.78	1.07
Metal	17.51	25.44	21.16	16.53

Source: UNCTAD.

In spite of this, most sub-Saharan countries exhibit extremely high concentration of their exports. This can be measured by the Export Concentration Index constructed by UNCTAD and shown in Table 13.4. It ranges from 0 to 1, and measures (in increasing order) the degree to which a country's exports are concentrated in SITC three-digit level commodities. All seven countries exhibit considerably higher export concentration than other developing countries in South Asia, East Asia, or Latin America whose indexes are around or below 0.20. Sub-Saharan countries which succeeded to some extent in diversifying their exports are Côte d'Ivoire, Kenya, Tanzania, and Zimbabwe.

Table 13.4: External Trade Indicators

Country	*Export Concentration Index*		*Terms of Trade 1994*
	1998	*1992*	*(1987=100)*
Cameroon	0.48	NA	79
Côte d'Ivoire	0.32	0.37	81
Ghana	0.54	0.47	64
Kenya	0.34	0.31	80
Tanzania	0.36	0.25	83
Zambia	0.84	0.79	85
Zimbabwe	0.30	0.33	85

Source: World Bank, World Development Report, 1996.

The last column of Table 13.4 demonstrates that the low diversification of exports has increased the vulnerability of these countries to adverse terms of trade shocks. Over the 1987–94 period, all seven countries have experienced a decline in their export prices relative to import prices. The move towards more flexible exchange-rate systems in these countries has probably dampened the real exchange rate overvaluation induced by these adverse terms of trade shocks. The high export concentration indices shown in Table 13.4 are mainly due to the extremely high share of primary commodities in the exports. In most sub-Saharan countries the share of primary commodities in total exports is higher than 80%. In addition, this share has not shown any significant downward trend over the last 20 years. Latin American countries had equally high shares of primary commodities in total exports at the beginning of the 1970s. However, in contrast to sub-Saharan countries, this share has been steadily declining in most of these countries, even before the creation of Mercosur, which expanded regional trade in manufacturing.

The evidence provided here clearly shows very little success for these countries in promoting their manufacturing export. The structure of export in sub-Saharan Africa as a whole, compared with other developing regions as illustrated in the Figure 13.1 further confirms this conclusion. This figure illustrates the average export composition of each group in 1990, broken down into the aforementioned three product categories. It shows that Africa's manufactured export share is less than half those of the next two lowest regions (Latin America and Middle East and North Africa), and far below the first-tier NICs. Africa's processed primary exports, as a share of total exports, are in the middle of the range, but as a share of all primary exports are again the lowest of any region. Africa's unprocessed primary export share, as Figure 13.1 shows, is the highest of all the groups. The performance of the manufacturing export in the last two decades also shows significant difference across different countries. Elbadawi (1998) reports a growth of 14% and 10.6% in the share of manufacturer export to GDP between 1984–95 for Kenya and Tanzania respectively. This growth, however, has been less than 5% in both of the more advanced economies, namely, Zimbabwe and Côte d'Ivoire.

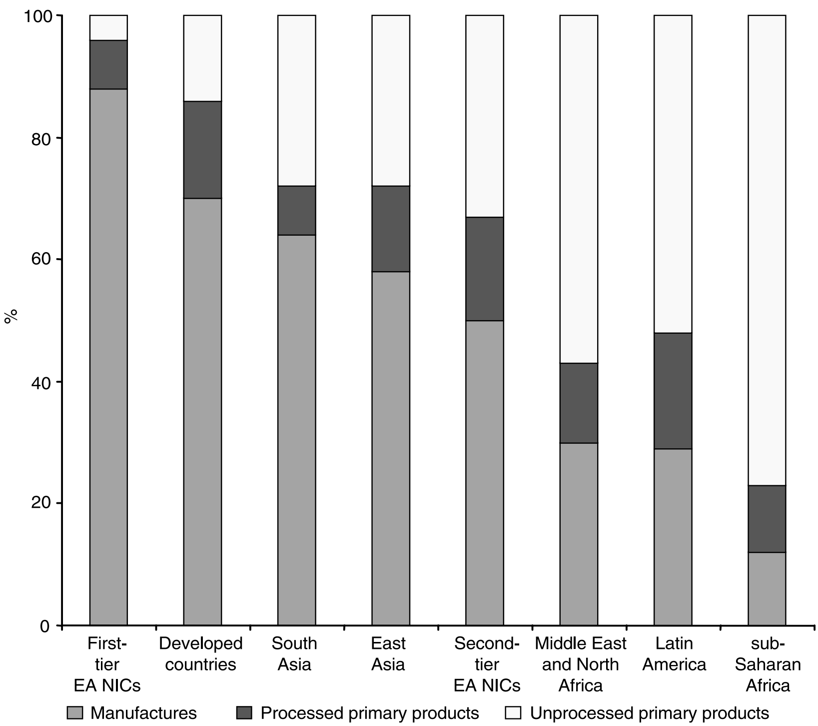

Figure 13.1: The Structure of Export, sub-Saharan Africa versus Others

Source: Wood and Mayer (1999).

Can Africa Export Manufactures? A Tale of Three Views

The evidence provided in the last section illustrates the marginalization of sub-Saharan Africa in global trade, in particular when the manufacturing export is concerned. This has been troubling for many researchers considering the fact that many other developing countries such as NICs that have shown dramatic growth in the last several decades have done so on the back of a strong export-led economic platform. In an attempt to explain this low level of manufacturing export many researchers have focused their attention on sources of comparative advantage in sub-Saharan Africa that has lead to such low level of manufacturer export and on the ways these countries can enhance their comparative advantage. In general three methods have been stressed in the literature (Elbadawi).

The Endowment Theory

According to this theory, developed by Adrian Wood and his associates, the human capital and natural resource are the primary forces of comparative advantage in a globalized world, rather than the capital and labor as stressed by the traditional Hecksher–Ohlin model. According to this theory, the resources whose varying supply causes variation in export composition among countries are three broadly defined ones: *skill* (acquired through education, training and experience, and usually called "human capital" by economists), *land* (a shorthand term for natural resources of all sorts), and *labor* (the number of people in a country's workforce). In contrast to the H-O model, capital (physical or financial) is omitted from this list of resources because it is considered to be highly mobile among countries, so that it cannot plausibly be regarded as an *endowment* which gives some countries a comparative advantage in the production and export of capital-intensive goods. For instance, if a country has a comparative advantage in some good because of the abundance of a resource such as copper ore or educated labor, then it can usually obtain the capital needed to develop this resource, either from domestic savings or from abroad. Furthermore, due to the fact that domestic capital markets and international markets are linked, the cost of capital rarely differs across different countries, hence differences in capital intensity among sectors do not give rise to differences in comparative advantage among countries (Wood, 1994, pp. 32–40).

Human and natural resource supplies affect export structure because the production of different sorts of goods requires different mixtures of resource inputs, and because the price of a given resource tends to be lower where its supply is greater. Manufacturing generally requires more skill and less land than primary production (or more precisely a higher ratio of skill to land input): so manufactures tend to be exported from countries where skill relative to land is abundant, and hence cheap, while countries that enjoy relative abundant land tend to export primary products. Similarly, processing generally requires more skill than the production of unprocessed primary commodities, so that countries with higher levels of skill per worker tend to export a higher proportion of their primary products in processed form. These relationships between the structure of exports and human and natural resource supplies are strongly supported by empirical evidence: a large part of the variation in export composition among all the countries in the world is explained (in the statistical sense) by variation in their resource supplies (Wood and Berge, 1997; Owens and Wood, 1997; Wood and Mayer, 1998).

The answer that emerges from Wood and Mayer analysis, in particular, is that the unusual features of Africa's export structure are largely the result of its unusual combination of human and natural resources. By comparison with other developing regions, Africa has both a poorly educated labor force and extensive natural resources (relative to the size of its population), or, in the terminology of this approach, a low level of skill per worker and a high level of land per worker. Africa's mixture of resources is thus the opposite of East Asia's (a high level of skill per worker and a low level of land per worker), and differs also from those of South Asia (low levels of both skill per worker and land per worker) and Latin America (high levels of both skill per worker and land per worker).

This can be further analyzed using Figure 13.2. This figure further illustrates that the position of sub-Saharan Africa relative to other regions did not change dramatically during the 30-year period. In fact, if anything, it slipped slightly further behind in terms of skill per worker (with the smallest vertical movement by any region), but closed the gap somewhat in terms of land per worker (the largest horizontal movement) reflecting a relatively faster population growth. It can also be seen from the figure that sub-Saharan Africa now has roughly the same combination of resources as Latin America in the 1960s. By contrast, its resources differ substantially from the earlier resource combinations of both the first- and second-tier East Asian NICs. More importantly, such comparisons with the past are of limited relevance: Africa’s current comparative advantage depends on its resources relative to those of other regions now. It is also important to note that, as Figure 13.2 suggests, if past trajectories were to continue, Africa’s relative resource position would not change much over the next few decades.

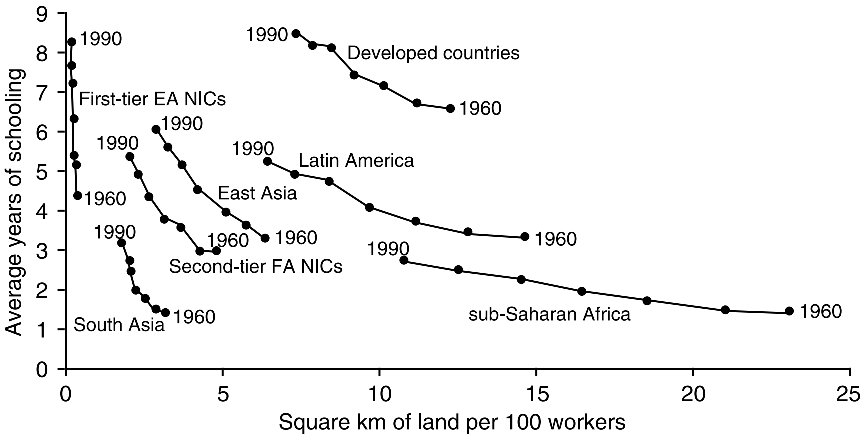

Figure 13.2: Regional Resource Combination, 1960–90
Source: Wood and Mayer (1999).

The impact of these differences in regional resources on regional manufacturing export can be shown in Figure 13.3 which depicts an *estimated* relationship across all individual countries (the cross-country regression line) with the *actual* average values of the dependent and independent variables for the eight country groups. The figure shows that for Africa the low skill/land ratio explains rather well why its ratio of manufactured to primary exports is lower than those of all other regions. However, Africa's data point lies well below the estimated regression line, indicating that the actual share of manufactures in its exports is even less than its low predicted share.

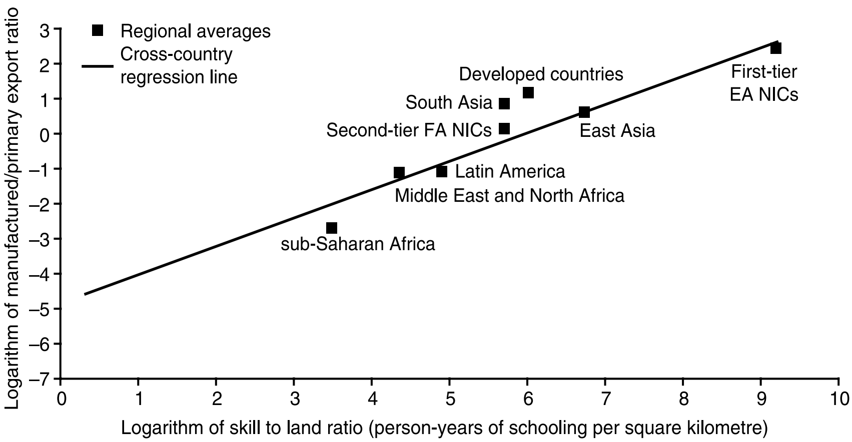

Figure 13.3: Estimated and Actual Export Structure, 1990
Source: Wood and Mayer (1999).

Wood and Mayer repeat their analysis for individual African countries as well and found more or less support for their hypothesis: the low level of skilled labor and high level of natural resources leaves Africa in comparative disadvantage with regard to manufactured exports. However, they also argue that considering the fact that the predicted value of manufacturer export lies above the actual value, Africa can still enhance its manufacturer export without having to alter its endowment. In other words, by comparing the actual shares of manufactures with their predicted shares they can assess the extent to which the African countries could raise the shares of manufactures and processed products in their exports, given the current skill levels of their labor forces. While raising the general level of education is inevitably a slow – a matter of decades rather than years – part of the gap between actual and predicted shares might be bridged by improvements in infrastructure and economic policies.

As can be noted from Table 13.5 with the exception of Zimbabwe for all other countries the predicted share of manufacturers is below actual and in the case of both Ghana and Zambia decisively so. For processed products, however, this share lies above the predicted value for all countries except for Tanzania. For Ghana, for instance, the actual share of manufactured exports was only 3% while the predicted value is 30%, the actual level of processed products stands at 28% almost 9% higher than the prediction. It is clear, Wood and Mayer argue, that with the exception of Zimbabwe, the manufacturers content of RPED countries export has lagged substantially below its potential based on the factor endowment.

Table 13.5: Predicted Export Composition of RPED Countries

	Share of Manufacturers in Total Exports		*Share of Processed Products in Primary Exports*	
Country	Predicted	Actual Minus Predicted	Predicted	Actual Minus Predicted
Cameroon	18	−10	14	1
Côte d'Ivoire	21	−15	13	13
Ghana	33	−30	19	9
Kenya	26	−5	19	1
Tanzania	17	−7	12	−6
Zambia	16	−12	21	76
Zimbabwe	20	14	16	4

Source: Wood and Mayer (1999, Table 8, p. 38).

In general, Wood and Mayer calculate that, based on comparisons with non-African countries, African countries, given their present levels of education, could raise the share of manufactures in their exports by, on average, between 5% and 10%. However, another conclusion is that these averages are misleading, since most of the unrealized potential is concentrated in about a dozen countries – between a quarter and a third of all African countries – while about two dozen other African countries have little or no currently unrealized potential to increase the share of manufactures in their exports. Among the eleven countries with large negative discrepancies in their 38-country set one can mention Côte d'Ivoire and Ghana.

Alternatives

The simplistic assumption of Wood's Endowment theory arguing that a natural resource abundant country will specialize in the export of natural resource intensive products has alarmed many researchers primarily due to its bold prediction: Africa cannot industralize because of its factor endowments as large amounts of natural resources and little human capital leads to comparative disadvantage. Paul Collier (1997), among others, criticizes the theoretical merits of the endowment theory arguing:

> The Wood Thesis is theoretically entirely correct within its own terms. In the simple common-technology, mobile-capital, immobile natural-resource model, countries well endowed with natural resources will not export manufactures. . . Were the only difference between Africa and Asia in the endowment of natural resources, then Africa would be uncompetitive in manufactures *because its labor would be more expensive than that of Asia*. In effect, Africa would experience Dutch disease. The high natural resource endowment would raise the productivity of Africa labor and thereby crowd out manufacturers. However, this would not be a problem because, after all, Africa would have higher wage levels than Asia, so that its labor force would earn more.

Hence Collier argues that the Endowment theory can only be supported if the Dutch disease mechanism is strong enough to yield a higher relative labor return. The prevailing argument, however, is that this phenomenon, witnessed in most oil exporting countries, is likely to be the case only in a few African countries such as Botswana. However, in the vast majority of Africa the income levels are much lower than that of Asia and the gap is still widening. Collier concludes that Africa's abundant natural resource has not led to a higher price of labor and hence the grave predictions of the endowment theory cannot be supported. In other words, the abundance of natural resource alone does not make Africa intrinsically uncompetitive as long as it can furnish an environment in which factors of production are at least as productive. In an attempt to explain Africa's inability to penetrate the export market in manufactures and counter the rigid argument of the endowment theory two alternative hypotheses have been introduced.

Transaction Costs

The *Transaction costs* theory as advocated by Collier (1997) argues that the high transaction costs in Africa has led to the marginalization of its manufacturing export. According to this view, manufacturing is a transaction-intensive activity, much more so than natural resource and agriculture. Manufacturing involves the purchase of a wide variety of inputs from multiple sources, their storage, and the storage and the sale of the output to a variety of customers in multiple destinations. Transaction costs in most African economies, however, are high for several reasons. First, transport costs are high due to the landlocked nature of a relatively large number of African countries, poor port facilities, or that the transport sector in many of the African countries is insufficiently competitive. This is most transparent in air transport where the privileges given to national airlines such as those in Francophone countries and Zimbabwe have resulted in increased prices and reduced competition. In sea transport, preferences given to national carriers have reinforced shipping cartels and curbed entrance and therefore raised prices. Furthermore, the transport is not only expensive but unreliable which has forced manufacturers to keep excess inventory as a buffer against unexpected disruption in the delivery of inputs or finished goods.

The second reason why transaction costs are high is the difficulty of contract enforcement. The lack of sufficient formal enforcement mechanisms as discussed earlier in Chapter 8 and the weakness of the informal mechanisms used in Africa raises the cost of procurement and lowers the competitiveness of manufacturing which happens to rely on an extensive supply chain. A third reason why transaction costs are high is due to the high cost of information augmented primarily by the small-scale nature of African business community. The relatively high telephone costs and the inadequacy of press, raises the cost of manufacturing and constitute a direct impediment to manufacturing exports. Finally, the poor quality of other public services such as health and custom departments also increase the transaction costs. With high transaction costs, a transaction sensitive activity such as manufacturing will be at a disadvantage both absolutely and relative to the exports of agriculture and natural resources. Hence, Collier suggests a set of trade policy initiatives that are primarily designed to lower transaction costs to enhance Africa's competitive advantage and support its manufacturer export.

Real Exchange Rate Strategy

Elbadawi and Helleiner (2000) see the over-valuation of the currency as a first target and argue that given the current low level of development in Africa, the export led strategy should be accompanied at least temporarily by sustained competitive real exchange rate policy. They assert:

> In order to overcome the initially limited capability for exporting manufactures – and sufficiently enough to stimulate new investment in export-oriented production – the real value of the currency may have to depreciate quite considerably, overshooting its eventual equilibrium value (Williamson, 1997). It is likely to have to remain under-valued for several years, before sufficient productivity growth in the traded sector is generated to bring with it secular real currency appreciation (Balassa, 1964; Samuelson, 1964). In the current era of global capital market integration, the temptation to abandon (or the inability to maintain) this real currency depreciation prematurely – before the economy is sufficiently developed to sustain real appreciation – has proved

> to be quite formidable in many developing countries … The recent, and in our view premature, opening of capital accounts in many reforming African countries (mainly based on advice from the IMF) has resulted in a rise in (mainly short-term) private capital inflows to these countries and consequent real currency appreciation. Given the speculative and unsustainable nature of these capital flows and the likelihood of frequent occurrence of financial crisis, the real exchange rate (RER) can be expected to experience *major* swings (increased RER instability) around a more appreciated currency value. (Some degree of short-term variation around the "target zone" for the RER is, of course, inevitable.)

Prior to independence, African economies typically defended fixed nominal exchange rates and enjoyed fairly liberal trade (and payments) regimes. However, during the 1960s and 1970s and in the aftermath of their independence, the accelerated drive to industrialization in sub-Saharan Africa, ultimately lead to balance of payment pressures and the typical response was to introduce or to tighten foreign exchange and import controls rather than adjusting exchange rates and so by the mid 1970s, most African countries had acquired fairly closed trade regimes and overvalued currencies. In the 1980s, the overvaluation of the currency lead to substantial currency devaluation and trade liberalization in almost all sub-Saharan countries which ultimately helped shape Africa's trade and exchange regimes in a number of important ways. These include: the elimination of exchange rate controls, the reduction or elimination of export taxes, the reduction and harmonization/transparency of tariff rates, (Africa's average tariff rates declined from 30% in the early 1980s to 21% in the late 1980s), and the elimination of non-tariff barriers. In general, trade policy was less frequently used to address balance of payments problems as exchange rates were freed or became more flexible.

While substantial reforms were implemented by many African countries in the 1980s, compared with other developing regions Africa's average tariff rates were still high in 1990. In terms of non-tariff measures, the gap between Africa and other regions was even wider (Rodrik, 1997: tables 4 and 5). Trade liberalization efforts in Africa were also often short-lived and lacking in credibility. In a recent comprehensive paper on trade policy and economic performance in Africa, Rodrik (1997: 5) provides the following evaluation: "successful instances like Botswana and Mauritius notwithstanding, trade reform in Africa has generally been erratic and marked by reversals and lack of credibility."

Elbadawi and Helleiner, hence, argue that African investment and export prospects depend greatly upon the maintenance of stable and appropriate real exchange rates at the national level and that volatile short-term capital flows, through their exchange rate effects, seriously threaten Africa's development. Hence, the advice to open up the capital account *totally*, as advocated by IMF, needs to be carefully weighed against the counter-arguments. While on the one hand, international financial integration may increase the efficiency of the financial services sector and diversify its overall portfolio and thus its risks, it also increases vulnerability to the turbulence of foreign financial markets and constrains the potential for independent monetary and exchange rate policies.

Elbadawi and Helleiner, hence, conclude that these are powerful arguments for the use of capital controls, direct or indirect or both, over both inflows and outflows, as part of the armoury of African macroeconomic and/or development (notably fiscal) policy instruments. At a minimum, they can "buy time," like reserves, for the deployment of other more fundamental policy instruments.

Endowment, Transaction Costs, or Real Exchange Rates: An Empirical Appraisal

Each of the models, obviously, implies a specific set of determinant for the manufacturer export. According to the endowment hypothesis, a combination of high per capita natural resource and low human capital affect manufacturer export negatively. The transaction cost hypothesis predicts that variables affecting the transaction cost are the dominant factors while the real exchange rate hypothesis argues that factors affecting the real exchange rate should be primarily looked at. Using these predictions, Elbadawi (1999) and Elbadawi and Randa (1999) attempt to empirically test the validity of the three models advanced to explain the underdevelopment of the African manufacturer export. In his model, Elbadawi (1999) uses data for 41 developing countries including Tunisia, Burkina Faso, Côte d'Ivoire, Kenya, Mauritius, South Africa, Tanzania, and Zimbabwe as representative of Africa, and South Korea, Indonesia, Malaysia, and Thailand as representative of East Asia to test each of these models.

Elbadawi's cross-country regression models, pooled over five periods between 1980 and 1995, seek to explain the variations in the log of manufactured exports to GDP by a set of explanatory variables, which represent each of the three main groups of hypotheses mentioned above. Thus the endowment hypothesis is represented by the ratio of schooling per worker to land area per worker; the transaction cost hypothesis is proxied by such variables as an index for corruption, length of paved road and the availability of telephone and fax machines; and the exchange rate hypothesis by an index of misalignment. In addition to this “pivotal” set of variables, other variables to account for macroeconomic shocks, external demand and regional dummies are included. Most of the variables were significant in the regression models estimated.

As far as manufactured exports are concerned there was no evidence that Africa is different. The countries of Africa represented were on the regression line, which suggests that the gap in performance between Africa and others, most notably East Asia, should be explained by differences in the global determinants of manufactured exports. Elbadawi estimates that the Asian manufactured export/GDP share in the 1990s was more than ten times the comparable share for sub-Saharan Africa. To explain this difference, Elbadawi simulates the sources that accounted for this outcome by using the estimated regression coefficients along with the means of the relevant variables for East Asia and sub-Sahara respectively. The results are summarized in Table 13.6.

The evidence very strongly supports the transaction theory, where lower transaction costs in East Asia relative to sub-Saharan Africa in the 1990s allowed the share of manufactured exports to GDP in the former to be as high as 8.7 times the share of sub-Saharan manufactured exports to its GDP. In particular, the number of faxes accounts for half of the shortfall of Africa’ s share of manufactured exports relative to that of East Asia. However, this result should be interpreted as a proxy for the overall effect on manufactured exports of communication and other communication-intensive inputs (such as managerial practices, flow of information…etc). East Asia also outperformed sub-Sahara in terms of real exchange rate stability, which more than compensated for Africa’ s advantage in the area of exchange rate competitiveness. The net effect of exchange rate policy allowed East Asia to achieve manufactured export shares at about 2.8 times those of sub-Sahara. Assuming that there were no differences between East Asia and Africa in other determinants, East Asia’ s superior performance in these two main sets of policy variables would predict the share of East Asia’ s manufactured exports to be about 11.5 times that of sub-Sahara. On the other hand, East Asia’ s advantage relative to Africa in terms of the ratio of skills per worker relative to land per 100 workers (endowment thesis) predicts the share of Asian manufactured exports to be about 1.4 times that of sub-Sahara. The results also show that terms of trade effects were favorable to Africa, however, the net effect was too small to make any measurable impact.

Table 13.6: Sources of Difference of the Shortfall of African Manufactured Exports Relative to East Asia (1990–95)

	East Asia	*sub-Saharan Africa*	*Difference*	*Net Contribution*
MX/GDP	−0.5121	−1.5353	1.0232	10.55
RER variability	−0.1125	−0.4238	0.3113	3.28
RER Misalignment	0.0070	0.0489	−0.0419	−0.44
Exchange Rate Policy				*2.84*
Terms of Trade	−2.4216	−2.3919	−0.0297	−0.31
Terms of Trade Variability	−0.0196	−0.0349	0.0153	0.16
External TOT Effect				*−0.15*
Corruption	0.6696	0.6224	0.0472	0.50
Number of Faxes	0.2189	−0.2816	0.5005	5.28
Proportion of Pave Roads	0.9024	0.6254	0.2770	2.92
Transaction Benefits				*8.70*
Skill to Land Ratio	1.6393	1.5109	0.1284	1.36
Endowments				1.36
Total Predicted (MX/GDP)				12.75
Actual				10.55
Residuals				2.20

Source: Elbadawi (1999), Table 3.
Note:
1. Column 1(2) is the fitted right-hand side components of Regression of the determinants of manufactured export, using averages for E. Asia (Africa).
2. Column (3) is the difference between East Asia and Africa ((1)–(2)).
3. Column (4) gives the ratio of East Asia to sub-Saharan Africa.

The simulation exercise, based on the manufactured export regressions, sheds some useful insight at the macro level as to why Africa is marginalized in world manufactured exports. The evidence suggests that bad policy, especially in areas that affect transaction cost, rather than adverse endowment, remains the most serious hurdle for Africa to pass before it can build comparative advantage in the international market for manufactured exports.

Investment and Transaction Costs

The importance of investment – particularly public investments – in reducing transaction costs is paramount. In this respect, the sharp reduction in investment, both public and private, in the 1980s and the 1990s in sub-Saharan Africa is a crucial part of the story. It has been pointed out that the SSA region experienced a marked increase in investment – both public and private – in the 1960s and the early 1970s, but that it petered out in the following decades into a prolonged investment slump. In fact, Akyuz and Gore have shown that the "post-colonial investment boom" in Africa produced rates of capital accumulation and growth comparable to that in East Asia, but that this upsurge could not be sustained or translated into the virtuous circle of rising investment and rising exports as in the East Asian case. There are many reasons for it, partly domestic and partly international. The decline in the terms of trade of non-oil exports after the second oil shock of 1978 contributed to the decline in resources for investment. The excesses of public spending during the post-colonial boom were based on incorrect anticipation of rising export revenues. At the same time structural adjustment programs of the late eighties did little to distinguish between necessary public investment to sustain the infrastructure which is essential to reduce transaction costs, and other forms of spending that had to be cut to balance the resource gap. The decline in foreign resource inflow also coincided with the build-up of a huge external debt overhang which left little room for surplus resources to be directed to productive public investment.

Constraints on Exports: Evidence from Case Studies

The evidence from cross-section international data given in the last section can be supplemented by the findings from some case studies which have not been used so far. Although based on small samples of enterprises, not randomly selected, or on specific country studies, this type of work focuses attention on the key constraints on exports from sub-Saharan countries, and strengthen the conclusions from the regression analysis

Firm Level Cost Data

Apart from the systematic firm surveys, on which a good deal of this book is based, the RPED undertook market research in the United States and in selected countries in Europe. First, the research team interviewed selected firms in the developed countries who were involved in importing manufactured products from African countries, and sought to obtain information on demand and supply problems facing them. Later the teams went to Africa and interviewed a selection of the African firms supplying the foreign importers. From our point of view particular interest attaches to the import into Europe of "standard products" in garments. The category "standard products" includes the vast majority of goods which are sold in international markets. These are goods whose origin is not obvious upon casual observation of materials or appearance. In the garments industry such products include denim jeans, T-shirts, basic sweaters etc. We know the success achieved by Asian economies in the export of such items. It provides the springboard for exporters to move into higher value items in due course.

For the most part marketing *per se* is not an issue. Exporter firms generally sell to large international buyers, who market the products under their own brand. The success of exporters depends on the exporters' ability to access inputs at world prices and then to organize high-volume production efficiently to be cost-competitive, but also to have enough flexibility to meet the requirements of international importers.

Biggs *et al*. (1996) summarize four requirements for success in this type of exports:

(a) Because product differentiation is minimal and price competition is intense, the supplier has to compete exclusively on price.
(b) Delivery requirements are very taxing, especially in clothing, because of the seasonal variations in products demanded.
(c) Quality control standards are extremely strict and uniformity between batches or pieces supplied are extremely important.
(d) Volumes in such standard products tend to be high – much greater than in more traditional "ethnic" goods. Thus firms have to gear up to production and delivery in many thousands of nits within a short period of time.

The last point implies that the observed bias towards large firms among the exporters, revealed in the survey data of the next chapter, is natural unless African countries can develop the system of involving large numbers of small producers in a production and marketing network, under the umbrella of a cooperative organization. The importance of price competitiveness which was also emphasized leads us to enquire further about the cost conditions under which African forms operate relative to their competitors in the world market. Biggs *et al.* collected data from their admittedly small sample of respondents about the price levels of the basic factors involved in the production of garments in the RPED countries as compared to those prevailing in competitor countries like Mauritius and India. These are reproduced below in Table 13.7.

Table 13.7: Comparisons of Factor Prices, 1994

	Zimbabwe	*Kenya*	*Côte d'Ivoire*	*Senegal*	*Ghana*	*Mauritius*	*India*
Monthly Wage[a] ($)	70–75	55	66–99	104	30–45	120	60
Electricity[b] (Cents)	1.78	9.70	11.76	11.76	5.70	9.00	4.80
Water[c] ($)	0.38	0.52	0.60	1.09	0.32	0.46	0.32
Diesel Fuel[d] ($)	0.26	0.47	0.40	0.68	0.37	0.27	0.28

Source: Biggs *et al.* (1996), Table 5.1, p. 75.

[a]Wage for a semi-skilled machine operator in the garment industry

[b]Industrial electricity rate per KwK during peak periods

[c]Industrial water rates per cubic meter

[d]Diesesl fuel cost per liter

It does not appear that costs of factors in sub-Saharan African countries are widely out of line with that of competitors. Concentrating on wage levels, only the Francophone countries report significantly higher wage levels than India, but still lower than Mauritius. The data pertain to a period immediately after the CFA devaluation, so the high levels might reflect temporary problems of adjustment to the new exchange rate. The wage level in the Chinese export zones is not in the table, but Biggs *et al.* report in another part of the study that at around $120 per month, it was on level with wages in Mauritius (*ibid.*, p. 78). These data then bear out the point made in Collier's critique of the Wood hypothesis that the high endowment of natural resources in sub-Saharan Africa did not make wage levels in this region higher than in land-scarce economies (see above).

It is, of course, not the wage level as such, but unit labor costs, after adjustment for the task-specific efficiency of labor, which is of importance in the comparative picture of the cost of labor as a factor of production. Biggs *et al.* comment from their case study:

> Considering the lack of experience of African workers, it is not surprising to find that task-level efficiencies of machine operators are only 60–70 percent of the average of Chinese workers and 75–80 percent of the average Indian worker (p. 77). Thus the unit labor costs (nominal wage divided by the dollar value of output per worker) worked out at 0.034 for Zimbabwe, 0.026 for Kenya and 0.022 for Ghana, as compared to 0.040 for China and 0.027 for India. We conclude for a large part of the sub-Saharan Africa wage costs are not the major factor in their lack of competitiveness *vis-à-vis* major suppliers of garments in Asia, even after allowing for differences in labor efficiency.

Coming back to Table 13.7, electricity costs, like wages, are substantially higher in the Francophone countries, reflecting differences in exchange rate and other government policies. An important point to note is that, as we have found in the evidence presented in Chapter 7 above, the problems with electricity are not just of price, but, perhaps more importantly, its supply. In many of these countries the supply is often interrupted, and without notice. It adds seriously to the cost of operations of firms, which either have to work their expensive machinery part-time or invest in their own generators. This, however, is a problem in India and other South Asian competitors as well.

Another factor not mentioned in the data given above is the problem of transportation. There are only a few firms operating in sea transportation. As can be expected the freight rates are very high, at least one-third more than rates available to Asian exporters (Biggs *et al*. Table 5.2). The frequency of sailings is also a good deal less and services are often cancelled or delayed without notice. Port charges add to the cost, running in some countries 50–100% more than in Asia. To make matters worse the infrastructure at ports are inadequate for handling bulky shipments, leading to time consuming congestion at the point of departure. Biggs *et al.* (p. 75) conclude:

> Meeting delivery schedules presents an additional difficulty for exporters, especially those operating on quick turnaround times for rush orders…. Firms are thus forced to use air transport frequently in Africa, which add significantly to the exporters' cost. Exporters in land-locked countries like Zimbabwe rely almost exclusively on air freight because customs duties and other "fees" on intra-African commerce are generally extraordinarily expensive, even when goods are only entering a nation to be re-exported through ports.

The RPED research team collected cost data, including materials, labor and transportation to the ports, from a few exporters in each country for standard products like a man's casual long-sleeved shirt, both in Africa and the Asian competitive countries. About 60–65% of the cost of producing the item was the cost of fabric and accessories. Almost all producers could import these inputs at roughly the same cost if – and sometimes it is a big if – transportation bottlenecks do not create problems. Labor costs constituted another 30% of the total. On strictly limited cost comparisons, the African producers were "well within comparative cost ranges of Asian producers, as the unit labor cost indices indicate." (p. 79). Leaving aside the Francophone countries, Zimbabwe was the high cost African country in the sample, and Ghana was the least cost. The former was somewhat higher than the China EPZ zone, and the latter somewhat lower. The range in either direction was no ore than 10–15%. But as the case study material shows, a cost differential of this magnitude is enough to make a competitive differential. Importers in developed countries are continuously searching the world for low cost countries for the production of standard items in garments. The opportunity for producers in countries like Ghana should be great if infrastructure services are adequate.

Country Studies

Studies of the export experience of specific countries can be useful in throwing light on key constraints on export growth, and in assessing the relative importance of impediments mentioned in a laundry list of problems. They are more illuminating if presented in a comparative perspective of the contrasting experience of one or two countries with a different experience. We summarize below the results from two studies which focus on two of the more successful cases of export growth – Mauritius which has been the leading success story in sub-Saharan Africa; and Zimbabwe which has performed better in exports than the other RPED countries. In each case the authors have compared the experience with one other not-so-successful country.

Mauritius and Ghana

Mauritius was viewed in the early 1960s as an overpopulated economy, surviving on the basis of a single export crop, sugar, but very much a candidate for being overwhelmed by the Malthusian problem of population growth outstripping resource growth This was indeed the message of the well-known James Meade Committee which reported in 1961 (Meade, J.E. *et al.*, 1961, *The Economic and Social Structure of Mauritius*, Methuen, London). The response of policy makers to the need to promote industrialization to provide employment to the growing volume of job seekers was to set in place a system of import-substitution programs under a protective wall. But along side the enunciation of the Development Certificate Scheme (1963) to provide financial and tax advantages to import-substituting manufactured industries, the Export Processing Zone (EPZ) Act (1970) went on to encourage the development of export-based manufacturing industries. The fiscal incentives provided under the latter, combined with low wage costs, were instrumental in the development of

EPZ. While the two-pronged approach had some success in promoting strong growth in the 1973–79 period, the Mauritius economy ran into trouble with bludgeoning deficits both internally and externally, as the rising wage and other costs of the boom hurt competitiveness. The policy reforms of 1979–83 started with macro-economic stabilization and exchange rate adjustment. Not until the import-to-GDP ratio had fallen from 0.57 in 1980 to 0.42 in 1983 that measures at trade liberalization were put into effect. These measures at reducing both tariff rates and quantitative restrictions led to a reversal in the trend of the import ratio, but it was now accompanied by a rapid rise in the share exports in GDP. The EPZs in place for more than a decade took the lead in supporting the new export-led growth. "Trade liberalization significantly altered relative incentives and this in turn was a major factor in the improvement of export performance" (Cf. Milner, p. 91).

Teal (1999) reports on a small survey of manufacturing firms in Mauritius and compares some pertinent results from this survey with those of the RPED discussed in this book. Several important differences are immediately apparent in the nature of export participation of Mauritius firms. (*Ibid.*, Table 5). First, the extent of the participation is so much greater, in line with the differences noticed in the macro data given above. The percentage of exports (relative to total sales during the year) was 39 in Mauritius. The highest for the RPED countries was 22 for Ghana, and this was only because the export ratio in one industry – wood and furniture – was very high at 84. The next highest export ratio was for Zimbabwe at 11 (cf. the next chapter, Table 14.1). Second, the Mauritius firms in textiles and garments exported most (98%), followed by wood and metals. In the sub-Saharan Africa samples, only Zimbabwe had a reasonable participation in textiles and garments at 26%. Mostly the exports, such as they were, came from the resource-based industries. Third, as we will see, although firms of all sizes did participate in exports in the RPED countries, the export-orientation of small firms was quite low in all the RPED countries. In Mauritius no less than 46% of small firms (under 30 employees) seem to have exported and the average export ratio for all small firms was 39%.

What explains the high competitiveness of firms of all sizes in the export market of Mauritius, particularly in the labor-intensive products? Teal compares Mauritius with Ghana – a poor export performer, although at the date of the surveys Ghana had been many years into a successful structural adjustment program. He fits simple production functions to the firm-level data, measuring all value measures at PPP dollars to ensure comparability. His results show that, as measured by the coefficient of a dummy variable for Ghana, the Mauritius firms are, on average, four times as productive as Ghana. This, of course, is the contribution of all the factors of production labor, capital and management – which cannot be disentangled. But it stands to reason that the biggest difference in factor price would be for labor. Average wages in PPP dollars were in fact six times higher in Mauritius. However, wages increased less steeply with firm size than in Ghana. So if we concentrate on large firms (more than 100 employees) – which were mostly involved in exports in Ghana – the wages in Mauritius were only three times higher. Thus it would appear that the difference in wage costs (after controlling for productivity difference) could indeed have been lower for exporting firms in Mauritius.

It is, however, important to note that the high wage levels found in the survey in Mauritius in 1994 were not those prevailing when Mauritius started on its path of export-led growth. We have already referred to the "surplus labor" situation prevailing in Mauritius in the 1960s. Wages seemed to have increased strongly over the period of Mauritius growth. The data on manufacturing wages reported by the ILO do in fact show that the average rate of growth of real wages in the period 1980–91 was nearly 4% per annum (Mazumdar and Mazaheri 2002, Table 4.1, p. 46). It appears from the evidence given in the firm survey of 1994 that labor efficiency grew *pari passu* with real wage, so that unit labor cost was no higher in the 1990s relative to the low wage countries of sub-Saharan Africa.

While this point about wage costs is important, it does not say much about the institutional and policy background which supported the Mauritius export growth. While the Export Processing Zone (EPZ) has been the major institution involved in the export growth story of Mauritius, three points need to be emphasized in assessing the pivotal role of this institution: first, EPZ has gone through cycles of relative failure and prosperity, and one should be aware of the domestic as well as international factors behind these cycles. Second, the peculiarities of the EPZ development pose some potential problems, which might yet be serious for Mauritius in the long run, and clearly need to be stressed in any recommendation of similar developments in other developing countries. Third, and most important the very special conditions of Mauritius which made the growth of EPZs a success story should be carefully noted.

(i) The EPZ was created as early as 1970 when it became clear that the original import-substituting strategy had run aground due to the constraints of a limited domestic market. But the growth of this sector of exportable manufactures has been anything but smooth. It had progressed in fits and start, and in fact as one growth phase started to fizzle out, new measures of concessions and incentives had to be offered to jump-start a new phase of expansion. The original take-off of the EPZ sector in the 1970s was fed by an exceptional period of Mauritius growth. High prices of its staple export, sugar, created a huge surplus in the balance of payment. The availability of sugar profits for investment coincided with the enhanced ability to expand imports of raw materials and machinery to enable the EPZ sector to flourish. This take-off came to a halt in the late 1970s with recession in the industrialized countries (which were the main importers of EPZ products). The EPZ development needed a stronger boost from the newly elected government in 1983 which put into place a whole new set of incentives and institutions to increase its attractiveness. This ushered in the "textile era" which lasted until the end of the 1980s. There followed another period of slowdown, and required a fresh set of incentives to give EPZs a third boost by attracting other, non-textile industries from East Asia in particular. It remains to be seen how far this third phase is going to be self-sustaining.

(ii) The heavy dependence of the EPZ on the EU and US markets, and so far on one major product group makes it very vulnerable to the vagaries of international demand. It is also unusually influenced by specifics of the international trade order. For example, the multi-fiber agreements (MFA), in so far as it limits exports from the low wage countries of Asia, seemed to have given the opportunity for the Mauritius textile based EPZ to be established. At the same time it has been pointed out that the linkages with the rest of the domestic economy are poor (e.g., Mathew, 1992). While EPZs might give a substantial boost to manufacturing output and employment in a small economy like that of Mauritius, its role, even as a pump-primer in generating economy-wide growth must remain limited in the absence of such linkages.

(iii) Among the most important special factors helping the success of the EPZ development in Mauritius, is the combination of political stability and sound economic management. The ability of the Mauritius Export Development and Investment Authority (MEDIA) to convince potential entrepreneurs in Hong Kong that the political uncertainty was likely to be less serious in Mauritius was probably crucial – as was its ability to offer sustained concessions on a variety of fronts, including facilities for import of capital and labor and free repatriation of dividends. The island economy was served by an adequate infrastructure even though transport costs to distant markets in Europe and the US might be a problem, unless Mauritius is able to develop significant trade links with neighboring economies in sub-Sahara.

Zimbabwe and Uganda

Zimbabwe is the one country in the RPED set which had a significant proportion of manufactured goods in its export – accounting for about a third of the total value in the early 1990s. As we have seen it is also the only country in which manufactures other than processed primary goods have been important.

The difference with other SSA countries is not due to any obvious difference in factor endowments. The skilled labor–land ratio, in the framework of the Wood hypothesis, was not very different as between Zimbabwe and Uganda, and yet the export of manufactures as a share of total exports was 34% in Zimbabwe in 1990 and just 1% in neighboring Uganda. Noting this huge discrepancy Wood and Jordan reports that in terms of the Wood–Mayer equation, the predicted share of manufactures in both countries should be around 20%. Furthermore the exports from Zimbabwe were much more diversified, with a range of manufactured goods figuring in the list, while Uganda seems to be narrowly specialized in its exports, even within the category of primary products, depending almost exclusively on coffee beans. The authors decided that it might be useful to probe the causes of this huge discrepancy, as it might shed some light on the larger question of the determinants of manufactured exports in the African context.

Did the difference in trade structure reflect similar difference in production structure? Historical data showed that Zimbabwe's manufacturing sector was around 40% of the total tradable goods production in 1960, the share increasing to nearly 60% in the 1965–79 period of UDI (unilateral declaration of independence) and the decade of the 1980s, when the new government took over and continued many of the import control regulations of the UDI period. The exports of manufactures as a share of total exports remained roughly at the level of 30%, ignoring fluctuations. By contrast, Uganda had both a low percentage of manufactures in tradable production and a negligible share of manufactures in exports throughout. The manufacturing share in production and in exports thus went hand-in-hand in the two economies.

A study of the statistical and historical factors in the evolution of the production and export structure of Zimbabwe led them to emphasize four factors which seemed to be particularly important.

(i) First, the impact of trade-cum-industrial policy. Both countries had pursued a fairly similar trade policy in the 1980s. Import controls through licensing and other quantitative measures were practiced in both countries, inducing Sachs and Warner (1995) to classify both countries as "closed." Tariffs were more or less at the same level and not differing between manufactures and primary products. Both had substantially overvalued exchange rates as revealed by the black market premium for foreign exchange. Dollar's price-distortion index for the 1976–85 periods was around the same level for both countries (Dollar, 1992). Thus the difference was in policies pursued well before the restrictive trade regime of the 1980s.

Manufacturing had been actively promoted in Zimbabwe since the 1920s. Direct government assistance to selected industries started in 1930 and continued in later decades. Restrictions on imports during the Second World War accelerated the growth of manufactures, as did the formation of the Central African Federation. Uganda had no such sustained effort at state-sponsored industrial development until the 1980s.

(ii) The role of imported technology and know-how. The two countries differed markedly in the way they absorbed technology imported by immigrants. Zimbabwe benefited hugely from European settlers bringing in their know-how, capital and connections with international markets. By contrast Uganda did have a sizable immigration of Asian entrepreneurs, but they came in mostly as traders, only shifting to some manufacturing activity slowly after they settled in the country. Even then their role as potential entrepreneurs was short-lived. They were expelled during the Idi Amin regime in 1972 leading to a collapse of manufacturing, along with other parts of the economy, in the 1970s.

(iii) Transport and Infrastructure. Associated with the different roles of governments in economic management and their responses to different types of entrepreneurs as immigrants, was the difference in the provision of infrastructure, particularly transport. In 1990 paved roads, electricity generating capacity and telephone lines per person were several times the African average in Zimbabwe and very much lower in Uganda (Wood and Jordan, Table 5, p. 109).

Both Zimbabwe and Uganda are landlocked economies. Milner *et al.* (2002, Table 4) have suggested a way of quantifying the "transport tax" on Ugandan exports to the world market. The tax varies substantially from commodity to commodity, according to the dependence on imported inputs and the weight of the final product. Manufactured goods which figure prominently as potential exports from this type of economy – clothing, textile and footwear – have an effective tax rate in the high range at 80%. (The "tax rate" is effectively halved for transport to neighboring African countries). We do not have comparative figures for Zimbabwe. But there are several reasons why the transport tax could be substantially lower for Zimbabwe. First it is closer to the sea (about half the distance from Uganda to its nearest outlet). Second, its railways are better managed. Third, the road system is much better developed, paved road length in 1990 being three times per square kilometers of area, and nine times per head of population, compared to Uganda. (Wood and Jordan, quoting World Bank data).

(iv) Proximity of Markets. A striking feature of Zimbabwe's exports is that two-thirds of the total goes to African countries, as against an African average of just 7% – and nearly half of the exports to the rest of Africa are manufactures. It appears that the comparative advantage established in Zimbabwe in manufacturing (for all the factors mentioned above) is especially so with respect to other African economies. This has the cumulative advantage of increasing Zimbabwe's competitiveness through the advantages it has secured with access to proximate markets.

Conclusions

This chapter reviewed the major classes of theories prevalent in the literature to account for the marginalization of Africa in the export trade of manufactures. While faulty macroeconomic and exchange-rate policies have undoubtedly hurt some economies, perhaps over extended periods of time, the main debate would seem to be between the theories such as that of Wood who stress resource endowments as being unfavorable to comparative advantage of manufactures in Africa, and the hypotheses which stress high transaction costs as playing the dominant negative role. The evidence from both the multi-country regression analysis a la Elbadawi, and the case study material cited here, lean towards favoring the transaction costs explanation of the low export performance of African manufactures.

It should, however, be clear from the country studies, in particular, that "transaction costs" are neither given nor shaped by current government policies alone. To a large extent they are a product of the interaction of geography with the history and the political economy of the country concerned. While the over-all hypotheses are useful in organizing thought, the attempt to find a general explanation for export stagnation at the macro level, without reference to country-specific economic history, cannot carry us very far.

In the next chapter we revert to firm-level micro analysis. The objective of the analysis is to see what are the characteristics of the firm which help export-orientation, given the economic and business environment facing it.

14 Characteristics and Performance of Export Oriented Firms: Evidence from RPED Surveys

Introduction

This chapter uses the survey material generated by the RPED to throw light on a number of questions relating to the export activity of manufacturing firms in the sample countries. While a good deal has been written on the macro problems of African exports, there has been little discussion so far on the microeconomics of firm behavior relating to exports. The availability of the RPED material enables us to fill the gap to some extent.

The Extent of Export Activity

The following table summarizes the data on export structure of RPED sample firms. The first point to stand out from these figures is that exports are not so insignificant for manufacturing firms as might be concluded from the macro picture for Africa discussed in the last chapter. The percentage of the total sales exported**,** however, varies considerably from country to country. Firms in Côte d'Ivoire export 22% of their total sales. The other Francophone country, Cameroon and Zimbabwe are also significant exporters at more than 10% of sales. But at the other extreme firms in Zambia export only around 2%, and the other Anglophone countries have low export ratios as well. This picture of inter-country differences is in line with that observed in macro data earlier. The table also gives the export ratio by industry. It is seen that in the more export-oriented countries wood products are the more prominent items of export, followed by textiles and metals. Food is an important export item in Côte d'Ivoire and Kenya.

Table 14.1: Export of Manufacturers

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
% Exporting	27.1	37.8	7.4	22.3	11.6	9.7	48
% Exported	10.3	22.4	3.8	6.9	3.7	1.8	11.3
% Exported if Firm Exports	38.1	59.3	40.0	30.9	32.1	17.9	23.5
Observation	196	209	167	220	215	206	200
By Sector							
Food							
% Exporting	29.7	38.2	7.4	33.3	17.8	6.5	38.6
% Exported	7.4	19.3	9.1	16.8	3.8	1.2	4.8
% Exported if Firm Exports	24.9	50.4	55.0	50.3	21.0	17.7	12.5
Metal							
% Exporting	31.7	35.0	10.3	16.7	7.1	5.1	50.0
% Exported	11.6	12.3	0.9	4.2	1.7	0.05	8.0
% Exported if Firm Exports	36.7	34.4	8.3	25.0	24.3	0.75	10.9
Textile							
% Exporting	16.9	32.4	..	13.7	14.6	14.9	52.6
% Exported	6.1	18.7	..	4.4	5.5	2.4	15.7
% Exported if Firm Exports	35.6	59.4	..	32.5	37.8	16.0	29.8
Wood							
% Exporting	39.0	58.4	18.8	35.4	8.2	5.9	44.0
% Exported	19.6	51.0	9.5	6.7	3.1	2.8	10.6
% Exported if Firm Exports	50.2	87.8	50.8	19.0	36.5	42.5	24.0

Characteristics of Export-Oriented Firms

The percentage of exporting firms follows closely the inter-country variations by the percentage of gross value exported, with Zimbabwe showing the highest value at 48%, and the Francophone countries following with 37% of firms in Côte d'Ivoire and 27% of those in Cameroon reported to be exporting. Ghana and Zambia exhibit the lowest export-orientation with under 10% of the firms exporting.

The third line in each block of Table 14.1 is a surprise. The percentage of gross value exported is high in all countries when we confine our attention to just the exporting firms. This is true even in low exporters like Ghana and Kenya. In Côte d'Ivoire the exporting firms reported that more than half of their gross sales went to foreign countries. Evidently, there is a big difference between firms oriented to the export market and others. In fact, the concentration of exporting activity in a group of export oriented firms can be read off by comparing the percentages in the first line with those in the third. Only in Zimbabwe the percentage exported from those exporting at all is lower than the percentage of firms exporting, showing that exporting activity is very widely distributed among the entire sample of firms. All other countries firms show a certain specialization in terms of export activity. This degree of specialization is highest in Ghana, Tanzania and Zambia in that order.

Table 14.2 pinpoints one other major difference among countries. The table reveals a clear relation between size and export-orientation with larger firms showing not only a higher propensity to export but also exporting relatively a larger proportion of their output. Except for Zambia and Tanzania, at least 60% of large firms (100 worker and more) export and the percentage exceeds 80 for the Francophone countries and Zimbabwe. This compares to the very low percentage of micro and small firms (50 workers or less) that have reported exports.

A basic difference, however, is seen between the three countries with a higher propensity to export, Cameroon, Côte d'Ivoire and Zimbabwe, and the other four in our sample. In the former group the exporting activity is clearly more widespread, with a sizable percentage of micro/small and medium firms participating in the export market, along with more than 80% of the large firms who export. In the other group very few of the micro/small and only a small percentage of medium firms export.

While the percentage of exporting firms increases strongly in the large size group in both groups of countries, an interesting fact emerges in that the large firms are less specialized or concentrated in export activity. The percentage of gross value exported by large firms, if the firm is an exporter, is in all countries lower than the percentage of firms exporting in this group, unlike what we have seen earlier for the sample of firms as a whole. Evidently the degree of specialization in exports is much stronger among smaller firms. This can indeed be read off directly by comparing the first and third line within each size-group of firms in Table 14.2. The specialization in exports is heavy among micro–small firms in all countries, while the experience of medium firms is more mixed.

Table 14.2: Export of Manufactures by Firm Size

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
By Size							
Micro and Small							
% Exporting	10.9	20.0	1.1	4.4	3.7	3.1	14.6
% Exported	3.1	9.2	0.05	1.4	1.0	0.3	3.6
% Exported if Firm Exports	28.1	48.2	5.0	31.3	27.2	9.3	24.8
Medium							
% Exporting	40.0	56.5	11.1	3.8	23.5	11.4	43.3
% Exported	9.9	27.8	10.9	13.3	12.9	1.3	6.8
% Exported if Firm Exports	24.9	49.2	98.0	35.1	55.0	11.4	15.7
Large							
% Exporting	84.9	82.6	75.0	63.1	44.1	29.3	80.7
% Exported	40.8	60.0	28.0	18.2	12.3	6.7	19.9
% Exported if Firm Exports	48.1	72.6	37.4	28.9	27.9	22.9	24.7

Table 14.3 presents export ratios by type of the enterprise – Private, State and Joint State and Private. For the private enterprises the statistics are also presented by the ownership structure and by the ethnicity of the owner/manager. Starting with the private local firms and for the Anglophone countries where a good percentage of local firms are owned by ethnic-non-Africans, in almost all cases, the African owned/managed firms show a lower propensity to export and a lower export ratio if they decide to do so. This may be partially attributed to the fact that African firms are on average smaller. Furthermore, with the exception of Tanzania, firms with foreign ownership including those that are owned jointly by foreign and local entities appear to have a significantly higher propensity to export. It is also interesting to note that firms with state ownership also show higher propensity to export, although the small number of state owned firms included in the sample may prevent any general conclusion.

As regards specialization in exports, it is apparent, from a comparison of the percentages given in the two lines of each panel, that the privately owned firms are generally more specialized, and the African ones more so. Again this might be partly a function of the smaller size of such firms.

Table 14.3: Export of Manufactures by Ownership of the Firm

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Private							
Local							
African							
% Exporting	11.4	14.3		4.9	3.4	4.3	10.7
% Exported if Firm Exports	24.7	55.6		26.8	15.3	9.3	43.8
Observations	123	77		81	117	94	56
Non-African							
% Exporting	0	.		23.6	16.2	9.4	53.5
% Exported if Firm Exports				37.5	63.3	16.3	25.2
Observations	2	0		89	37	64	86
Foreign							
% Exporting	54.2	40.2	50	42.9	0	23.1	71.4
% Exported if Firm Exports	66.5	59.9	20	25	0	27.8	9.6
Observations	24	22	2	14	10	13	14
Joint Foreign & Private							
% Exporting	56.5	71	0	52.4	9.1	10	81
% Exported if Firm Exports	36.9	69.8	0	27.1	2	75	26.1
Observations	23	31	9	21	11	10	21
State and Joint							
% Exporting	65	100	50	60	33.3	23.5	90.5
% Exported if Firm Exports	25.3	43.9	32.6	32.5	41.7	28.9	12.0
Observations	20	9	8	5	33	17	11

Concentration of Export Activity

A more direct way of analyzing the degree of specialization in export activities is to look at the concentration of exports among those firms that do export. Table 14.4 presents some data on the distribution of the export/sales ratio by the percentage of gross value exported by the firms that do export. It is seen that the mean of the distribution exceeds the median by a significant margin in all countries except in Côte d'Ivoire – suggesting that the distribution is strongly skewed to the left. A large number of firms export a small proportion of their sales as can also be read off from the data presented in the bottom panel. Only in Côte d'Ivoire as much as 44% of the firms export more than three-quarters of their gross value produced (and the distribution is skewed to the right). We conclude that while a large number of exporting firms in Côte d'Ivoire specialize in export, in other countries only a small fraction do so.

Table 14.4: Distribution of Export Ratio

	Cameroon	*Côte d'Ivoire*	*Ghana*	*Kenya*	*Tanzania*	*Zambia*	*Zimbabwe*
Mean of Export Ratio	38.1%	59.3%	40%	30.9%	32.1%	17.9%	23.5%
Median of Export Ratio	23%	68.9%	20%	15%	20%	10%	13.8%
Export Ratio	***Number (percentage) of Exporters***						
0–25%	28 (52.8)	21 (26.6)	6 (54.5)	32 (65)	14 (56)	17 (85)	63 (65.6)
25–50%	7 (13.2)	13 (16.5)	1 (9.1)	5 (10.2)	5 (20)	1 (5)	21 (21.9)
50–75%	8 (15.1)	10 (17.7)	1 (9.1)	4 (8.2)	3 (12)	1 (5)	7 (7.3)
>75%	10 (18.9)	35 (44.3)	3 (27.3)	8 (16.3)	3 (12)	1 (5)	5 (5.2)

Note: The numbers in parentheses are standard deviations.

But although the proportion of firms exporting a large proportion of their output might be small in all countries except Côte d'Ivoire, the total value of exports might be concentrated in a small number of large firms. Table 14.5 presents the share of top five exporters in total export and CR5. Although in general the concentration of exports appears to be less than the concentration of sales as reported earlier in Chapter 2, the concentration ratio is high. Even for countries such as Zimbabwe, Kenya, and the Francophone countries where a good percentage of firms do export, the CR% remains high at a minimum of 51%.

Table 14.5: Export Share of Five Largest Firms

	Firm 1	*Firm 2*	*Firm 3*	*Firm 4*	*Firm 5*	*Share Per Firm*	CR5
Cameroon	25	17	10	5	4	1.92	60
Côte d'Ivoire	30	13	7	6	5	1.39	60
Ghana	26	19	18	9	7	9.09	79
Kenya	16	13	13	12	8	2.08	61
Tanzania	37	17	14	13	8	4.35	88
Zambia	43	28	12	8	2	4.76	94
Zimbabwe	24	12	6	5	4	1.08	51

Note: The indices are averaged over all the waves.

Another way of looking at the picture is to construct a Lorenz curve for the value of exports. We have already presented data on the percentage of firms that do export at all in Table 14.1 above. But it is interesting to know if, among these firms, we find a significant specialization in export activity. Thus the Lorenz curve is confined to the data from the exporting firms and for those four countries with significant number of exporters.

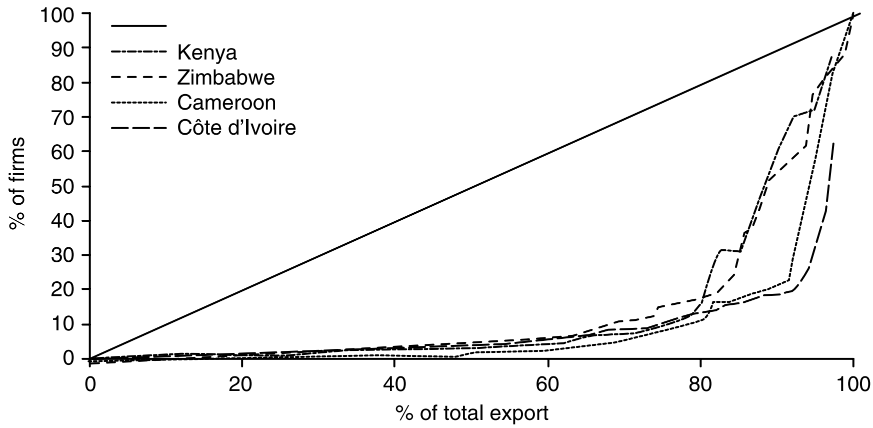

Figure 14.1: Distribution of Export Value

The Decision to Export

The analysis of export has generated numerous studies over the years many of which focused on the determinants of export. However, the literature reviews on the topic (Miesenbock, 1988) have found it very difficult to make generalization on these determinants and have argued that much of it depends on many factors defining firms' market position as well as the environment in which they operate. These factors, in general, can be grouped into several broad categories.

The first group includes variables related to firms' characteristic. These variables include firm size, the volume of sales, the expenditure in human resources, and the degree of internationalization. Other variables drawn from organizational theory such as those measuring the characteristics of managers are also studied. Several authors have analyzed the impact of variables such as level of education, nationality, knowledge of a foreign language while others have studied subjective variables such as managers' attitude toward foreign markets, their perception of risk or their values (Bijmolt and Zwart, 1994).

Another group of variables that have been studied are those related to the competencies of firms. These variables focus primarily on the way firms organize and use their resources and include variables such as management capabilities (planning, controlling, etc.), information gathering activities and specific technology/products. It is also possible to consider an additional group of variables related to the firms' environment, including characteristics of the industry, markets in which they operate and the prevailing public policy. Finally, from the marketing perspective some authors also have included strategy-related variables such as elements of a firm's marketing mix (1994; Lee and Yang, 1990).

Some other authors, however, have focused their attention more specifically. For instance, Azam *et al.* (2000) have analyzed the relations between domestic competitions and export performance of manufacturing firms in Côte d'Ivoire from both a theoretical and empirical points of view. They argue that the natural trade barriers entailed by high transportation costs in Africa have helped African manufacturing firms to typically enjoy some monopoly power in their domestic market. Hence, even if they are facing a strong competition in the foreign market, they have the ability to discriminate between the two segments of their market, where they can charge different prices. They provide a simple theoretical framework for analyzing this issue which as they state is somewhat related to the models used in the dumping literature. The simple model analyzed shows that the level of output will be determined by the equality between the marginal cost and the export price, net of transportation cost, while the level of domestic sales depends on the market power that the firm has. A strong market power provides an incentive to restrict domestic sales, in an attempt to get a high price on this segment. Azam *et al.* argue that the impact on the firm's export performance of enhanced domestic competition, as measured by an increase in the number of competitors in the domestic market, is ambiguous – while a new entrant increases the quantity produced by the industry, which tends to push exports up, it also reduces the market power of the incumbent firms, thus reducing the incentive to restrict sales on the domestic market.

In this section, these studies are used in the framework of a simple Probit model to analyze the variables that may affect the export performance of a firm. The variables used for this analysis in addition to the country and sector dummies include those that affect firm's performance directly such as overall productivity as measured by employment size and the capital intensity, *the relative labor cost* (measured by the total wages/value added) and firm age. In accordance with our earlier analysis, other firm specific characteristics are also included. These variables include, ownership structure, as defined by foreign or state ownership, entrepreneurship dummy, location (capital city) dummy, a dummy variable for licensing agreement with foreign firms, a dummy for those firms that have invested in the last year, and the number of competitors. The results are provided in the following table.

Table 14.6: Probit Estimation of Determinants of Export

	Model 1	*Model 2*	*Model 3*	*Model 4 −Micro Firms*	*Model 5 −Large Firms*
Constant	−2.61**	−3.36**	−1.12**	−2.36**	−2.51
Log (L)	0.419**			0.458**	0.480**
Log(K/L)	0.067*	0.237**		0.044	0.033
Labor Unit Cost	−0.036	−0.027	−0.116**	−0.026	−0.059
Log (Firm Age)	0.029	0.137	0.396**	0.024	0.066
Cameroon	−0.195	−0.537**	−0.438**	−0.179	−0.160
Côte d'Ivoire	−0.035	0.110	−0.384*	−0.065	0.046
Ghana	−0.698**	−0.756**	−1.06**	−0.632**	−1.01**
Kenya	−0.466**	−0.516**	−0.704**	−0.476**	−0.426*
Zambia	−0.918**	−1.05**	−1.24**	−0.982**	−0.563*
Tanzania	−1.22**	−1.31**	−1.46**	−1.32**	−1.03**
Foreign Ownership	0.215*	0.232*	0.531**	0.162	0.323*
State Ownership	−0.289	0.035*	0.443**	−0.313	−0.391
Entrepreneurship	−0.284**	−0.363**	−0.481**	−0.324*	−0.185
Capital	0.010	0.019	0.024	−0.086	−0.066
License	0.269*	0.344**	0.489**	0.246*	0.498**
Investment	0.091	0.211*	0.215*	0.127	0.061
Number of Competitors	−0.021**	−0.019	−0.031**	−0.019*	−0.039**
Observations	872	872	872	620	650
Quasi R^2	0.3870	0.3497	0.2809	0.3152	0.2846

Note: *, ** indicate significance at 10% and 5% respectively. Standard Errors are in parentheses. Model 4 excludes Micro Firms (<10 employees), and Model 5 excludes Large firms (>=100 employees).

The employment size of the firm is the most significant contributor to the firm's decision to export besides country dummies. Capital intensity is not significant when used in conjunction with employment size, specially when the sample excludes micro firms. The firm size might partly reflect higher productivity, given the earlier evidence of increasing returns to scale. Our earlier finding in Chapter 10 that the export-oriented firms were found to be more efficient also supports this interpretation. But the size effect might also proxy some organizational features pertaining to the entry into the export market. Among other factors, ownership dummies have the expected sign, with foreign firms more likely to export and state owned firms less likely. Entrepreneurial firms have a significantly lower propensity to export even after controlling for firm size. This might partly reflect the lower export activity of firms owned/managed by black Africans. Firms with foreign licensing contracts also appear more likely to export while to our surprise investment behavior of the firm was not found significant. Furthermore, in line with the findings of Azam *et al.* (2000) for the specific case of Côte d'Ivoire, we found strong overall evidence suggesting that less competition enhances firm's ability to export. To further investigate these effects we have re-estimated the model after dropping firm size (model 2) and firm size and capital intensity (model 3). The results are in line with that found in model 1, except that unit labor cost becomes significant, but with a perverse sign. This variable is likely to be a proxy for capital intensity rather than firm-level productivity.

Performance of Exporting Firms

The issue of the export and productivity has always been considered important in the literature. Most studies, however, use macro data to address the issue. More recently, some researchers have used panels of firms in different countries. The extra cross-sectional variation makes identification of the export effect more robust. For instance, among the literature on USA economy, Bernard and Jensen (1995) illustrate clearly that exporters are different from average plants, having higher productivity being one of the differences. The detailed nature of panel data provided by RPED surveys enables us to take a further step in this direction. In what follows we study the performance of exporting firms versus others in some detail. This is studied within two sections; first we analyze in some detail the differences that may exist between performance of the exporting firms and non-exporting firms. We, then, attempt to explain this difference.

Export Orientation and Efficiency

In the analysis of firm's efficiency in Chapter 10 we came to the conclusion that firms that engage in trade in general and the exporting firms in particular are more efficient. We studied firm efficiency for each country separately and for all countries pooled. Trade orientation was the strongest factor affecting the technical efficiency. Firms that engage in trade were found to be more efficient in all five Anglophone countries studied.

Furthermore, the export-oriented firms were found significantly more efficient than others including those that engage in no trade and those that engage in import only. This result was also true in the context of the so-called Africa frontier and hence gave a strong support to the hypothesis that export orientation enhances efficiency or that more efficient firms are more likely to engage in export. We repeat the estimation of the Africa frontier with export ratio and size of the firm as the determinants of inefficiency to further study the relation between efficiency and export orientation. It is worth noting that for each model, country and time dummy is also added to capture time and country specific effects but are not reported. The results are presented in the following table:

Table 14.7: Technical Efficiency and Export Orientation

	All Firms	*>=10 Workers*	*>=50 Workers*
Determinants of Inefficiency			
Log (Size)	1.65 (0.38)	2.75 (0.55)	2.42 (0.67)
Export Ratio	−11.29 (3.76)	−7.74 (2.66)	−4.24 (1.67)
Log (Size)*Log (Size)	−0.320 (0.062)	−0.362 (0.05)	−0.356 (0.093)
Export Ratio*Export Ratio	4.41 (2.08)	2.03 (1.02)	1.52 (0.99)
Log (Size)*Export Ratio	1.41 (0.47)	1.19 (0.55)	1.104 (0.70)
Variance Parameters			
$\sigma^2_s = \sigma^2 + \sigma_v^2$	3.095 (0.44)	2.855 (0.42)	3.289 (0.71)
$\gamma = \sigma^2/(\sigma^2+\sigma_v^2)$	0.789 (0.03)	0.795 (0.035)	0.853 (0.035)
Log-Likelihood	−3442.2	−2412.1	−1451.23
Mean TE	0.5882 (0.17)	0.5980 (0.18)	0.6039 (0.20)
Tests			
H: No Size Effect	19.56**	14.5**	8.58*
H: No Export Effect	12.98**	9.12*	7.94*
Distribution			
Non Exporters	0.563 (0.17)	0.560 (0.19)	0.548 (0.21)
Exporters			
>=50% Exporters	0.690 (0.14)	0.691 (0.14)	0.699 (0.16)
<50% Exporters	0.669 (0.12)	0.690 (0.13)	0.690 (0.16)

Note: Standard Errors are in parentheses. ** stands for significance at 5%, * at 10%.

As expected the exporting firms are found more efficient in all three models with differing degrees of significance – more significant so in the model where all firms are included but still significant even when only medium and large firms are included. For the general model, the average technical efficiency measure is 0.5882 when all firms are considered whereas it is 0.690 for those that export more than half of their product and

0.669 for those that export less than 50%, both significantly higher than the average technical efficiency of non-exporters which stands at 0.563. The distribution of the efficiency for the exporters and non-exporters are provided in the following figures. As these figures demonstrate, the exporters are not only more efficient they show a lot less dispersion within themselves unlike non-exporters where the firms are dispersed within a large spectrum of efficiency.

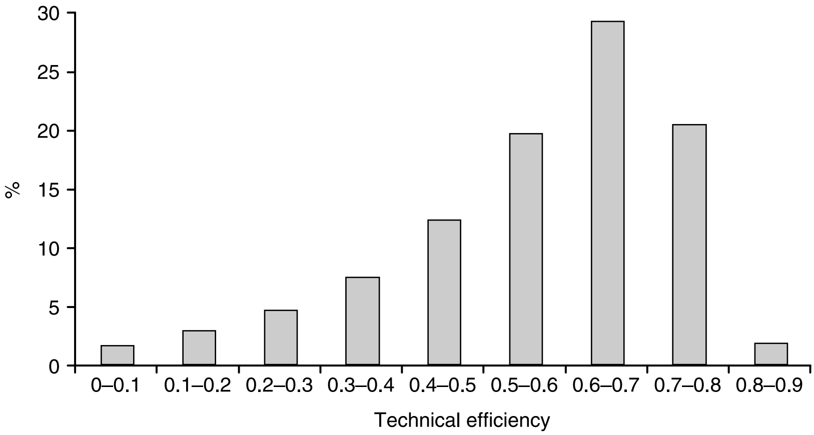

Figure 14.2: Distribution of Technical Efficiency, Non-Exporters

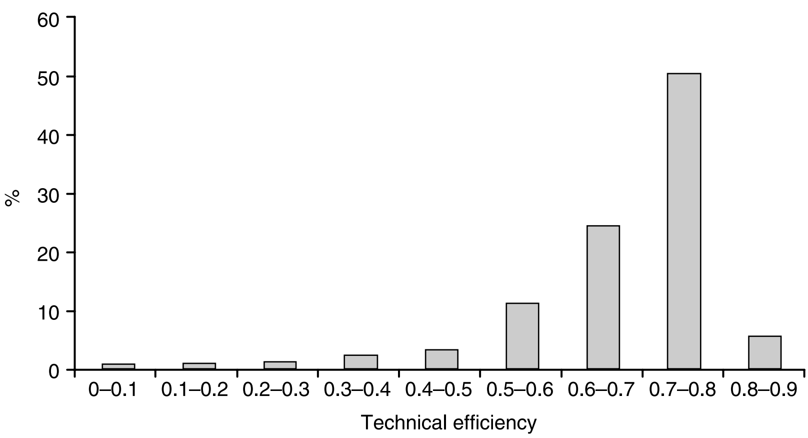

Figure 14.3: Distribution of Technical Efficiency, Exporters

The quadratic function relating the size and export orientation to the technical inefficiency as depicted in Table 14.7 also reveals an important difference between the effect of these two variables on efficiency. The relation between technical inefficiency and size shows a maximum at a relatively small value of size, and the effect of size on technical inefficiency decreases thereafter. For instance in the general model considered here, this quadratic function is maximized when the size of the firm is 13 and any increase in the size thereafter *citreous paribus* leads to lower technical inefficiency and therefore higher technical efficiency. However, evaluating at the means, the relation between export orientation and technical *inefficiency* reaches a *minimum* when the export ratio is just above 50%, and unlike the size effect, the export orientation effect does not show a dramatic increase with the export ratio. Thus, according to the results obtained from Table 14.7, exporting firms are found to be significantly more efficient than non-exporting firms. However, we do not observe a dramatic difference between the minority or majority exporters. This can also be verified if one considers the distribution of the technical efficiency by the export ratio as provided in the following Table 14.8. As one can observe the exporters are much more efficient than non-exporters but those with higher export orientation do not appear to be more efficient.

Table 14.8: Distribution of Technical Efficiency by Export Ratio

	All Firms	*>=10 Workers*	*>=50 Workers*
Export Ratio			
0–25%	0.669	0.691	0.694
25–50%	0.679	0.700	0.692
50–75%	0.662	0.668	0.664
75–100%	0.691	0.689	0.662
Average	0.6755	0.691	0.6841

Others using different approaches have also verified a positive relation between exporting and efficiency in the RPED set of countries. For instance, instead of using a technical efficiency framework, Van Biesebroeck (2001) uses a more traditional Hicks-neutral productivity index to estimate the productivity gap between exporters and non-exporters in nine sub-Saharan countries. These countries in addition to the seven RPED countries include Ethiopia and Burundi. The results as reported in the Table 14.9 include the median productivity level and growth rate separately for exporters and non-exporters. These results are also in accordance with our findings and reveal that micro, small and medium sized exporters are more productive than the corresponding non-exporters and that micro, small, and large sized exporters have higher productivity growth as well.

Table 14.9: Productivity Comparison in Level and Growth Rate (Medians)

	Size Distribution		*Productivity Level*		*Productivity Growth*	
Size	Non-Exporter	Exporter	Non-Exporter	Exporter	Non-Exporter	Non-Exporter
Micro (1–10)	43%	4%	1.06	1.18	−0.038	−0.113
Small (11–50)	37%	18%	0.94	1.14	−0.022	−0.049
Medium (51–50)	16%	44%	0.97	1.01	0.074	−0.092
Large (>250)	4%	34%	1.20	0.94	−0.085	−0.076

Source: Van Biesebroeck (2001)

Export Orientation and Efficiency: the Issue of Causality

In the last section we demonstrated that on average exporters are more efficient (productive). This finding is not too controversial as many other studies have established this relationship using both micro and macro data. However, what is controversial is why this efficiency gap exists. Theoretically, the existing literature explains this gap in two ways. First, the process of self-selection ensures that more efficient firms enter the export without necessarily benefiting from their exporting activity. Second, exporters increase their efficiency through what is called learning-by-doing process where they can benefit from their international exposure. This international exposure enables firms to transfer technology and utilize their scale economies. Empirical work, however, has found it hard to distinguish between these two conflicting and in many cases overlapping effects.

One way to address the issue of causality within the framework of technical efficiency used in the last section is to see how export orientation affects the level of efficiency of the firm in subsequent periods. To do so we need to define the export orientation in a way that does not depend on prior efficiency levels and as Kraay (1997) has noted, a richer classification of exporters may help facilitate the direction of causality. In the RPED data set we have data for three periods (years), which unfortunately are successive years. Thus the prior history of exporting could be used to some extent to explain subsequent changes in efficiency. Hence, in addition to a dummy variable for initial exporters (those who exported in period 1), we could also use dummy variable for continued exporters, those that exported in periods 1 and 2, and entrants, those that exported in period 2 and beyond but did not export in the first period. Note that the dependent variable is efficiency in the third period, but export orientation in the third period has not been considered. This helps to minimize the effect of what is called self-selection bias in so far as more efficient firms tend to become exporters too. We expect to see both continuing exporters and entrants to be more efficient than the non-exporters if the learning-by-doing holds and that the entrants to be less efficient than the continuing exporters as they have yet to benefit fully from their experience on the export market. The results are provided in the following table.

Table 14.10: Technical Efficiency and Export Orientation

	Model (1)	*Model (2)*
Determinants of Inefficiency		
Log (Size)	1.019 (0.363)	1.122 (0.372)
Log (Size)*Log (Size)	−0.232 (0.059)	−0.247 (0.109)
Initial Exporter	−1.93 (0.610)	
Continuous Exporter		−1.753 (0.303)
Entrant		−1.146 (0.664)
Variance Parameters		
$\sigma^2_s = \sigma^2 + \sigma_v^2$	2.313 (0.420)	2.451 (0.448)
$\gamma = \sigma^2/(\sigma^2 + \sigma_v^2)$	0.734 (0.036)	0.747 (0.041)
Log-Likelihood	−1072.3	−1074.7
Mean TE	0.5922 (0.17)	0.5876 (0.17)
Tests		
H: No Size Effect	11.82**	11.74**
H: No Export Effect	8.24**	12.18**
Distribution		
Non Exporters	0.5473 (0.17)	0.5454 (0.17)
Exporters		
Initial Exporter	0.6812 (0.13)	
Continuous Exporter		0.703 (0.13)
Entrant		0.636 (0.12)

Note: Standard Errors are in parentheses. ** indicates significance at 5%.

As one can see, the results confirm strongly that the exporters are more efficient – model (1) shows that the mean value of technical efficiency for exporters is 0.6812 much higher than that of non-exporters, i.e. 0.5473.

Furthermore, as model 2 reveals, both entrants and continuing exports are significantly more efficient than non-exporters but that the entrants are slightly less efficient than the continuing exporters too, which supports the learning-by-doing hypothesis although the difference is not significant. In brief, this analysis provides strong evidence suggesting that the exporters are more efficient. It also provides some evidence suggesting a causality effect emanating from export orientation towards efficiency. However, the simultaneous estimation of determinants of efficiency, although it enables a more efficient estimation method, hinders a more direct test of causality.

Econometric Issues: Bigsten et al.

Bigsten *et al.* (2000) use a more traditional two-stage approach to analyze the relation between efficiency and export. This method although less efficient in nature, enables a more direct test of the aforementioned causality relation. In their approach, Bigsten *et al.* use a balanced RPED panel data for four countries (Cameroon, Ghana, Kenya, and Zimbabwe) in which, the first stage is used to estimate the efficiency measures and then these efficiency measures are regressed over explanatory variables including variables defining export orientation. Bigsten *et al.* initially examine the relationship between time-invariant productivity level and initial export history. They explain that this specification is prone to the problem that previous high efficiency will contribute both to current efficiency and to exporting. Hence, in order to control for self-selection of the efficient into exporting, they include the efficiency for the first period in regression using the time-variant efficiency index in time 2 and 3. They argue that under a strong assumption, if the initial exporter dummy remains significant, then this can be interpreted as demonstrating a causal relationship from exporting onto efficiency. Specifically, it must be assumed that there is no serial dependence and that although firm performance and exports are jointly determined, exports are predetermined with respect to the firm's decision making. The results of estimates of the efficiency level index, as reported in Table 14.11 and in terms of firm-level characteristics, demonstrate that initial exporters tend to exhibit significantly higher levels of efficiency than other firms during the period.

In the next step, Bigsten *et al.* replace the variable representing the initial exporter, which denoted whether the firm was exporting in the first period, by a richer depiction of export history in line with what we explained earlier. Thus, prior history of exporting is used to explain subsequent changes in efficiency. As shown in Table 14.11 model (c), the coefficients of the dummies for continuous exporters and for new exporters are positive and significant. Thus, controlling for other determinants of changes in efficiency, exporting in one period raises efficiency in the next period. The coefficients imply a quite substantial effect where one additional year of exporting raises the efficiency of continuous exporters by almost 13%. Further, the coefficient on new exporters is larger than that for continuous exporters indicating that the first year of exporting raises efficiency by 14%. Bigsten *et al.* interpret this as consistent with the hypothesis that firms catch up as a result of encountering learning opportunities and competition, closing the gap with best practice at a diminishing rate.

Table 14.11: Determinants of Technical Efficiency Level

	(a) Random effect efficiency level OLS	*(b) Time Variant efficiency level GLS*	*(c) Time variant efficiency level OLS*
Constant	1.971**(5.19)	0.707**(2.13)	0.694**(2.21)
Initial exporter	1.480**(3.10)	1.339**(4.35)	
Initial efficiency		0.389**(8.97)	0.373**(5.43)
Continuous exporter			1.268**(2.71)
Entrant			1.347**(2.24)
Observations	303	606	303
R-squared	0.20	0.30	0.25

Source: Bigsten *et al.* (2000).
Note: t-statistics, based on robust standard errors in models (a) and (c), in parentheses.
* Indicate statistical significance at the 10% level **Indicate statistical significance at the 5% level. (a) Probability that H0: "All coefficients except constant is zero", is true. Some of the original variables are not reported to save space.

Following Bernard and Jensen (1999) who study the causal relationship between exporting and productivity at the firm level in the USA, Bigsten *et al.* also reformulate their analysis with the growth in efficiency as the dependent variable. They follow their previous structure of first introducing exporting only as a dummy describing behavior in period 1, and then replacing this with a richer description of exporting history. As model (a) in Tables 14.12 reveals firms' export status during the initial year is significantly correlated with productivity growth during the entire sample period, for all specifications.

Table 14.12: Determinants of Growth of Technical Efficiency

	Model (a)	*Model (b)*
Constant	−0.932**(2.33)	−0.990**(2.48)
Initial exporter	1.191**(2.26)	
Continuous exporter		0.964*(1.82)
Entrant		1.152*(1.87)
Observations	303	303
R-squared	0.08	0.08

Source: Reproduced from Bigsten *et al.* (2000) table 4 and table 5.
Note: t-statistics, based on robust standard errors in models (a) and (c), in parentheses. * Indicate statistical significance at the 10% level **Indicate statistical significance at the 5% level. (a) Probability that H0: "All coefficients except constant is zero", is true. Some of the original variables are not reported to save space.

Model (b) in Table 14.12 distinguishes the performance of continuous exporters and new entrants in the exporting market, from non-exporters and quitters during the first two years of the survey and demonstrates that new entrants show a significantly higher efficiency growth rate (12%) compared to non-exporters and quitters for all specifications during the entire period under consideration. Continuous exporters also show higher efficiency growth than non-exporters and quitters (10%).

In brief the results presented in Bigsten *et al.* found that exporting has a large and significant effect on efficiency. Even for firms with a previous history of exporting, an additional year of exporting raises efficiency in the next period controlling for other factors by 10%. The efficiency gain for a new entrant to exporting is even larger. They explain that this relation between efficiency and export orientation can be explained by two means, presence of learning-by-exporting and self-selection effects. To formally test whether the association between exporting and efficiency reflects more than self-selection, Bigsten *et al.* simultaneously estimate an efficiency function and a dynamic discrete choice equation of export market participation accounting for correlated error terms, using non-parametric maximum likelihood. They argue that the results were similar to those reported by Bernard and Jensen (1999) and Clerides *et al.* (1998) regarding the presence of sunk costs into exporting and of the self-selection of the relatively most efficient firms into the export market. They, hence, conclude that contrary to previous results, the RPED data is consistent with a causality pattern also flowing from exporting experience to improvements in performance, providing support for the learning-by-exporting hypothesis as well, finding that supports our earlier observations. They argue that the distinctive nature of these results for Africa when compared to those with other regions suggests that whether or not there are efficiency gains from exporting depends upon the market environment in which the firm is located: smaller markets and technological backwardness make the export experience more advantageous. Finally, they conclude that if this is correct then, contrary to the suggestions of some commentators, Africa has more to gain than other regions from orientating its manufacturing sector towards exporting.

An Alternative Approach

In a more recent study, Van Biesebroeck (2001) addresses the problem in a somewhat different way. To begin with he uses a more traditional Hicks-neutral productivity index rather than technical efficiency as his measure of firm-level efficiency. He then uses two different approaches to address the issue of causality between export orientation and productivity. First, he argues that if learning-by-exporting effects are important, exporters should be able to increase their productivity advantage over non-exporters with time spent in the export market and that this productivity gap should be larger for firms that sell a larger share of their output abroad. If this were true, then a practical approach to uncover plausible learning-by-exporting effects would be to look closely at whether firms that are exporting for a longer time or export a larger share of their output have indeed a larger productivity advantage. Van Biesebroeck, therefore, regresses the productivity index, as defined earlier, on a number of dummies characterizing the export experience of a firm after controlling for country, sector, time, and firm-size effects. He also uses the growth rate of productivity as dependent variable and dummies for the length and intensity of the export experience. The results are summarized in the Table 14.13.

The figures provided in Table 14.13 to a good extent confirm the hypothesis that exporters enjoy a higher productivity level: the numbers in the top-left panel show that on average exporters enjoy a 4% productivity advantage. Furthermore, judging from the lagged exporter dummies one can also conclude that long time exporters, namely those that have been exporting for all three years of the sample unlike those that have just entered the market enjoy 9% additional productivity advantage which bring their total productivity advantage over non-exporters to around 13%. According to Table 14.13, firms that exit the export market in the next period, have a lower productivity level even before they exit, a finding consistent with the self-selection hypothesis and that whether these firms have a higher or lower productivity level than non-exporters, depends on the number of years they were active on the export market, a finding that according to Van Biesebroeck supports the learning-by-exporting hypothesis. The relation between export orientation and productivity growth has been analyzed in the top-right panel. Here, firms that have been active in the export market for the entire sample show a productivity growth advantage of more than 18% over non-exporters and 13% over those than have bee exporting since the last two periods while the difference between non-exporters and those that just entered the export market is negative but negligible.

Table 14.13: Productivity Level and Growth Conditional on the Export History and Intensity

Independent Variable	*Productivity Level*	*Productivity Growth*
Export History		
Exporter at t	0.040 (0.039)	−0.032 (0.058)
Exporter at $t{-}1$	0.001 (0.050)	0.052 (0.057)
Exporter at $t{-}2$	0.090 (0.074)	0.162 (0.089)
Stop Exporting at $t{+}1$	−0.111 (0.090)	−0.264 (0.150)
Export Intensity		
Any Exporter	0.132 (0.047)	0.077 (0.061)
Exports >10% sales	−0.184 (0.059)	0.038 (0.076)
Exports >50% sales	0.032 (0.076)	0.031 (0.097)
Exports >90% sales	0.153 (0.105)	−0.148 (0.149)

Source: Van Biesebroeck (2001).

Note: OLS regressions with dummies controlling for country, sector, time, and firm size. Standard errors in parentheses.

The second prediction of the learning-by-doing hypothesis pertains to the positive relation between export intensity and the productivity advantage. This has been analyzed for both productivity and productivity growth in the lower two panels where it is found that in general, firms that export a larger share of output also exhibit larger productivity advantage. However, surprisingly, firms that export between 10% and 50% of output show a lower productivity level than non-exporters, although the difference is insignificant. Numerically, the productivity advantage over non-exporters stands at around 15% for firms that export only a small portion of their output (less than 10% of sales) or almost their entire output (more than 90% of sales). Using a quadratic specification for the export share Van Biesebroeck reports a convex function with a minimum efficiency level for an export share around 20%. The productivity growth results reveal gradually increasing productivity growth if the export share rises. Only firms that concentrate almost completely on exporting show a lower productivity growth.

In brief, as Table 14.13 demonstrates, firms with a longer export history show higher productivity level and higher productivity growth, and this is also true for firms that export a higher proportion of their output. Van Biesebroeck argues that this finding is more supportive of learning-by-exporting than self-selection. However, consistent with our findings earlier, many of the coefficients, specifically those related to the intensity of export, are not significant. This makes the reported results less reliable and necessitates a more supporting analysis and takes us to the second approach used by Van Biesebroeck; the use of the endogenous nature of the export decision explicitly.

The main question Van Biesebroeck intends to answer here is whether a firm that exports has a higher productivity than it would have without exporting or put it differently whether the experience gained in exporting allows a firm to produce more output with the same amount of inputs. To address this question as we saw earlier traditionally a two-stage approach is used in which in the first stage a productivity measure is calculated and in the second step, productivity is regressed on the export dummy, controlling for other variables. It has been argued, however, and rightfully so that this two-stage method suffers from two shortcomings. First, if the export dummy is correlated with the set of repressors used in the first stage, then the first-stage estimation will suffer from the so-called omitted variable bias and hence yield biased estimates. Second, given that firms self-select in the export market, their inputs might be correlated with export status and if so then this will lead to a biased estimator for the second stage as well. Hence, to overcome these problems, instead of using a two-stage approach one can include the export dummy directly in the production function. However, this requires the export dummy to be independent of the residuals which is difficult to attain since the endogeneity of the exporting decision will likely cause correlation between the export decision and the residuals due to the unobserved productivity differences. As Van Biesebroeck puts it "if more productive firms are more likely to enter the export market, the correlation between the export dummy and output is not necessarily the result of learning-by-exporting effects as the export status for firms is not randomly assigned." Hence, he argues that, a consistent estimator for the production function requires instruments to control for the endogeneity of unobserved productivity differences and input choices.

The results from estimation of this production function are summarized in Table 14.14. In the first column the original model i.e. the OLS estimates of the production function together with export dummies are provided. In the second column, capital and labor inputs are instrumented while in the third column additional instruments including dummies for the location of the firm, ethnicity of the owner, and foreign ownership, are used for the export dummy. The intuition behind selection of these instruments lies in the presumption that firms located in the capital will be more prone to exporting simply because transport infrastructure is better developed, the ethnicity of the owner influences the extent of domestic and foreign contacts since if the owner belongs to a domestic minority or speaks a foreign language, the firm is more likely to export, and finally that firms with some foreign ownership are, *ceteris paribus*, also more likely to export. The final column replicates the results with contemporaneous export status instead of the lagged dummy.

Table 14.14: The Effect of Exporting on Output

Estimation Method	*OLS*	*IV (L, K)*	*IV (L, K, EX)*	*IV (L, K, EX,)*
Lagged Export (EX_{t-1})	0.052 (.055)	0.006 (.057)	0.351 (.254)	
Export (EX_t)				0.226 (.286)
Labor	0.445 (.024)	0.378 (.035)	0.301 (.042)	0.316 (.044)
Capital	0.131 (.011)	0.236 (.021)	0.235 (.021)	0.239 (.021)
Material	0.539 (.013)	0.489 (.015)	0.510 (.016)	0.506 (.017)
Time	0.012 (.039)	0.015 (.040)	0.005 (.040)	0.003 (.040)

Source: Van Biesebroeck (2001).

Note: OLS regressions with dummies controlling for country, sector, time, and firm size. Standard Errors in parentheses.

The results provided in Table 14.14 in particular those of the third column are in general supportive of the learning-by-exporting hypothesis. A closer look at these results indicates that as one might expect using instrument for inputs raises the capital coefficient at the expense of labor and that all input coefficients are plausible. Furthermore, judging by the coefficient of time dummy, the productivity growth is negligible and returns to scale stands at around 1.05, in line with earlier findings. Comparing the coefficient of lagged export in the second and third column indicates that the use of instrumental variables to control for the endogeneity of the export decision raises the productivity advantage for exporters to 35.1% from close to negligible and that even if one uses contemporaneous export dummy instead, the productivity advantage still remains high at around 22.6%.

Why Are Exporters More Productive?

So far we have established that the exporters are more efficient and that there is some evidence suggesting that the export enhances productivity. This brings us to an important question with significant policy implications; why does export enhance productivity? The economic literature addressing the issue of export and productivity focuses on several different reasons. First, the primary benefit of export is to gain access to larger markets and hence to exploit economies of scale not possible in the local market. Van Biesebroeck finds returns to scale as the most important factor contributing to the productivity gap between exporters and non-exporters implying that exporters have exhausted scale economies, while non-exporters are producing at a point on the production function where there are significant increasing returns to scale. The information we presented in previous chapters, in particular those of Chapter 7 can also provide support for this. In Chapter 7 we showed that lack of demand is one of the most important obstacles to expansion as observed by the managers. Furthermore, we showed that the exporters perceive demand constrains as less severe holding other variables such as firm size, country and sector as constant. If the exporters benefit from returns to scale then they should be complaining less about lack of demand and this was supported by the results provided in Chapter 7. For a better analysis we first provide these perceived obstacles to expansion by export orientation and size.

As Table 14.15 reveals, demand is ranked high as an obstacle to growth. However, the exporters, in general, perceive the demand as less of an obstacle presumably due to their access to foreign markets. This not only holds for firms in general, it holds for each size group as well. This is also more transparent when we differentiate between those firms that export very little (less than 10% of this total sale) and those that export a lot (more than 80% of their sale), those that export most of their product are by far less concerned about demand than either non-exporters or those that export only a fraction. The difference can also be tested within the Probit model of Table 7.3 if one adds dummies for these two types of exporters. We have done so and found that the majority exporters express significantly less concern about demand whereas minority exporters are more concerned about demand constraints than either high exporters or middle exporters.

Table 14.15: Export Orientation and Perceived Problems to Firm Expansion

	Micro	*Small*	*Medium*	*Large*	*All*
			Demand		
Non-Exporters	2.61	2.69	2.99	3.09	2.73
Exporters	1.53	2.36	2.86	2.83	2.69
<10%	2.17	2.20	3.24	3.06	2.85
>80%	1.67	2.00	1.55	1.97	1.89
			Credit		
Non-Exporters	3.70	3.33	3.12	3.03	3.44
Exporters	3.18	3.21	2.98	2.83	2.94
<10%	2.67	3.05	2.82	3.02	2.99
>80%	..	2.13	2.67	2.42	2.71
			Regulation		
Non-Exporters	1.33	1.48	1.57	1.68	1.44
Exporters	1.45	1.72	1.75	1.83	1.75
<10%	1.54	1.54	1.80	1.97	1.82
>80%	1.38	1.57	1.48	1.74	1.66
			Infrastructure		
Non-Exporters	2.05	2.05	2.58	2.60	2.24
Exporters	1.76	2.24	2.42	2.54	2.43
<10%	2.17	2.25	2.59	2.89	2.64
>80%	1.77	1.79	2.11	2.04	2.00

Among other obstacles to growth, exporters appear to be a lot less concerned about access to credit and this is true for all size groups. This should be expected since export orientation indicates to the creditors the trustworthiness of the firms and this is especially true for the majority exporters. As we discussed in Chapter 8, in the less developed economies of SSA, the difficulty of formal contract enforcement forces the creditors to rely more on trust and export orientation is often used as a signal to repay and that is particularly true for smaller firms. In Chapter 7 we also found a negative relation between export orientation and managers' perception about severity of credit constraint although the relation was not significant. However, when we dropped larger firms from the estimation the coefficient of export orientation was larger in absolute value and more significant.

It is seen that there is no difference between exporters and non-exporters as far as regulations are considered an obstacle to growth. The overall importance of regulations in the eyes of the respondents is in any case quite low. Infrastructure is perceived to be the most important obstacle after demand and credit constraints. Here the exporters are also better off, but by a significantly lower degree than with respect to demand or credit.

So far we have shown that economics of scale plays a major role in benefiting the exporters *vis-à-vis* the non-exporters and that they also benefit from better access to the credit markets. However, one potential difference that may contribute to the observed difference in productivity between exporters and non-exporters is their technology. Exporters may acquire more advanced technologies from interacting with more developed clients and competitors that may enhance their productivity. To test this hypothesis one can estimate the production function separately and pooled and test for structural break. This has been done by Van Biesebroeck who rejects the hypothesis that both types of firms produce with the same technology. However, given the fact that exporters are heavily concentrated among larger firms whereas non-exporters are primarily smaller firms, these results may rather reflect the size distribution of these two groups. Another way is to look at the difference in the transfer of technology to the exporters versus non-exporters. For instance, the existence of licensing agreement with foreign firms or the use of foreign technical assistance can signal the use of better technologies. Since licensing agreements often require certain standards to be applied and that these standards often lead to the installment of different technologies, we can expect that those holding such agreements would possess better technologies. To analyze this issue further we provide the distribution of licensing agreements and foreign technical assistance contracts in the following table:

Table 14.16: Percentage of Firms with Foreign Licenses or Foreign Technical Assistance by Export Orientation

	Micro	*Small*	*Medium*	*Large*	*All*
			Foreign License		
Non-exporters	2.35	5.09	10.00	31.76	7.32
Exporters	9.09	17.50	19.64	29.42	24.91
			Foreign Technical Assistance		
Non-exporters	7.94	11.53	21.00	27.06	12.81
Exporters	18.18	30.00	32.14	45.62	39.57
			Foreign License or technical Assistance		
Non-exporters	9.71	14.24	26.00	44.71	16.95
Exporters	18.18	40.00	41.07	53.80	47.85

As Table 14.16 reveals in almost all cases the exporters appear to use more foreign licenses and/or technical assistance. The lone exception is the foreign licensing in the large size group where no noticeable difference between the exporters and non-exporters is observed. We have also conducted a Probit analysis on the same line as those of Table 7.3 to see if the relationship between exporters and foreign licensing/assistance holds in a more elaborate model. The results confirm the general impression here that irrespective of other variables such as size, foreign ownership etc, the exporters are significantly more likely to seek a foreign connection either through foreign licensing or through the use of foreign technical assistance. The conclusion we can draw from this exercise is that the exporters should possess a technological edge over others through a better technological base that accompany licensing agreements and technical assistance provided to them by foreigners. We should recall here the point often made in the analysis of foreign buyers of standard commodities from exporters of developing countries. The narrowness of competitive margins and the potential of many alternative sources of supply in different regions of the world, make it imperative that African exporters take part in and conform to the standards laid down by "buyers' chains."

Exports and Growth of Firms

There seems to be a strong relationship between exports and firm-level efficiency as discussed in the previous section. We could expect this to translate into the growth rates of firms. In fact the determinants of firm growth rate in Chapter 12 did show that the export dummy for firms exporting more than 10 per cent of their sales had a strong positive effect on the employment growth rate since 1980 (Table 12.15 above). It was also interesting to note that the impact seems to have been at least 25% higher for the sub-group of entrepreneurial firms. Does this imply that exporting offers a way for small firms to achieve mobility upwards in their scale of operation? We have found in the discussion above that large firms dominate the export scene in the African countries. What proportion of these large firms started off as smaller units?

Table 14.17 gives the matrix of initial size × final size for the exporters (defined as those firms who export at all) and Table 14.18 the matrix for the major exporters (defined as those who export 50% or more of their output).

We read from Table 14.17 that although 66% of larger firms at the date of the survey are exporters, not all of them have been by any means established as large firms. Overall 19.58% of those firms who started as micro firms are exporters today. Exporting is associated strongly with "graduation" into higher size groups. This can be seen from the fact that the entries in the cell to the right of the diagonal of the matrix show that micro, small and medium firms which have graduated have increased their probability of exporting by many times. We can read off from the figures in parentheses how the total of exporting firms are distributed in the different cells. It is seen that fully half of the firms who are exporting today originated as micro firms. Looking at the cells of the matrix, without the column and row totals, it is seen that the largest percentage of firms (27.70% of the total) occupies the cell showing those who started as micro but graduated to being large. It is, however, not known at what point of their graduation the micro firms started to export.

Table 14.17: Distribution of Export Orientation by Initial and Final Size: All Exporters

Initial Size	*Current Size*				
	Micro	Small	Medium	Large	Total
Micro	3.07	10.35	40.26	74.04	19.58
	(3.60)	(7.55)	(11.15)	(27.70)	(50.0)
Small	4.35	14.29	31.58	63.01	30.57
	(0.36)	(5.76)	(6.48)	(16.55)	(29.14)
Medium	0	20	31.25	53.13	39.06
	(0)	(1.08)	(1.80)	(6.12)	(8.99)
Large	0	0	33.3 (0.72)	42.5	37.29
	(0.)	(0)		(11.1 5)	(11.87)
Total	3.13	11.94	35.90	66.80	25.32
	(3.96)	(14.39)	(20.15)	(61.51)	(100.0)

Note: The figures in the table are the percentage of firms who export at all in that cell. The figures in parentheses are the percentages of the total exporters in that cell.

Table 14.18 tells the same story for major exporters as defined.

Table 14.18: Distribution of Major Export Orientation by Initial and Final Size

Initial Size	*Current Size*				
	Micro	Small	Medium	Large	Total
Micro	1.23	0.99	7.79	24.04	5.21
	(5.33)	(2.67)	(8.0)	(33.33)	(49.33)
Small	0	3.57	8.77	23.29	9.81
	(0)	(5.33)	(6.67)	(22.67)	(34.67)
Medium	0	0	0	12.5	6.25
	(0)	(0)	(2.67)	(5.33)	(8.0)
Large	0	0	0	14.89	11.86
	(0.)	(0.)	(2.67)	(5.33)	(8.0)
Total	1.14	1.79	7.05	20.70	6.74
	(5.33)	(8.0)	(20.0)	(66.67)	(100.0)

Note: Same as Table 14.17.

Conclusion

This chapter has drawn a picture of manufacturing exports based on the micro data of the sample firms in the RPED surveys. The first point to stand out from these figures is that exports are not so insignificant for manufacturing firms as might be concluded from the macro picture for Africa discussed in the last chapter. The percentage of the total sales exported, however, varies considerably from country to country. Firms in Côte d'Ivoire export 22% of their total sales. The other Francophone country, Cameroon and Zimbabwe are also significant exporters at more than 10% of sales. But at the other extreme firms in Zambia export only around 2%, and the other Anglophone countries have low export ratios as well.

A basic difference, however, is seen between the three countries with a higher propensity to export, Cameroon, Côte d'Ivoire and Zimbabwe, and the other four in our sample. In the former group the exporting activity is clearly more widespread, with a sizable percentage of micro/small and medium firms participating in the export market, along with more than 80% of the large firms who export. In the other group very few of the micro/small and only a small percentage of medium firms export.

African manufacturing firms are not specialized in export activity, but the concentration of exports is high. The data shows that the proportion of firms exporting a very large proportion of their output is small in all countries except Côte d'Ivoire, but the total value of exports does seem to be concentrated in a small number of large firms. This is seen both in the index of concentration ratio and for the Lorenz curve for exporters given in the chapter.

A Probit model was estimated to isolate the factors most important in the firm's decision to export. The employment size of the firm was the dominant one. Among other factors, ownership dummies have the expected sign, with foreign firms more likely to export and state owned firms less likely. Entrepreneurial firms have a significantly lower propensity to export even after controlling for firm size. This might partly reflect the lower export activity of firms owned/managed by black Africans. Firms with foreign licensing contracts also appear more likely to export while to our surprise investment behavior of the firm was not found significant. Furthermore, in line with the findings of Azam *et al.* (2000) for the specific case of Côte d'Ivoire, we found strong overall evidence suggesting that less competition enhances firm's propensity to export.

The results obtained from the analysis of efficiency show exporting firms are found to be significantly more efficient than non-exporting firms.

However, we do not observe a dramatic difference between the minority or majority exporters (those exporting a small percentage of their output and those exporting a substantial percentage). The exporters are not only more efficient they show a lot less dispersion within themselves unlike non-exporters who dispersed within a large spectrum of efficiency.

This finding is not too controversial as many other studies have established this relationship using both micro and macro data in various countries. However, what is controversial is why this efficiency gap exists: is it because more efficient firms self-select into the exporting group, or is it because exporting itself increases efficiency over time? This issue has a substantial literature. We have presented our own results and also reviewed some of the other work on the RPED data set. A consensus seems to be emerging in the literature suggesting that exporting enhances productivity. This brings us to an important question with significant policy implications; why does this happen? The response on the question evaluating the relative importance on "obstacles to growth" (analyzed in Chapter 7) is studied separately for non-exporters exporters, minority exporters and majority exporters. The biggest difference is found in the role of demand and credit constraints, which seem to be dramatically less important for majority exporters. Infrastructure follows as a distant third, while regulations, which do not seem to be perceived a strong obstacle anyway, is not scored differently by the different groups. A strong possibility is that exporters are able to overcome the demand constraint by being able to better exploit the economies of scale.

An important point to note in this connection is that, as Table 14.16 reveals, even when broken down by size groups, the exporters appear to use foreign licenses and/or technical assistance far more than non-exporters. The foreign connection has productivity enhancing effects in a number of different ways. It provides access to better technology, credit sources as well as wider markets. The international buyers' role in the export activity of the African manufacturing firm would seem to be quite crucial.

The evidence suggesting a strong learning-by-exporting impact on firm efficiency is consistent with the impact of exporting on the growth of firms. The last section of the chapter brings out the importance of exporting as an aid to "graduation" up the size groups extending from micro to large firms.

Part VI
Conclusions

15 Conclusions

The record of growth of manufacturing in the African economies has not been very encouraging in recent decades. The failure of this region to industrialize in the way East and South-East Asia have done has been a major concern in the literature of development. Much discussion of the difficulties faced by the SSA region has been on macro or economy-wide issues, ranging from the fiscal-monetary management of the economy, to trade and exchange rate policies. The availability of data generated by the systematic and detailed firm surveys in a number of SSA countries (called the RPED surveys) have provided an opportunity to shift the attention to micro issues of firm behavior to supplement the work on economy-wide problems. This book has looked at a variety of these micro issues. It has reviewed the work already done on the RPED data sets and tried to integrate their major contributions with fresh analysis done for this study.

The fourteen chapters of the book – grouped into five parts – discuss the problems of the manufacturing firm: the competitiveness of the market structure facing the firm; the nature of the production function; the problems of the factors of production involved; the dynamics of firm behavior; and finally, the issues of the export market, in which the firms participate in varying degrees. Each chapter has concluded with a gist of the major conclusions. The purpose of this concluding chapter is not just to recount these main results of the analysis, but also to highlight how the results of each chapter are related to those of some of the others. It is hoped that an integrated picture of the characteristics and problems of the African manufacturing firm would thus begin to emerge. Although the main thrust of this book is on positive analysis, we also refer to policy options as they are suggested by the results of the analysis.

Part II

Size Structure of Manufacturing Firms

Following the introductory chapter, Chapter 2 of Part II discusses the size distribution of the firms. The RPED surveys specifically excluded the informal sector which consists of firms mainly operating with the help of household workers, with only moderate help from one or two hired employees. This does not mean that the surveys covered only the so-called registered sector, i.e., the firms which are in the books of the licensing authorities. Generally the "registered" sector has a lower cut-of point of about five employees, though the point varies from country to country. The RPED included a sample of micro and small firms which made use of some paid employees below this range. (The Appendix to Chapter 2 gives a more detailed account of how the sample was formed in one of the RPED countries, Zimbabwe.) However, the exclusion of the household enterprises, depending predominantly on family members' work, meant that the "dualistic pattern" of employment in manufacturing with two strong modes at a small and a large size-group, is not so apparent in the RPED samples. Rather, the distribution for all countries are skewed to the large size group. However, the proportion of value added and employment contributed by very large firms are much higher in Zimbabwe, and the two Francophone countries, than in the other Anglophone ones.

As one might expect from the dominance of large enterprises the concentration ratio is high. But the economic distance between small and large firms is not extraordinarily wide as one might fear it might be. Judging by relative labor productivity (value added per worker), the differential is more or less of the same order of magnitude as observed in East Asia, and rather less than seen in South Asian countries.

Non-Competitive Markets and the Price–cost Margin

Although any measure of the concentration ratio is high in all countries and industries surveyed, other available indicators in the survey, e.g., the number of competitors regarded as important by the firm surveyed, the percentage of sales going to the largest customer, and the entry and exit of firms, all point to the prevalence of a market structure which is far from monopolistic or even oligopolistic. The two findings need not be inconsistent. A classification of the seven countries by the different indicators suggests that by all the criteria used Tanzania stands out as being the least competitive. It is followed by the two Francophone countries, Cameroon and Côte d'Ivoire. At the other end of the scale Kenya and Zimbabwe appear to have a very competitive industrial environment. Ghana is less competitive as judged by the oligopolistic character of its market environment.

An index of the price–cost margin is often used to judge the effect of monopolistic market conditions on the firms' surplus. The concept is defined as the excess of the value of the output over expenditures on labor and materials as a ratio of the former. It is equivalent to the sum of economic profit and payment to fixed factors, i.e., capital, as proportion of total revenue. This ratio was calculated for all the survey firms pooled together, and regressed on a set of variables, which included employment size, capital per unit of output, and the number of competitors, as well as country and industry dummies as controls. Two results of this estimated model are of interest. First, after controlling for firm size, firms with monopoly power (i.e., with no reported competitor) are likely to enjoy higher price–cost margins. However, the relationship between margins and number of competitors is not linear implying that higher number of competitors does not necessarily lower margins. Secondly, the firm-size effect is highly significant even after we have controlled for capital intensity. This suggests a prevalence of economies of scale which increases the surplus over and above the returns to capital.

Production Functions

The production relations are studied in Chapter 3. The partial economic ratios are all well behaved. The capital–labor ratio (K/L) increases monotonically with firm size, as does value added per worker (Y/L). We would normally expect the output–capital ratio (Y/K) to decline as firms encounter diminishing returns to capital, but it can be offset if there are sufficiently strong returns to scale. This is indeed what we find if we exclude the micro firms. The micro group (less than 10 workers) use very little fixed capital which can be properly valued and the data are likely to be of poor quality. Excluding them from the sample, a significant negative elasticity of Y/K with respect to firm size is found only in Ghana, and to a smaller extent in Zimbabwe. All the other countries, and the pooled data for all countries, show that this elasticity is not significantly different from zero, even if we control for the industrial composition.

The fitted production functions with Capital and Labor as inputs strongly bear out the existence of significant economies of scale in all countries. Studies by other researchers, refereed to in Chapter 3, also reach the same conclusion even when other considerations are added to the estimate – for example, a measure of the human capital attributes of labor, or control for endogeneity of inter-firm productivity differences. It is interesting to speculate on the factors behind these economies of scale in the African manufacturing sector. Prime candidate for the most important factor is technology – the larger firms have access to and able to exploit better the higher technology of more capital-intensive production. But it should be clear that this only opens up a number of questions about the opportunities enjoyed by larger firms to exploit the better technology. On the demand side are the constraints on the firm's expansion, involving such factors as markets, both domestic and exports, and the institutional problems of relationships with buyers. On the supply side we have the variations in the price of key factors with firm size, and problems of regulations and infrastructure.

In fact, we already have evidence of a major factor-price issue in the study of key economic ratios for the survey firms. It is found that although profit per worker increases strongly with firm size, the profit per unit of capital decreases at a significant rate. This implies that the marginal cost of capital also decreases with firm size. This is an important aspect of the operation of credit markets in SSA, as in other developing countries, and is the subject of detailed discussion in Chapter 5 of Part III of the book, dealing with the problems of Factors of Production in African manufacturing. It has been noted that measured at the median of the Y/K ratio the rate of return to physical capital is very high in the survey countries – in the range of 20%–35% with the exception of Zambia. This reflects the relative shortage of capital in African economies. But it is also seen that the rate of return drops fairly rapidly for larger firms.

The decline in the marginal product of capital with firm size is compatible with the evidence of increasing return to scale in the estimated production functions, in so far as the increase in labor productivity more than offsets the fall in capital productivity with firm size. Average earnings per worker do increase strongly with firm size in the RPED sample, suggesting a strong increase in the marginal product of labor with size. The increase in earnings per worker with firm size is partly due to the higher measured human capital of the workers, but not exclusively so. This is seen from the data presented in Table 3.8 of Chapter 3. A two-way relationship between earnings and labor productivity is possible as firm size increases. Efficiency wage effects translate higher wage into higher labor productivity. At the same time there might be a significant element of rent sharing as employers share the higher level of productivity and surplus with their workers. Theses relationships have been studied in detail elsewhere (Mazumdar and Mazaheri 2002, Chapters 15 and 16), and the discussion is summarized in Chapter 6 of this book.

The Relative Efficiency of Small and Large Firms

An important issue in the policy debate about manufacturing in developing countries is the desirability, from a social welfare perspective, of small and large firms. The question involves several different areas of concern, even if we confine ourselves to narrowly defined economic issues. At a minimum we should distinguish the relative efficiency of small and large firms in a static framework (at a point of time), from the dynamic considerations of entrepreneurship, growth and job creation. The latter group of issues form part of the discussions in Chapter 4 and also in the chapters on the growth of firms (Chapter 12) and parts of the micro-economic issues of growth of exports in Chapter 14. The results obtained in the production function analysis of Chapter 2 can be used to throw light on the static aspects of relative factor productivity by firm size.

Two points need to be stressed here. First, the average productivity of labor and of capital in different classes of firms, as calculated in Chapter 2, is only a partial view of relative efficiency. In Chapter 10 the discussion focuses on technical efficiency using the method of frontier production function analysis. This technique quantifies the distance of different firms from the most efficient frontier, rather than the differences in average productivity. Second, in order to measure of average productivity of the two factors of production, capital and labor, for small and large firms, we need to weight each factor by its true marginal productivity. Because of the segmentation in factor markets the factor prices facing these classes of firms do not reflect their true "opportunity cost." It is argued in Part III of the book that while higher wages in larger firms largely reflect higher efficiency of labor, the lower price of capital enjoyed by such firms is more significantly caused by institutional factors which make the price of capital low for them. Based on this admittedly extreme assumption we simulate the total factor productivity or the "benefit–cost ratio" for different size groups of firms for different interest rates uniformly applied to all groups. The result of some interest is that, if larger firms had to pay the price of capital which small firms have to pay, the benefit–cost ratio would not be all that different for small and large firms.

Part III

Part III of the book discusses the markets for the two main factors of production – capital and labor. It is preceded by an analysis of some issues of entrepreneurship in the manufacturing sector. In the last two chapters of this part we discuss the business environment within which the manufacturing firms operate.

Entrepreneurship

Entrepreneurial firms are distinguished from private corporations, parastatals and subsidiaries of multinational corporations (MNCs). In the RPED sample the entrepreneurial firms dominate the numbers, but since many of them are small, it is more meaningful to consider the proportion of employment accounted for by them. The percentage of employment in these firms is small in the Francophone countries (10%–15%), where private corporations dominate, and in Tanzania (25%) where parastatals are an important feature of the manufacturing sector. In all other countries around two-thirds of total employment is provided by entrepreneurial firms, mostly limited liability concerns rather than sole proprietorships or partnerships. The foreign presence is strong in this sector with the exception of Tanzania, high at 60%–80% of total employment in the Francophone countries and around 40% in the other Anglophone countries.

Who are the entrepreneurs? The great majority of entrepreneurs came from families that owned businesses of one kind or another. Overall, most entrepreneurs have at least completed the secondary education with some of them having university degrees. As might be expected, the level of education increases with the size of the enterprise, with more than 30% of entrepreneurs of the medium and large firms have university degrees. On average, entrepreneurs have between 7–10 years of prior experience with Côte d'Ivoire and Ghana falling at the lower end of the range and Zambia at the upper. It appears that the vast majority of the firms have been established by the owner.

In order to finance the start-up of their activities, entrepreneurs in general rely heavily on non-formal sources. Among these, own saving is the predominant source in all the countries. In general, the internal sources of finance that includes saving and borrowing from friends or relatives constitute the lion's share of total finance: between 71% and 92% of the total. It is also interesting to note that the percentage of saving in total start-up finance does not decrease substantially with the increase in the firm size as fast as might be expected. In fact, the results do not reveal significant difference in this percentage between micro and small firms or even to some extent the medium and large firms. However, there is a significant decrease in the share of saving when one considers the very large firms separately. It is also worth noting that the size used in Table 4.3 is the current size. However, even when the initial size is used the medium and large firms still appear to be financing most of their start-ups through internal sources. In general, when the initial size is used medium and large firms appear to finance 60% of their start-up through internal sources versus 73% when the current size is used. This strong result points to the limited availability of formal sources of finance for manufacturing enterprises in Africa.

An important issue in entrepreneurship is the role of the native African. After a detailed discussion of individual variables, a Probit model was used to evaluate the factors determining the probability of an entrepreneur being African. The entire sample was pooled, and country dummies were included (with Ghana as the base or omitted category – see Table 4.13). For both the sub-groups of firms (of < and >=10 employees) African entrepreneurs are more likely to manage significantly smaller firms. Furthermore, the results also reveal that, controlling for size, African entrepreneurs are more likely to have primary education as against no education; but for higher levels of education there is no significant difference between African and non-African entrepreneurs. This should not be interpreted to mean that post-primary education does not help African entrepreneurship in the long run. Rather, in the socio-economic situation as it existed at the time of the survey, Africans who managed or owned firms had more defining characteristics than higher education. African entrepreneurs tended to have less experience than non-African ones, but more training. The African entrepreneurs are more likely to start their own business, rather than inherit or buy the firm. Furthermore, it appears that African entrepreneurs rely less on their own savings or borrowing from their relatives/friends to finance the establishment of the firm. Rather, the majority of them use other sources such as formal bank loans for this purpose. This finding is crucial to the analysis of the entrepreneurship in Africa as it strongly reinforces the hypothesis that African entrepreneurs are more financially constrained. They are less wealthy and hence can rely less on their savings to finance the start-up.

The last section of the chapter analyzes the efficiency of entrepreneurial firms relative to that of the non-entrepreneurial ones, and within the former the efficiency of African-owned firms *vis-à-vis* that of the non-African ones. The method of analysis employed is that of the production frontier. It is very interesting to note that when we do not consider the size of the firms we find that the entrepreneur firms appear to be significantly less efficient. However, when we add the size variable we get the result that these two types of firms are not significantly different in terms of their performance. Evidently, smaller firms have a lot more of variance in the efficiency attained, with a larger proportion yet to benefit from learning through growth, and a larger proportion of entrepreneurial firms are indeed small. These conclusions are verified in Chapter 10. When we distinguish the entrepreneurial firms by the race of the owner/manager, the results show that European entrepreneurs on average tend to be more efficient than both African and Asian entrepreneurs while Asian entrepreneurs are likely to be more efficient than African entrepreneurs. These results are further strengthened when we control for firm size. This is as is to be expected from our earlier results on entrepreneur characteristics. Ethnic entrepreneurs not only possess a larger stock of embodied human capital, they also enjoy a much better access to capital both internally and externally.

The Markets for Capital – Finance

Chapters 5 and 6 deal with the markets for two major factors of production – Capital and labor – as they affect the African Manufacturing Firm. We document in Chapter 7 that in answer to the RPED questionnaire managers indicated that "the most important obstacle to growth" was the availability of credit. Asked to rank the "three biggest problems" from a long list at least 40% of managers ranked credit among their top three biggest problems. With reference to current performance, "lack of working capital" was scored as the one of the two most important obstacles to capacity utilization, the other factor being "lack of demand", which scored only slightly higher (Chapter 9). The result holds across countries and across size groups. It is, therefore surprising o find that in the RPED surveys about 43.7% of all firms reported no debt at all, a ratio that is as high as 64% in Tanzania and as low as 24% in Zimbabwe. Furthermore, the proportion of firms in the sample that were identified as being not credit constrained was around 60% for the whole sample, and as high as around 80% in Kenya and Zimbabwe (even when we included some of the "discouraged borrowers" in the credit-constrained group). This proportion, however, decreases to about 50% for micro firms and increases to more than 80% for large firms.

But quite apart from the firm-size effect, one explanation for the apparent discrepancy in the answers to the role of credit, is that, in responding to the questions on credit, firms had the existing institutional structure in mind. Thus when they replied that they did not need a loan, they probably thought of the conditions under which they might be able to obtain a bank loan. It does not mean that their demand for credit was satisfied, or that such demand would not become "effective" with a more extensive set of sources of finance.

Looking at the figures presented in Table 5.4, it is seen that supplier credit and overdraft are the two most important sources of finance in most countries. Overdraft, along with trade credit are the two sources which account for the larger part of the debt of micro and small enterprises in several of the countries, not because the amount of finance obtained this way is large, but simply because bank and non-bank loans are limited for this class of firms. But the data make the important point, that even if bank and non-bank loans, are more easily available to large firms, overdraft and trade credit still remain their main source of inflow of funds – fully one-half in Zambia and Zimbabwe, and well above this proportion in the other countries. Informal finance, however, is uncommon as a borrowing device; even in the sample of micro-enterprises only 10% of the firms make use of informal loans.

The size of the firm as measured by employment and the race of the owner are the most interesting variables which had pervasive effects on the ability to borrow. The size elasticities of the probability of receiving bank loans, overdrafts and trade credit were 0.32, 0.39 and 0.27 respectively for the pooled sample. The strong positive value of all three elasticities contradict any hypothesis about different types of credit being substitutable for one another in different size classes of firms. The detailed empirical analysis shows that even after controlling for firm size, those firms which were able to access bank loans were also more able to access short term funds, and those who were able to access overdrafts also had greater probability of using trade credit. Furthermore, this complementary relationship between different types of credit was revealed not just with respect to the ability to access the loan type, but also with respect to the relative value of the different types of loans utilized. Again the relationship was significant irrespective of the firm size (Table 5.21). Evidently there are some other characteristics of firms which make them favorable borrowers for all types of credit, over and above the dominant effect of size.

Turning to the problem of race on credit constraints, we recognize that while African-owned firms have significantly reduced access to credit, even after controlling for size, we have to make adjustments for the fact that the demand for credit might be higher for such firms. It is seen that controlling for size, the probability of the decision to apply for a loan is higher for African-owned firms by as much as 43%. The probability of approval of loan is also higher, but not by as much as the decision to apply. This factor, together with a somewhat higher incidence of "discouraged borrowers" in the African sub-sample gives the result that African firms are more credit constrained. We conclude that the basis for discrimination in the credit market for Black Africans in the RPED countries is not due to overt discrimination on the part of banks or other financial institutions. It has to be sought in other aspects of the capital market which have reduced the internal financial resources of potential entrepreneurs. Black firms are born small and stay small and are generally outside the domain where the credit market could play a positive role.

The segmentation of capital markets – the different degrees of access to capital for different classes of firms – is crucial to the determinants of investment. We have already mentioned the high rate or return to physical capital at the median value of capital intensity and its sharp reduction in larger size-groups of firms. Readers might be interested in following up with the discussion on investment behavior in Chapter 11 which explores the role of credit constraints in the investment functions in greater detail.

The Markets for Labor

While the price of capital falls significantly with firm size the average earnings of labor increases. This should offset the relative disadvantage of small firms in terms of factor costs, if indeed the increase in earnings represent an increase in the real cost of labor. There is, however, an important difference between the costs of labor and earnings per worker. While capital or finance is a one-dimensional factor of production (a dollar is a dollar), labor has two dimensions: quantity and quality. Labor measured in terms of numbers or man-days of work does not say anything about the efficiency of a unit of work. It is possible that the higher earnings per worker would elicit a higher supply of units of work per laborer which would at least partly offset the higher wage, so that the wage cost per efficiency unit does not increase by nearly so much. It is possible to make allowance for varying quality of labor by objectively measured characteristics only to a limited extent. The returns to education are high in African economies, and moreover evidence is produced in Chapter 6 to show that higher levels of education produce increasing returns. We also have generally high returns to experience. But even after we control for these characteristics of the workforce the increase in wages by firm size, although reduced in magnitude, continues to be high and significant. The interpretation of this result – if it is an increase in wage cost or not – turns on our judgment as to the relative importance of institutional and economic factors in causing this size-related wage increase.

The examination of the institutional factors in the labor market, summarized in Chapter 6 from a longer study of labor in Africa (Mazumdar and Mazaheri 2002) suggests that the importance of institutional factors in African labor market have been largely exaggerated. The RPED survey questionnaire includes a large set of questions inviting the owners/managers to evaluate the relative importance of labor market legislation in the problems created for the firms. These included high wages imposed by minimum wage or other legislations, as well as other types of labor costs augmented by such measures as job security legislation. The effect of minimum wages was reported to be the least burdensome for the employers of all the restrictions considered. Secondly, the impact of existing labor restrictions on hiring decisions seems to be the most severe for employers in Zambia and Zimbabwe among the seven countries surveyed. Even then, the proportion of firms recognizing it as an effective "distortion" was in the highest case – Zimbabwe – only 38% of the overall sample. It is apparent from the surveys that labor regulations are nowhere near the top of the major problems. The World Bank survey, discussed in Chapter 7, in fact ranks this set of problems at 11 in the list of 15.

The conclusion of the discussion is that economic factors are much more important than institutional ones in causing the increase in wages with the size of firm. Two factors seem to be more important behind this phenomenon, which is much more marked in Africa and in other developing countries, than in advanced economies. First, is the more heterogeneous quality of labor which enables larger firms to invest more strongly on their firm-specific labor-force to select, retain and train a more efficient body of workers. Second, the greater dispersion of techniques of production allow more capitalized firms to enjoy higher returns to scale and higher surplus which could be shared with labor from strictly economic i.e., long-run profit maintenance objectives.

Regulations versus Other Constraints

The last two chapters of Part III look more generally at the business environment facing firms. If labor regulations have had a disproportionately bad press about distortions created by ill-conceived government actions, what about other types of regulations? The presence of the state is large in African economies, even after the structural adjustment programs. Much of the problems of government policies of course relate to the macro-economic management of the economy. Although very important, a detailed examination of this large issue is outside the scope of this book. But we try to evaluate the impact of regulations affecting the day-to-day operations of the firm, the problems of infrastructure and of the issues of social capital, in particular the nature of contract enforcement in an underdeveloped formal legal system.

We refer in Chapter 7 to an intercontinental survey of large-scale firms by the World Bank. The survey went into great detail about the nature of government–private interface. Overall respondents were asked to record if the state was perceived as a helping hand, a neutral agent or an opponent. While only 20% of the entrepreneurs considered the state to be an out-and-out opponent in the OECD and SSEA regions, the percentage was over 30% in all the other regions of the developing world. In SSA, 35% of the respondents found the state to be a hostile agent, exceeded only by LAC where 40% thought so. Corruption and its consequences were clearly the major factor behind this perception. In SSA 50% of the entrepreneurs reported that they were frequently asked to pay "irregular additional payments to get things done."

The RPED surveys (1993–96) covered a somewhat different set of firms; they were confined to manufacturing, but included a wider spectrum of firms of different sizes. in which respondents were asked to evaluate the impact of these regulations on the firm's operations, relative to other pressing problems facing them. There are fifteen types of "obstacles" specified in the questionnaire which managers were asked to score in terms of severity on a scale of 1 to 5. We regrouped the obstacles into four groups: demand, credit, infrastructure and regulation constraints. Classification of the mean scores by type of constraint that in most countries credit constraint scored the highest, followed closely by demand constraint. Infrastructure followed in the third place and a rather low score was recorded by "regulations." The scores for Ghana, on a rising scale of importance of 1 to 5, are fairly typical: Credit 3.82, Demand 2.24, Infrastructure 1.87, and Regulations 1.22 (Table 7.1). The importance of credit constraint decreased with firm size, while that of the others increased. A multivariate model was estimated to identify the major factors affecting each of the four groups of obstacles separately. The results confirm that the negative monotonic relationship between firm size and credit constraints stand even after we have controlled for other factors, while the relationship between firm size and obstacles due to regulations and infrastructure problems is significantly positive.

Apart from the difference in the sample of firms covered, an important difference between the World Bank and the RPED surveys is that the questionnaire in the latter did not ask for the evaluation of "corruption." We found in the World Bank survey that it was not the regulations *per se*, but the associated problems of corruption arising out of the administration of the regulations, which were singled out by the respondents as the most serious problem.

Nevertheless, the fact that credit and demand top the list of "obstacles" in the RPED surveys, significantly above the problems with regulations, should be a salutary warning against jumping to conclusions about regulations creating the major problems for the African manufacturing firm, particularly the small–medium ones. Exporting firms, as we see in more detail in Chapter 14, suffer less from the demand constraint, suggesting that the narrowness of the domestic market is a problem for many producers.

Infrastructure and Contract Enforcement

We see in the discussion of Chapter 7 that both the World Bank Survey and the RPED survey – differing substantially in the coverage and design of the samples – produced the result that all respondents recognized infrastructure problems to be in the top league of their problems (higher than regulations, but slightly lower than demand). The RPED questionnaire enables us to go into some details about the nature of the infrastructure problems faced by manufacturing firms in Africa. It is seen that the supply of electricity is the biggest problem in all countries. Roads and telephones are the next importance. Problems with roads are particularly mentioned in Kenya while telephones are seriously under-performing in Ghana. A large proportion of firms in almost all countries indicated that "security" was also a very serious problem, and the score given to it is also quite high.

Infrastructure problems increased in importance as "obstacles to growth" as the firm size increased, after controlling for other relevant factors and country dummies. It can be seen from the results set out in Table 7.12 that the same conclusion is reinforced for individual items of infrastructure services. Smaller firms, operating in localized markets and often utilizing non-mechanized techniques of production, are less bothered by inadequate infrastructure than large firms. However, it is worth emphasizing that even for the sample of micro-firms the problem of inadequate electricity and telephones was noticed by one-third of the firms, while bad road conditions created difficulties for 20% of them.

Finally, in Chapter 8, we discuss the problems of contract enforcement in the RPED countries. The empirical results provided in this chapter suggest a very loose relation between the firm and its clients/suppliers. Late payment and delivery is widely reported by the firms, but it has not discouraged them from interacting again. The results reported also show that attempts such as the use of written agreements or the use of collateral or different type of guarantees to prevent contractual problems have rarely been successful. In fact, both theses methods have led to an increase in late payment by the clients but not non-payment. This implies that these methods are not used to eliminate the contractual problems all together but rather to minimize the more severe type of them. This, combined with the observed widespread existence of contractual problems, points to the fact that generally these problems are perceived to be inevitable – a product of an underdeveloped supply chain in these countries. The flexibility of the contracts, and the resultant free-rider possibility, however, require an implicit assurance that they will finally be carried out. To this end, and in the absence of a formal method, firms use mutual trust. Therefore, when contracts are broken firms try to resolve the problem through direct bargaining and they usually continue their trade even when the contract is still in dispute.

The observed phenomenon of contract flexibility provides a framework within which established firms can interact and hence help to facilitate trade. However, it may also prevent a new firm from entering the market as they are less likely to trust or be trusted in such an environment. This also applies to foreign firms as such flexibility may exceed their level of risk tolerance.

Part IV

Part IV of the book turns to some key topics in the economic performance of firms, both in the static and the dynamic aspects. Chapters 9 and 10 deal with the issues of efficiency of the sample firms at the point of time of the survey. The following two chapters are about the performance over time. Chapter 11 discusses the rate of investment. Chapter 12 describes and analyzes the growth of firms over different periods since their inception.

Capacity Utilization

The two concepts measuring the performance of the sample firms at a point of time – capacity utilization and the index of efficiency are obviously related. The difference is that the former is based on the subjective responses of the managers/owners indicating what percentage of the maximum output the firm produced in the last production cycle, while the latter is calculated from the measured inputs in terms of the production possibility of the most efficient firms in the sample. We expect that the results should agree on the broad causes of less than optimum performance, although they clearly measure different things.

At a mean value of 57% and a median of 52%, the degree of capacity utilization in African firms is decidedly low by international standards. Also there is a large dispersion among firms. Côte d'Ivoire, Kenya and Zimbabwe reported a higher degree of capacity utilization among the RPED countries, and the fact that these are the more industrialized of the lot is probably not a coincidental result.

The results of our analysis of the determinants of capacity utilization clearly indicate that it is positively related to firm size measured in terms of employment. In terms of our earlier discussion of the relative productivities of small and large firms this result scores in favor of the large firms. This, in spite of the fact that, controlling for employment size, capacity utilization falls with the size of the capital stock. The latter result suggests that entrepreneurs are more likely to over-invest as an insurance against uncertainty rather than under-invest in response to the high cost of capital.

The respondents to the RPED survey scored the relative importance of the various obstacles to capacity utilization on a rising scale of 1 to 3. We grouped the obstacles considered into three categories: supply, credit and demand constraints. Note that the score for the supply constraint is the average of five questions, while the demand, and credit constraints are measured directly by answers given by the management to the corresponding questions. In the multivariate model, pooled for all countries, supply constraints appear to be the weakest whereas credit constraints are the strongest factors leading to excess capacity followed closely by demand constraints. Taken individually, supply constraints were more important for large and very large firms, while credit constraints affected micro firms most strongly. Export-oriented firms are distinguished by having a strong negative coefficient for demand constraints on their ability to utilize capacity.

Technical Efficiency

The two major results of the capacity utilization index – the increased utilization with firm size and export orientation – are strengthened by the analysis of technical efficiency in Chapter 10. The impact of size on technical efficiency is, however, clear-cut only in the case of two of the five countries studied, while the impact of trade orientation holds strongly for all five. While there is strong evidence suggesting that larger firms in both Zimbabwe and Kenya are more efficient, this positive relationship was not supported for other three countries.

Table 10.4 presents the distribution of efficiency. As can be seen from this table, for both Kenya and Zimbabwe where the size effect was found to be significant, the technical efficiency appears to be increasing monotonically with size. For instance, in the case of Zimbabwe, the mean technical efficiency for small firms is 0.40 firms whereas it is 0.67 for the largest size-group of firms. The same monotonic relation can also be witnessed in the case of Kenya. For other countries, however, this relation does not appear to be as straightforward. In the case of Tanzania, larger firms appear to be less efficient albeit mildly. For the other two countries and specifically for Zambia, however, technical efficiency appears to exhibit little correlation with size. It is also interesting to note that, with the exception of Tanzania and Ghana, where no specific relation between size and efficiency is revealed, the standard deviation of technical efficiency decreases considerably for larger firms. This indicates that smaller firms tend to be more heterogeneous in terms of their performance relative to their larger counterparts.

Country differences in the structure of industry might account for the differences. For example, the size distribution of firms in Ghana are skewed to the small size groups. Tanzania contains a sizable proportion of inefficient, publicly operated large firms. Another issue that of the impact of firm age and a possible interaction of firm size with firm age. According to the learning models firms are expected to increase their efficiency with age, but the age effect slows down as opportunities for learning are exhausted. We extended the efficiency analysis to evaluate the age-size effect on technical efficiency. In the case of Kenya, Zimbabwe and Tanzania the age-size interaction was non-existent. For the first two the marginal effect of size was positive on efficiency for any age, and it was the opposite for Tanzania. Ghana and Zambia are the two countries which show significant interaction of age and size on firm efficiency. For both countries the marginal efficiency of size on efficiency increases with firm age, more so in the case of Zambia. The distribution of the sample of firms in the age-size space thus has a lot to do with the result we get of the impact of size on efficiency. Figure 10.6, depicting the marginal effects of size on technical efficiency in Ghana, suggests that only large and older firms in Ghana fall in the (−) area, where the marginal impact of size on technical efficiency is positive. In the case of Zambia the (+) space, which shows a negative marginal effect of size on efficiency, is occupied by older and smaller firms.

Trade orientation is the strongest factor affecting technical efficiency. Firms that engage in trade are found to be more efficient in all five countries. Furthermore, the export-oriented firms are found to be significantly more efficient than the others — including those that engage in no trade and those that engage in import only. Foreign ownership, *per se* was only significant for Zimbabwe although on average the foreign owned firms were more efficient in all countries. This may be attributed partly to the fact that the majority of these firms engage in export. In fact, when the trade variables, and in particular when the export orientation variable, was deleted from the inefficiency effect, foreign ownership was found to be significant for most countries. This implies that the foreign ownership effect is, to a large extent, a proxy for trade orientation. This important issue is taken up again in Chapter 14 where we consider the characteristics of export-oriented firms.

Technical Efficiency: Inter-country Variations

In the latter sections of Chapter 10 we shift attention from the determinants of efficiency within each country to inter-country differences in technical efficiency. The analysis is done by pooling all the observations for the five countries together. To ensure that the inter-country differences are not sector or size specific we estimate the model for all five African countries (African Frontier) over all, and by different sector and size groups. The estimated parameters of the country dummies in the estimated Africa frontier function were all significant. Zimbabwe was found to be the most technically efficient country, followed by Kenya, Zambia, Tanzania and Ghana. The differences in the mean efficiency levels were substantial – Ghana at 0.542 and Zimbabwe estimated at 0.728 (Table 10.11). We estimated the differences by sector and by firm size. The ranking by efficiency levels were the same for two of the four sectors – textiles and wood (which were incidentally the tradable sectors in these countries), but there was no significant inter-country differences in the food sector, while in metals Zambia turned out to be the most efficient. Classified by firm size groups, the country differences were significant for all size groups except the micro. The overall ranking, with Zimbabwe at the top and Tanzania and Ghana at the bottom, held for the large and very large size groups, but were slightly different for the small and medium groups.

Are these inter-country differences merely reflecting differences in the firm-level characteristics in the countries studied? To answer this question we enhance our earlier model of the Africa frontier (Table 10.10) by adding firm level characteristics contributing to the technical efficiency in Africa. We classify these determinants into three main groups; structural parameters captured by firm size and firm age, representing the effect of development process as manifested by learning by doing and survivorship factors; human capital variables; and learning channels, e.g., trade orientation or foreign ownership/licensing. We find that firm size is a significant factor irrespective of whether we add country dummies to our estimation or not. This indicates that irrespective of the country effect, size contributes to technical efficiency. However, the introduction of firm age and firm size as determinants of inefficiency lead to a reduction in the pure country effect. This reduction is most apparent for Kenya where the difference in technical efficiency between this country and Zimbabwe is almost eliminated. The differentials for the other countries remain mostly intact.

The most important of the firm-level factors affecting efficiency turn out to be outward orientation. We get the strong result that firms that engage in trade, either as importers or exporters, and those with technology transfer/foreign licensing or foreign ownership are more efficient, irrespective of whether country dummies are added or not.

The question arises: are the firm characteristics discussed above sufficient to account for inter-country differences observed earlier? To answer this we estimate the elasticity of technical efficiency with respect to each country dummy, with and without the efficiency-augmenting firm characteristics, and calculated at the mean values of the relevant variables. The results as set out in Table 10.17 show that there is undoubtedly a reduction in the country effect when the firm characteristics are added, but a substantial part of the inter-country differences remain.

Investment

The last two chapters discuss the dynamic performance of African firms, starting with the rate of investment and its determinants. The macro-economic environment has not been very encouraging to investment in most of the countries of the survey, as can be seen from the introductory chapter. This is reflected in the record of investment provided by the sample of RPED firms. Taking all firms together, and pooling the sample for all seven countries, 39% of the firms undertook some investment in the three years of the survey in the first half of the nineties. But the rate of investment (as proportion of capital stock) was quite low, 5% of the total and 15% for the investing firms alone.

The distribution of investment in the African firms surveyed is highly skewed. While the mean value of the investment rate is no doubt lower than that for advanced countries, when all firms both investing and not investing are taken into account, it is striking that the median is even so much lower than the mean. In the industrialized countries the median is quite close to the mean showing the more normal distribution of investment rates.

The skewed distribution in investment rates cannot be traced to the differences between small and large firms. The percentage of firms investing in the survey years does increase with firm size, but only in four of the seven countries, while the investment rate of the firms that do invest is negatively related to firm size. Our judgment is that there are factors other than, or in addition to, firm size which contribute to the phenomenon that investment seems to be relatively concentrated in a limited sub-sample of the firms.

Another important difference with developed economies is the much higher profit rate observed in Africa (and again the mean being so much higher than the median). This, of course, reflects the credit constraint noticed in Chapter 5. The role of external sources in the financing of investment is correspondingly low. Most investment for firms of all size groups is financed from internal revenue, and to a much smaller extent, and for smaller firms only, from personal savings and contributions by "friends." Accordingly, the past debt to the formal financial system is negligible for a majority of firms. The distribution of the ratio of indebtedness to total capital (B/K) is strongly skewed, with the mean 0.12 and the median zero. The corresponding figures cited for the UK are 0.12 and 0.09.

Taken in conjunction to the high rates of profits observed, the picture suggested is one of a sector which is financially constrained for most and depend on internal finance for fixed investment. The chapter pursues the relationship between credit constraint and investment through several models of investment, using alternative classifications of firms, which could be identified as being credit-constrained. The exercises are carried out within the framework of the "flexible accelerator" model. As formally worked out in the chapter, it is shown that under imperfect information, the model implies that investment will be a function of changes in value added (the capital adjustment stressed by the accelerator principle), profitability indicating both current and future market conditions, and liquidity constraints. There is an ambiguity about the interpretation of the profit rate when used as explanatory variables in the investment function. It could proxy elements both on the demand side, predicting future market conditions, and on the supply side, easing credit constraints facing the firm. One way to tackle this issue and pinpoint the net role of profits, is to divide the sample into sub-groups which are separated by independent variables signifying different degrees of financial constraint. In one of the exercises we adopted a more objective way of distinguishing the credit-constrained firms. We used the criterion of the chapter on Finance in Part III. Using the responses to the finance part of the questionnaire, credit constraint is deemed to apply to two groups: (i) those who had applied for loans and had been rejected; and (ii) the discouraged borrower who had never applied, saying that they would not get a loan because of inadequate resources. In the case of missing values an alternative criterion was used selecting firms which identified “finance” as their major obstacle to growth. For the pooled sample the credit constrained firms, thus defined, accounted for 44% of the total. Models of both the decision to invest (a Probit model) and the investment rate were estimated for the two groups. The profit rate was a highly significant variable for the constrained firms in both models, but not for the unconstrained firms. This strongly suggests that the rate of profit, providing opportunity for internal financing and hence easing the financial constraint, is critical in firm level investment.

The Growth of Firms

Chapter 12 studies the growth of firms from recall data provided by the respondents. The recall data are much more reliable for changes in employment over time than other variables like sales or capital expressed in values, with the attendant problems of changing rates of inflation. The descriptive material on employment growth of the RPED sample firms show a high rate of growth of 10.5% per annum which is clearly at odds with the macro-economic climate and performance of African economies outlined in the opening chapter of this book. This large figure is partly due to the fact that our firms are all survivors and do not reflect the job loss due to the death of firms, and partly because we are dealing with firms which have survived over a very long period of time. If we recalculate the growth rates for only the post-1980 period the growth rate is cut down drastically.

Our econometric analysis of the determinants of growth rejects the hypothesis of independence of growth rates and the size or age of the firm as suggested by Gibrat’s Law of random growth. On the contrary there is considerable support for a significant negative relationship between size and growth rate, and as well as between age and growth. As a firm ages, the predictions of the manager regarding the firm’s output and input levels become more accurate, and consequently the firm expands at a slower rate. After controlling for age, larger firms grow more slowly because they are already at a higher level of efficiency and hence do not have large efficiency gaps to exploit.

The basic model of learning can be expanded to include the manager’s human capital attainments, the initial conditions of the firm in its ability to use imported or new equipment (presumably of better quality), and its access to the credit market. The results presented in Tables 12.14 and 12.15 show that several of these effects are significant, though in the case of credit, possession of title to the land is a more significant determinant of growth than access to formal bank loans. Dummy variables for firms exporting and importing more than 10% of sales had a strong significant effect on the growth rate – the export dummy being much the stronger of the two. It was also interesting to note that it increased the growth rate of entrepreneurial firms more than that of the full sample.

An important issue in the dynamics of firms is upward mobility – in particular the ability of micro and small firms to move up the scale. Mobility tables by size groups were constructed relating the present to the initial size of firms. When we considered the entire period between the firm's start-up date and the survey year, more than half the firms in the smallest size group (less than 10 workers) were unable to graduate to a higher group, and a third moved up to the next class (10–49). But the proportion of the small firms moving up in the RPED survey is higher than that found in the Leidholm–Mead surveys of informal sector firms dominated by household enterprises. Firms of the next higher size class (10–49) showed somewhat higher mobility, particularly in their ability to jump two size groups up. But considering that the average age of the firms was about 13 years, and that we are dealing only with survivors, the experience of upward mobility can at best be considered to be moderate.

We next ask the important question: what size-group of firms are the drivers in job creation in manufacturing? While the rate of growth of employment of small firms is generally high, the larger proportion of net increase in employment might still be provided by large firms. We divided our sample between old (existing) firms and new entrants during the 1980–92 period. As far as old firms are concerned the lion's share of net employment growth in the four countries which registered positive growth was accounted for by large firms. Employment growth was, however, positive in all countries among the new entrants. The small–medium firms had a much bigger role to play in this group.

Part V

The last Part of the book deals with the exporting capacity of the African manufacturing sector. A major issue in the disappointing growth in sub-Saharan Africa centers on the region not being able to seize the opportunity of the expanding global trade in manufacturing – particularly in labor-intensive products – like many countries East and South-East Asia have done. A strong interpretation of the suggested modification of the Heckscher–Ohlin model by Wood and his associates would suggest that natural endowments – abundance of natural resources and paucity of skilled labor – make sub-Saharan Africa generally unsuitable for manufacturing exports. Collier, among others, has rightly pointed out that the Wood type of model works really through high wages, compared to regions with an abundant supply of labor relative to land. Our discussion of limited case studies in Chapter 13 does not show that wage-costs are really higher in African countries than in the Asian exporting countries. Moreover, wages are only one-half of the story, the other important half is the efficiency of labor use. The example of Mauritius shows that real wages increased strongly with export growth, but efficiency of labor seems to have increased, and dampened any significant increase in wage cost. Skilled labor is indeed in short supply and it is shown in the chapter on labor that returns to education and skill are high and increasing for successive levels of education. But it is telling that in the RPED surveys, the respondents, replying to the question about the ranking of problems facing the firm and its growth prospects, did not ever rank shortage of skilled labor or high wage cost, or even labor legislation as being in the top part of the league of obstacles. There is clearly a good deal of heterogeneity in the quality of labor available to the manufacturing firm, and we have seen that average wages increase sharply with firm size. But as we have seen, the high wages in large firms do not seem to affect the performance of large firms adversely, suggesting that efficiency of labor probably increases *pari passu* with wages.

African export possibilities have, of course, been adversely affected by poor macro-economic polices in many countries. Apart from these issues of economic (and political) management, some authors have stressed the importance of "high transaction costs" in discouraging export growth. Our survey in Chapter 13, while agreeing with the general diagnosis, notes that in some sense this only begs the question. "Transaction costs" are not predetermined by geography, but are critically shaped by economic history and political economy over a long period of time. We would incline to the view that generalizations about factors hampering export growth at the macro level are not that productive. The attention shifts in Chapter 14 to what can be learnt from micro-level survey data about the factors affecting exports by the RPED sample firms.

The RPED data indicate that exporting activity is fairly widespread among the firms surveyed, particularly in the countries where the export sector is strong – Cameroon, Côte d'Ivoire and Zimbabwe. African firms are not specialized as exporters, in the sense that we can identify a few firms which produce predominantly for the export market. But the concentration of exports is high. The share in total exports of the five largest exporters ranges from a low of 51% for Zimbabwe to a high of 80% or more for Ghana, Tanzania and Zambia. The Probit model, estimated to determine the most important factors in the propensity to export at the firm level, indicated that the employment size of the firm was the dominant one, after country and ownership differences. At the same time exporting firms are seen to be more efficient by any number of alternative criteria, as has already been noticed in Chapters 9 and 10.

The two factors, firm size and efficiency might indeed be connected. We considered the difference in the "obstacles to growth" as reported by exporters and non-exporters. It was found that exporters, and particularly major exporters, are distinguished by having a much lower score recorded for demand and credit constraints on expansion. Other evidence supports the inference that exporters are able to exploit the economies of scale effectively as they break out of the constraints of the limited domestic market. The fact that success in exporting is a signaling device for credit worthiness is an important factor in augmenting the efficiency and growth potential of exporting firms. An important distinguishing characteristic of exporting firms is that, irrespective of the size of firm, they have stronger foreign connections either in the form of licensing agreements or direct assistance. It is clear that foreign buyers or middlemen play a crucial role in the African manufacturing sector in being a conduit for the export market, and the attendant opportunities for expanded markets and technology transfer.

Our conclusion, supported by detailed econometric work which we report, inclines to the thesis that the causality indeed runs from export opportunities to efficiency rather than the other way round. Consistent with this conclusion, it is seen that the growth of firms, and in particular the graduation of smaller firms to higher size groups, is significantly helped by the participation in exports. It was surprising to find that although large firms dominate the export scene, many of them started in smaller, and even in the micro size-group, at the start of their business life. Upward mobility among exporting firms seems to be much more than for the sample of firms as a whole.

Bibliography

Aigner, D.J., A.K. Lovell and P. Shmidt, (1977), "Formulation and Estimation of Stochastic Frontier Production Models", *Journal of Econometrics*, 6: 21–37.

Akerlof, G.A., (1982), "Labor Contracts as Partial Gift Exchange", *Quarterly Journal of Economics*, 97: 543–69.

Akerlof, G.A. and J.L. Yellen (eds), (1986), *Efficiency Wage Models of the Labor Market*, Cambridge: Cambridge University Press.

Akyuz, Yilmaz and Charles Gore, (2001), "African Economic Development in a Comparative Perespective", *Cambridge Journal of Economics*, 25: 265–88.

Andrews, Victor L. and Peter C. Eisemann, (1984), "Who Finances Small Business in the 1980s?", in Paul M. Horvitz and R. Richardson Pettit (eds): *Small Business Finance: Problems in the Financing of Small Business*, Greenwich, Conn.: JAI Press, 75–96.

Aryeetey, Ernest and Christopher Udry, (2000), *Saving in Sub-Saharan Africa*, CID Working Paper No. 38, Harvard University.

Arellano, M. and S. Bond, (1988), *Dynamic Panel Data estimation Using DPD: A Guide for Users*, Institute for Fiscal Studies Working Paper, 88/15.

Azam, Jean-Paul, Marie-Françoise Calmette, Catherine Loustalan, and Christine Maurel, (2000), *Domestic Competition and Export Performance of Manufacturing Firms in Côte d'Ivoire*, Centre for the Study of African Economies, University of Oxford.

Baldwin, John R., (1995), *The Dynamics of Industrial Competition*, Cambridge: Cambridge University Press.

Balassa, B., (1964), "The Purchasing Power Parity Doctrine: A Reappraisal", *Journal of Political Economy*, 72.

Barnow, B., G. Cain and A. Goldberger, (1981), *Issues in the Analysis of Selection Bias*, University of Wisconsin, Department of Economics.

Barro, Robert and Jong-Wha Lee, (1994), *Data Set for a Panel of 138 Countries*, Harvard University.

Bartelsman, E.J. and M. Doms, (2000), "Understanding productivity: Lessons from longitudinal microdata", *Journal of Economic Literature*, 38: 569–94.

Bates, Timothy, (1990), "Entrepreneur Human Capital Inputs and Small Business Longevity", *Review of Economics and Statistics*, Vol. LXXII, no 4, November.

Battese, G.E. and S.S. Broca, (1997), "Functional Forms of Stochastic Frontier Production Functions and Models for Technical Inefficiency Effects: A Comparative Study for Wheat Farmers in Pakistan", *Journal of Productivity Analysis*, 4: 395–414.

Battese, G.E. and T.J. Coelli, (1995), "A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data", *Empirical Economics*, 20: 325–32.

Bench, J., (1987), "Money and Capital Markets", in Edward Altman (ed.), *Handbook of Financial Markets and Institutions*, New York: Wiley and Sons, 6th Edition.

Bernard, A.B. and J.B. Jensen, (1995), "Exporters, jobs, and wages in US manufacturing, 1976–1987", *Brookings Papers on Economic Activity*, Microeconomics. Washington D.C.

Bernard, A.B. and J.B. Jensen, (1999), "Exceptional exporter performance: Cause, effect, or both?" *Journal of International Economics*, 47 (1): 1–26.

Berthelemy, J.-C. and Ludvig Soderling, (1999), "The Role of Capital Accumulation, Adjustment and Structural Change for Economic Take-off: Empirical Evidence from African Growth Episodes", CEPII Working Paper, 99–107, University of Paris.

Bertola, G., (1988), *Adjustment Costs and Dynamic Factor Demands: Investment and Employment under Uncertainty*, Ph.D. Dissertation, Cambridge, MA: Massachusetts Institute of Technology.

Biggs, T., M. Shah and P. Srivastava, (1995), *Technological Capabilities and Learning in African Enterprises*, Regional Program for Enterprise Development (RPED), Case Study Series, World Bank, Washington D.C.

Biggs, T., M. Raturi and P. Srivastava, (1996), *Enforcement of Contracts in an African Credit Market: Working Capital Financing in Kenyan Manufacturing*, RPED Discussion Paper Series, 71, World Bank, Washington D.C.

Biggs, T. and M. Shah, (1997), *Trade Reforms, Incentives on Ground and Firm Performance in Ghana*, Regional Program on Enterprise Development, World Bank, Washington D.C.

Biggs, T., V. Ramachandran and M. Shah, (1998), *Does Greater Competition Improve Firm Performance in Africa?*, Regional Program for Enterprise Development (RPED), Discussion Papers No 085, World Bank, Washington D.C.

Bijmolt, T.H.A. and P.S. Zwart, (1994), "The Impact of Internal Factors on the Export Success of Dutch Small and Medium-sized Firms", *Journal of Small Business Management*, 69–83.

Bigsten, A., (1994), "Limitations and Rewards in Kenya's Manufacturing Sector: A Study of Enterprise Development", RPED Country Study Series, World Bank, Washington D.C.

Bigsten *et al.*, (1998a), *Investment in Africa's Manufacturing Sector: A Four Country Analysis*, Center for the Study of African Economies, Oxford University.

Bigsten *et al.*, (1998b), *Capital Adjustment Costs in Sub-Saharan Africa's Manufacturing Sector*, Center for the Study of African Economies, Oxford University.

Bigsten *et al.*, (1998c), *Expectations in a Dynamic Investment Model: Survey Evidence from Kenya and Zimbabwe*, Center for the Study of African Economies, Oxford University.

Bigsten *et al.*, (1998d), *Exports and Firm-level Efficiency in African Manufacturing*, Center for the Study of African Economies, Oxford University.

Bigsten, *et al.*, (1999), "Exports of African manufactures: macro policy and firm behaviour", *Journal of International Trade and Economic Development*, 8(1): 53–71.

Bigsten *et al.*, (2000a), *Credit Constraints in Manufacturing Enterprises in Africa*, Center for the Study of African Economies, Oxford University.

Bigsten *et al.*, (2000b), "Rates of return on physical and human capital in Africa's manufacturing sector", *Economic Development and Cultural Change*, 48: 801–27.

Birch, David L., (1987), *Job Generation in America*, New York: Free Press.

Bond, S. and C. Meghir, (1994), "Dynamic Investment Models and the Firm's Financial Policy", *Review of Economic Studies*, 61: 197–222.

Bond, S., J. Elston, J. Mairesse and B. Mulkay, (1997), *Financial Factors and Investment in Belgium, France, Germany and the UK: A Comparison Using Panel Data*, NBER Working Paper, No 5900.

Bresnahan, T.F. and Peter C. Reiss, (1991), "Entry and Competition in Concentrated Markets", *Journal of Political Economy*, Vol. 99, no 5, 977–1009.

Brown, C., J. Hamilton and J. Medoff, (1990), *Employers Large and Small*, Cambridge MA: Harvard University Press.

Brunetti A., G. Kisunko and Beatrice Weder, (1997), *Institutional Obstacles for Doing*

Business: Data Description and Methodology of a World-wide Private Sector Survey, World Bank, Washington D.C.

Cavalluzzo K., L. Cavalluzzo and John Wolken, (1999), *Competition, Small Business Financing, and Discrimination: Evidence from a New Survey*, McDonough School of Business, Georgetown University.

Clerides S., S. Lach and J. Tybout, (1998), "Is Learning by Exporting Important? Micro-Dynamic Evidence From Colombia, Mexico and Morocco", *Quarterly Journal of Economics*, August, 903–48

Coelli, T., (1994), *A Guide to Frontier Version 4.1: A Computer Program for Stochastic Frontier Production and Cost Function Estimation, User Guide to Computer Program Frontier Version 4.1*, Unpublished Memo, University of New England, Armidale.

Collier, Paul, (1995), "The Marginalization of Africa", *International Labour Review*, 134 (4–5): 541–57.

Collier, Paul and Deepak Lal, (1986), *Labor and Poverty in Kenya 1900–1980*, Oxford: Clarendon Press.

Collier, Paul, (1997), *Globalisation: what should be the African policy response*, Centre for the Study of African Economies, University of Oxford, mimeo.

Collier, P. and J.W. Pattillo (eds), (1999), *Risk and Agencies of Restraint: Reducing the Risk of African Investment*, London: Macmillan.

Collier, Paul and Jan Gunning, (1999), "Explaining African Economic Performance", *Journal of Economic Literature*, 37: 64–111.

Cuevas, C., R. Hanson, M. Fafchamps, P. Moll and P. Sirvastava, (1993), *Case Studies of Enterprise Finance in Ghana*, RPED, World Bank, Washington D.C.

Debreu, G. (1951), "The coefficient of Resource Utilisation", *Econometrica*, 19: 273–92.

Demrigue-Kunt A. and Rose Levine, (1999), *Bank-Based and Market-based Financial Systems: Cross-country Comparisons*, World Bank, Washington D.C.

Durbarry, Ramesh, (2001), "The Export Processing Zone", Chapter 6 in Dabee, Rajen and David Greenway (eds): *The Mauritius Economy: a Reader*, New York: Palgrave.

Elbadawi, Ibrahim A., (1999), *Can Africa Export Manufactures? The Role of Endowment, Exchange Rates, and Transaction Costs*, Development Research Group and Africa Region, World Bank, Washington D.C.

Elbadawi, I.A. and J. Randa, (1999), *Can Africa Export Manufactures: A Tale of Three Views*, World Bank, Washington D.C.

Elbadawi, I.A and G. Helleiner, (2000), "African development in the context of new world trade and financial regimes: the role of the WTO and its relationship to the World Bank and the IMF", in T.A. Ademola (ed.), *Africa and the New World Trading System*, Routledge.

Evans, David, (1987a), "Tests of Alternative Theories of Firm Growth", *Journal of Political Econom.*, Vol. 95, no. 4.

Evans, David, (1987b), "The Relationship between Firm Growth, Size, and Age: Estimates for 100 Manufacturing Industries", *Journal of Industrial Economics*, 35: 567–81.

Fafchamps, M., T. Biggs, J. Conning and P. Srivastava, (1994), "Enterprise Finance in Kenya", Regional Program on Enterprise Development, World Bank, Washington D.C.

Fafchamps, M., (1996), *Ethniticity and Markets: Supplier Credit and African Manufacturing*, Mimeo, Stanford University, Stanford.

Fafchamps, M., (1997), "Trade Credit in Zimbabwean Manufacturing", *World Bank Development*, Washington D.C.

Fafchamps, M. and Remco Oostendorp, (2002), "Investment", in *Industrial Change in Africa: Micro Evidence on Zimbabwean Firms under Structural Adjustment*, by Gunning J.W. and Remco Oostendorp (eds), Basingstoke: Palgrave.

Forsund, F.R. and L. Hjalmarsson, (1987), *Analysis of Industrial Structure: A Putty-Clay Approach*, IUI, Stockholm, Almqvist & Wiksell International.
Farrell, M.J., (1957), "The measurement of productive efficiency", *Journal of the Royal Statistical Society*, A120, 253–90.
Fazzari, S.M., R.G. Hubbard and Bruce C. Peterson, (1988), "Financing Constraints and Corporate Investment", *Brookings Papers on Economic Activity*, 141–95.
Fazzari, S.M. and Bruce C. Peterson, (1993), "Investment Smoothing with Working Capital: New Evidence on the Impact of Financial Constraints", *Rand Journal of Economics*, Vol. 24, no 3, 328–42.
Ghura, D. and M.T. Hadjimicheal, (1996), "Growth in Sub-Saharan Africa", *IMF Staff Papers*, Vol. 43, no 3, September: 605–34.
Gottschalk, Peter and T.M. Smeeding, (1997), "Cross-National Comparisons of Earnings and Income Inequality", *Journal of Economic Literature*, 35: 633–87.
Greene, W.H., (1993), "The Econometrics Approach to Efficiency Analysis", in *The Measurement of Productive Efficiency: Techniques and Applications*, H.O. Fried, C. Lovell, and S. Schmidt (eds), Oxford: Oxford University Press.
Gunning, J.W. and Remco Oostendorp (eds) (2002), *Industrial Change in Africa: Micro Evidence on Zimbabwean Firms under Structural Adjustment*, Basingstoke: Palgrave.
Hadjimichael, M.T., D. Ghura, M. Muehleisen, R. Nord and E.M. Ucer, (1995), *Sub-Saharan Africa: Growth Savings, and Investment*, International Monetary Fund, Occasional Papers 118, Washington D.C.
Hart P.E. and S.J. Prais, (1956), "The Analysis of Business Concentration: A Statistical Approach", *Journal of the Royal Statistical Society*, 35: 583–606.
Harvey, C. (ed.) (1996), *Constraints on the Success of Structural Adjustment Programmes in Africa*, London: Macmillan.
Hall, B.H., (1987), "The Relationship Between Firm Size and Firm Growth in the USA Manufacturing Sector", *Journal of Industrial Economics*, Vol. XXXV, no 4, June.
Harrold, Peter, Malathi Jayawickrama and Deepak Bhattasali, (1996), *Practical lessons for Africa from East Asia in industrial and trade policies*, World Bank Discussion Paper, 310, Washington, D.C.
Haymer S. and O. Pashigan, (1962), "Firm Size and Rate of Growth", *Journal of Political Economy*, 70: 556–69.
Heckman, J.J., (1981), "Statistical Models for Discrete Panel Data", in *Structural Analysis of Discrete Data with Econometric Applications*, C.F. Manski and D. McFadden (eds), pp. 114–78, Cambridge: MIT Press.
Hoffmaiser, A., J.E. Roldos and P. Wickham, (1997), *Macroeconomic Fluctuations in Sub-Saharan Africa*, IMF Working Paper, International Monetary Fund, Washington D.C.
Huang C.J. and J.T. Liu, (1994), "Estimation of Non-neutral Stochastic Frontier Production Function", *Journal of Productivity Analysis*, 5: 171–80.
Idson, T. and D. Feaster, (1990), "A Selectivity Model of Employer Size Wage Differentials", *Journal of Labor Economics*, 8: 99–122.
Jamel, Vali and John Weeks, (1993), *Africa Misunderstood or Whatever Happened to the Rural–Urban Wage Gap*, London: Macmillan for the ILO.
Jenkins, C., (1996), "Determinants of Private Investment in Zimbabwe", *Journal of African Economies.*
Jovanovic, Boyan, (1982), "Selection and the Evolution of Industry", *Econometrica*, Vol. 50, no 3, pp. 649–70, May.
Kandori, M., (1992), "Social Norma and Community Enforcement", *Review of Economic Studies*, 59: 63–80.

Kaplan, S. and L. Zingales, (1997), "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?", *The Quarterly Journal of Economics*, 62: 169–216.

Koopmans, T.C., (1951), "An Analysis of Production as an Efficient Combination of Activities", in T.C. Koopmans (ed.), *Activity Analysis of Production and Allocation*, Cowles Commission for Research in Economics, Monograph No. 13, New York: Wiley.

Kraay, A., (1997), *Exports and Economic Performance: Evidence from a Panel of Chinese Enterprises*, mimeo, DRG, World Bank, Washington D.C.

Kumar, M.S. and K. Mlambo, (1995), *Determinants of Private Investment in Sub-Saharan Africa: an Empirical Integration*, Mimeo, International Monetary Fund.

Kumar, K.B., R.G. Rajan and L. Zingales, (1999), *What Determines Firm Size?*, NBER Working Paper 7208.

Lang L., E. Ofek and R.M. Stulz, (1996), "Leverage, Investment, and Firm Growth", *Journal of Financial Economics*, 40: 3–29.

Lee, C.S. and Y.S. Yang, (1990), "Impact of Export Market Expansion Strategy on Export Performance", *International Marketing Review*, 7 (4): 40–52.

Leidholm, Carl and Donald Mead, (1992), *The Structure and Growth of Microenterprises in Southern and Eastern Africa: Evidence from Recent Surveys*, Department of Economics, Michigan State University, January.

Levine, D.L., (1992), "Can Wage Increases Pay for Themselves? Test with a Production Function", *Economic Journal*, 102: 1102–15.

Levine, Ross and David Renelt, (1985, 1990–1993), *World Currency Yearbook*, Brooklyn NY: Currency Data and Intelligence, Inc.

Little, I.M.D., D. Mazumdar and J.M. Page Jr, (1987), *Small Manufacturing Enterprises: A Comparative Analysis of Indian and other Economies*, Washington: Published for the World Bank by Oxford University Press.

Liu, J.-T., M.-W. Tsou, and J. Hammit, (1999), "Do Small Plants Grow Faster? Evidence from Taiwan Electronic Industry", *Economic Letters*, 65: 121–29.

Lovell, C. (1993), "Production Functions and Productive Efficiency", *The Measurement of Productive Efficiency: Techniques and Applications*, H.O. Fried, C. Lovell, and S. Schmidt (eds), Oxford: Oxford University Press.

Lundvall, K. and G.E. Battesse, (2000), *Firm Size, Age, and Efficiency: Evidence from Kenyan Manufacturing Firms*, Journal of Development Studies 36: 146–63.

Mansfield, E., (1962), "Entry, Gibrat's Law, Innovation and the Growth of Firms", *American Economic Review*, 48: 1023–51.

Mansfield, E., (1962), "Entry, Gibrat's Law, Innovation, and the Growth of Firms", *American Economic Review*, 52: 1023–51.

Marchant, Jean-Miche, (1997), "On Exogenous Shocks Transmission to Domestic Prices in the Ivoirian Manufacturing Sector Between 1993–1995", RPED paper # 083, World Bank, Washington D.C.

Mathew, W.R., (1992), *Export Processing Zones in Jamaica and Mauritius*, World Bank, Washington D.C.

Mazumdar, D. and A. Mazaheri, (2002), *Wages and Employment in Africa*, Aldershot: Ashgate Publishing.

McPherson, Michael, (1996), "Growth of Micro and Small Enterprises in Southern Africa", *Journal of Development Economics*, Vol. 48, pp. 253–277.

Mead, Donald (1994), "The Contribution of Small Enterprises to Employment Growth in Southern and Eastern Africa", *World Development*, Vol. 22, no 12.

Meeusen, W. and J. van den Broeck, (1977), "Efficiency Estimation from Cobb-Douglas

Production Functions with Composed Errors", *International Economic Review*, 18: 435–444.

Miesenbock, K.J., (1988), "Small Businesses and Exporting: A Literature Review", *International Small Business Journal*, 6 (2): 42–61.

Milner, Chris, (2001), "International Trade and Trade Policy", Chapter 5 in Dabee, Rajen and David Greenway (eds): *The Mauritius Economy: a Reader*, New York: Palgrave.

Mlambo, K., (2002), "Productivity Growth and Technical Efficiency in Zimbabwean Manufacturing", *Industrial Change in Africa: Micro Evidence on Zimbabwean Firms under Structural Adjustment*, J.W. Gunning and Remco Oostendorp (eds), Basingstoke: Palgrave.

Mlambo K. and M.C. Mhlophe, (1995), *Investment Behaviour under Uncertainty: An Analysis of the Determinants of Investment in Zimbabwe*, Presented in International Economics Association Conference, December.

Mumbengegwi, C. and J. Wengel, (1994), "The Finance of Investments by Firms", *The Manufacturing Sector in Zimbabwe: Dynamics and Constraints*, RPED Country Study Series, Free University of Amestrdam, University of Zimbabwe, and the World Bank.

Ng, Francis and Alexander Yeats, (2000), *On the Recent Trade Performance of Sub-Saharan African Countries: Cause for Hope or More of the Same?*, Africa Region Working Paper Series No. 7, World Bank, Washington D.C.

Noorbaksh, F. and Alberto Paloni, (1999), *The State of Industry in Sub-Saharan African Countries Undertaking Structural Adjustment Programmes*, Centre for Development Studies, Department of Economics, University of Glasgow.

Nugent, J.B. and M.K. Nabili, (1992), "Development of Financial Markets and the Size Distribution of Manufacturing Establishment: International Comparisons", *World Development*, 20: 1489–99.

Oostendorp, R., (2002), "Firm and Product Market Characteristics", *Industrial Change in Africa: Micro Evidence on Zimbabwean Firms under Structural Adjustment*, J.W. Gunning and Remco Oostendorp (eds), Basingstoke: Palgrave.

Pack, Howard, (1987), *Productivity, Technology, and Industrial Development*, New York: Oxford University Press.

Pack, Howard and Christina Paxson, (1999), *Is African Manufacturing Skill Constrained?*, World Bank, Washington D.C.

Pakes, Ariel and Richard Ericson, (1989), *Empirical Applications of Alternative Models of Firm Dynamics*, Working Paper No. 2893, National Bureau of Economic Research Inc., March.

Pattillo, C., (1998), "Investment, Uncertainty, and Irreversibility in Ghana", *IMF Staff Papers*, Vol. 45, no 3, September.

Petersen, M.A. and R. Rajan, (1997), "Trade Credit: Theories and Evidence", *The Review of Financial Stiudies*, 10: 661–91.

Petersen, M.A. and R. Rajan, (1994), "The Benefits of Lending Relationship: Evidence from Small Business Data", *Journal of Finance*, 49: 3–37.

Psacharapoulos, Soerge and Z. Tzannatos, (1992), *Women's Pay and Employment in Latin America*, World Bank, Washington D.C.

Rajan, R. and L. Zingales, (1995), "What Do We Know about Capital Structure: Evidence from International Data", *Journal of Finance*, Vol. 50, no 5, 1421–60.

Rajan, R. and L. Zingales, (2001), "The Firm as a Dedicated Hierarchy: A Theory of the Origins and Growth of Firms", *Quarterly Journal of Economics*.

Ramachandran, Vijaya and Manju Shah, (1997), *The Effects of Foreign Ownership in Africa: Evidence from Ghana, Kenya and Zimbabwe*, RPED paper # 081, World Bank, Washington D.C.

Raturi, M, and Anand Swamy, (1997), *Explaining Ethnic Differences in Credit Market Outcomes: Evidence from Zimbabwe*, RPED Paper #78, World Bank, Washington D.C.
Rauch, James E., (1991), "Modeling the Informal Sector Formally", *Journal of Development Economics*, 35 (1): 33–48.
Reder, M.W., (1955), "The Theory of Occupational Wage Differentials", *American Economic Review,* 44: 833–52.
Risseeeuw, P., (2002), "Firm Growth", *Industrial Change in Africa: Micro Evidence on Zimbabwean Firms under Structural Adjustment,* Gunning J.W. and Remco Oostendorp (eds), Basingstoke: Palgrave.
Roberts, M. and J. Tybout, (1991), *Size Rationalization and Trade Exposure in Developing Countries*, World Bank, Washington D.C.
Roberts, M.J. and James R. Tybout, (1995), *Empirical Model of Sunk Costs and the Decision to Export"*, Policy Research Working Papers, WPS 1436, International Trade Division, World Bank, Washington D.C.
Rodrik, D. (1998), *Trade Policy and Economic Performance in Sub-Saharan Africa*, NBER Working Paper, 6562.
Roemer, Michael, (1996), "Could Asian policies propel African growth?", Development Discussion Paper, 543, Harvard Institute for International Development, Cambridge (Mass.).
Salinger, M., (1990), "The Concentration–Margins Relationship Reconsidered", *Brookings Papers: Microeconomics*, 287–321.
Salop, S.C., (1979), "A Model of the Natural Rate of Unemployment", *American Economic Review*, 69: 117–125.
Samuel, C., (1999), *Internal Finance and Investment: Another Look*, Operation Policy Group, Operation Policy Department, World Bank, Washington D.C.
Samuelson, P., (1964), "Theoretical notes on trade problems", *Review of Economics and Statistics*, 46 (May).
Saygili, S., (1998), "Is the Efficiency Wage Hypothesis Valid for Developing Countries? Evidence from the Turkish Cement Industry", Discussion Paper, University of Kent at Canterbury, UK.
Schaffner, J., (1994), "Larger Employer Wage Premium in Peru", Mimeo, Stanford University.
Schwarz, R.A. and D. Whitcomb, (1979), "The Trade Credit Decision", in J. Bicksler (ed.) *Handbook of Financial Economics*, Amsterdam: North-Holland.
Serven, Luis, (1996), *Irreversibility, Uncertainty and Private Investment: Analytical Issues and Some Lessons from Africa*, World Bank, Washington D.C.
Shapiro, C. and J.E. Stiglitz, (1984), "Equilibrium Unemployment as a Worker Discipline Device", *American Economic Review*, 74: 405–26.
Simon, H.Z. and C.P. Bonini, (1958), "The Size Distribution of Business Firms", *American Economic Review*, 48: 607–17.
Sleuwaegen, L. and Micheline Goedhuys, (1998), *Determinants of Entrepreneurship and Growth of Entrepreneurial Firm in Côte d'Ivoire*, RPED Discussion Paper Series, 92, World Bank, Washington D.C.
Sleuwaegen, L. and Micheline Goedhuys, (1996), *Size Distribution and Growth of Manufacturing Firms in Côte d'Ivoire*, RPED Discussion Paper Series, 87, World Bank, Washington D.C.
Sleuwaegen, L. and Micheline Goedhuys, (1998), *Entrepreneurship in Côte d'Ivoire*, RPED Discussion Paper Series, 86, World Bank, Washington D.C.
Smith, A.D. (ed.) (1969), *Wage Policy Issues in Economic Development*, London: Macmillan.

Söderbom, M. and Francis Teal, (2001), *Firm size and human capital as determinants of productivity and earnings*, CSAE Working Paper WPS 2001.9. Centre for the Study of African Economies, Department of Economics, University of Oxford.

Söderbom, M. and Francis Teal, (2001), *Are African Manufacturing Firms Really Inefficient? Evidence from Firm-Level Panel Data*, Centre for the Study of African Economies, Department of Economics, University of Oxford.

Solow, R.M., (1981), "Another Possible Source of Wage Stickiness", *Journal of Macroeconomics*, 1: 79–82.

Stewart, F. *et al*., (eds) (1992), *Alternative Development Strategies in Sub-Saharan Africa*, London: Macmillan.

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

Sutton, John, (1997), "Gibrat's Legacy", *Journal of Economic Literature*, Vol. XXXV, pp. 40–59, March.

Teal, Francis, (1999), "Why Can Mauritius Export Manufactures and Ghana Not?", *The World Economy*, 22 (7): 981–93.

Tybout, J., (1983), "Credit Rationing and Investment Behavior in a Developing Country", *Review of Economics and Statistics*, 65: 598–607.

Tybout, J.R., (2000), "Manufacturing Firms in developing countries: How well do they do, and why?", *Journal of Economic Literature*, 28: 11–44.

Tybout, J.R. and M.D. Westbrook, (1995), "Trade Liberalization and the Dimensions of Efficiency Change in Mexican Manufacturing Industries", *Journal of International Economics*, 39: 53–78.

Valenchik, A.D., (1997), "Government Intervention, Efficiency Wages, and the Employer Size Wage Effect in Zimbabwe", *Journal of Development Economics*, 53: 305–38.

Van Biesebroeck J., (2001), "Exporting raises productivity, At least in Sub-Saharan African manufacturing Firms", Mimeo, Stanford University.

Van Biesebroeck J., (2001), "Firm Development and the Lack Thereof in Sub-Saharan Africa", Mimeo, Department of Economics, University of Toronto.

Variyam, Jayachandran and David Kraybill, (1992), "Empirical Evidence on determinants of firm growth", *Economics Letters*, Vol. 38: 31–36.

Wangwe, S. (ed.) (1995), *Exporting Africa: Technology, Trade and Industrialization in Sub-Saharan Africa*, London: Routledge.

Williamson, Oliver E., (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: Free Press.

Williamson, J., (1997), "Exchange rate policy and development strategy", Elbadawi and Soto (eds), "Foreign Exchange Markets and Exchange Rate Policies in Sub-Saharan Africa", *Journal of African Economies*, Supplement to Vol. 6, no 3: 17–36.

Winston, G.C., (1974), "The Theory of Capital Utilization and Idleness", *Journal of Economic Literature*, 12: 1301–20.

Wood, Adrian, (1988), "Global Trends in Real Exchange Rates: 1960 to 1984", *World Bank Discussion Papers 35*, World Bank, Washington D.C.

Wood, Adrian, (1994), *North–South Trade, Employment and Inequality: Changing Fortunes in a Skill-Driven World*, Oxford: Clarendon Press.

Wood, Adrian and Kersti Berge, (1997), "Exporting manufactures: Human resources, natural resources, and trade policy", *Journal of Development Studies*, 34: 35–59.

Wood, A. and T. Owens, (1997), "Export-oriented Industrialization Through Primary Processing?", *World Development*, 25: 1453–70.

Wood, Adrian and Jörg Mayer, (1999), *Africa's Export Structure in a Comparative*

Perspective, Institute of Development Studies (IDS) and United Nations Conference on Trade and Development (UNCTAD), United Nations, Geneva.

World Bank, (1997), *Adjustment Lending in Sub-Saharan Africa: An Update*, Operation Evaluation Department, World Bank, Washington D.C.

World Bank (1994), *Adjustment in Africa: Reforms, Results, and the Road Ahead*, New York: Oxford University Press.

World Bank, *African Development Indicators*, *different issues*, World Bank, Washington D.C.

World Bank, *World Development Report*, *different issues*, World Bank, Washington D.C.

Yeats, Alexander J., Azita Amjadi, Ulrich Eincke, and Francis Ng, (1997), *Did Domestic Policies Marginalize Africa in World Trade*, Directions in Development Series, World Bank: Washington, D.C.

Zeufack, A. and J.M. Marchat, (1996), "Fiscal Incentives and Private Investment in Côte d'Ivoire: An Investigation Using RPED Data", RPED Discussion Paper Series, 076, World Bank, Washington, D.C.

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