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## What Have We Learned From a Decade of Manufacturing

### Enterprise Surveys in Africa? \*

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#### Abstract

In the early 1990s the World Bank launched the Regional Program on Enterprise Development in several African countries, a key component of which was the collection of manufacturing firm-level data. In this paper we review the research based on the data sets generated by these and subsequent firm surveys in Africa, with a special view to what we think are the most important policy implications. We survey the research on the African business environment, focusing on market size, risk, access to credit, labor, and infrastructure. We cover the research on how firms choose to organize themselves and how firms do business. We review the research on firm performance, including firm growth, investment and technology acquisition, and exports. We conclude with an extended discussion of the policy lessons.

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**Key words:** African manufacturing, economic performance, survey data.

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Facts:

- *Between 1972 and 2002 income per capita in Sub-Saharan Africa fell by 8 percent, from USD 625 to USD 575 in constant 1995 values.*
- *Between 1972 and 2002 manufacturing value-added per capita in Sub-Saharan Africa fell by 13 percent, from USD 98 to USD 85 in constant 1995 values.*
- *In 2001/2002 the share of Sub-Saharan African in world population was 11 percent, the share in world income was 1.1 percent, the share in world manufacturing value-added was 0.8 percent, and the share in world manufacturing exports was 0.7 percent.*

*Source: World Development Indicators<sup>1</sup>*

## **1. Introduction**

Africa's poor economic performance is a well established fact. The process of globalization, or international economic integration, has largely passed the continent by. Foreign investors do not see Africa as a promising location for investment, and many Africans share this view and keep a large share of their wealth outside Africa.<sup>2</sup> The growth of world trade in recent decades has been driven by the increasing international outsourcing of production, a process that has made it possible for poor countries with relatively unskilled workers to participate in (parts of) high-skill or high-tech industries. There has been extensive outsourcing primarily to Asia, but very little to Africa. Further, with the exception of Mauritius, Africa's own manufacturing sector is small and stagnant, undertakes little investment, and has not managed to break into exports markets. The optimistic beliefs of the 1960s that the sector would act as an "engine of growth" in the continent have thus far not been fulfilled.<sup>3</sup>

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<sup>1</sup> World Bank (2004a).

<sup>2</sup> Africans hold 40% of their wealth outside Africa according to Collier, Hoeffler, and Pattillo (2001).

<sup>3</sup> Manufacturing is typically far from the largest sector in African economies, nevertheless it has often been considered central for economic development. Reasons why the manufacturing sector is often perceived as "special" is that this sector is a potential engine of modernization, a creator of skilled jobs, and a generator of positive spillover-effects (Tybout, 2000).

Over the last 15 years the attitude of policy makers towards manufacturing in Africa has changed significantly. The strategy of import substitution, which involved protecting the domestic manufacturing sector by means of barriers to imports and discouraging exports, was embraced in Africa for a long time and was almost certainly part of the reason for the poor economic outcomes. At the center of the current policy discussion is the idea that improved economic performance in Africa's private sector can contribute to poverty reduction by generating more well paid jobs. Since the early 1990s, large scale data collection projects have been fielded in Africa with the objective of generating data on manufacturing firms and plants informative of why things had gone wrong in the sector and how matters could be improved. The purpose of this paper is to review the findings that have come out of this research with a special view to what we think are the most important policy implications. Our purpose is thus not to extend the work that has been done but to draw on it to address a range of questions relevant to understanding the links from industrial policy to poverty reduction.

We are not the first to take stock of what can be learned from data on manufacturing firms in Africa. Tybout (2000) reviews the research on firm performance in developing regions, including Africa. Mazumdar and Mazaheri (2003) focus exclusively on African manufacturing. Collier and Gunning (1999) discuss the problems faced by Africa's manufacturing sector as part of their survey paper on Africa's general economic problems. All of these studies cover data on African firms confined to the period 1991-1995, i.e. the first wave of the RPED data (see Section 2). More recently, Kingdon, Sandefur and Teal (2004) and Fafchamps and Söderbom (2004a) have provided overviews of the conditions for job creation and labor demand in Africa, drawing on the firm surveys among other sources. Our review is based on more recent data than what was referred to in Collier and Gunning (1999), Tybout (2000), and Mazumdar and Mazaheri (2003), and in looking at a wide range of results that have come out of the research on the firm data it has a broader focus than the review papers by Kingdon et al. and Fafchamps and Söderbom (2004a).

One of the most remarkable characteristics of African economic performance is the wide range of outcomes across countries. There exist spectacular success stories as well as mediocre economic performers. There are relatively large as well as very small economies. There are countries that have experienced drawn out political turmoil and others that have seen long-term political stability. There are countries

where there is ongoing rapid economic and political change and others that are firmly in the status quo category. Sweeping averages of aggregate variables - such as those reported above - thus mask an enormous amount of variability in the data. One of the recurring themes throughout this paper is that the firm data show a similar pattern of a very wide range of outcomes across firms *within countries* in Africa. While most firms have not fared well during the last 10-15 years, some have actually performed extremely well. We think this is one of the most striking general results that have come out of the work on these data. Because the heterogeneity in outcomes is so strong, understanding its causes and consequences is, we think, of central importance. To this end, firm data must be available.

In recent years there has been a rapidly growing interest in documenting differences in the “investment climate” across regions and countries, and investigating if such differences can be linked to differences in outcomes, both across and within countries (e.g. Batra, Kaufmann and Stone, 2003; World Bank, 2004b, 2005).<sup>4</sup> The poor investment climate in Africa results in high transaction costs and particularly disadvantages the manufacturing sector and its ability to export, as manufacturers are intensive users of investment climate services (Collier, 2000). This is problematic, because exporting presents a promising route to growth and development in Africa. There are two reasons for this. First, the domestic markets for manufactured goods are typically very small. African industry must therefore orientate a substantial share of its output towards exporting if the sector is to grow, generate new jobs and contribute to poverty reduction in the continent. Second, there is evidence from the data that firms become more productive as a result of exporting. This is the so-called learning-by-exporting effect, first documented for Africa by Bigsten et al. (2004) and subsequently confirmed on a larger sample by van Biesebroeck (2005a). We will return to this below. Since Africa represents only a tiny fraction of world trade the potential for expansion is significant, and experience from Ghana and Uganda suggests that export recovery can generate large gains quite quickly.

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<sup>4</sup> The investment climate as a concept is very broad, its key components being the institutional, policy, and regulatory environment in which firms operate (Dollar, Hallward-Driemeier, and Mengistae, 2003). The quality of infrastructure, the nature of business regulations and their enforcement, the prevalence of credit constraints, the quality of governance, general conditions for private investment and enterprise growth, economic freedom, country credit ratings, human development, environmental sustainability and civil rights are all examples of recently studied dimensions of the investment climate.

The remainder of the paper is organized as follows. In Section 2 we discuss why and how firm survey data are useful in the context of improving our understanding of Africa's manufacturing sector. In this section we also describe briefly the main data collection projects that have been fielded in Africa since the early 1990s. In Section 3 we review the research results on manufacturing firms in Africa. We begin by looking at the business environment, focusing on market size, risk, access to credit, labor, and infrastructure. We then turn to issues to do with how firms that operate in such an investment climate choose to organize themselves and how firms do business. We end the section by looking in some detail at what we have learned about three key aspects of firm performance, namely firm growth, investment and technology acquisition, and exports. We conclude in Section 4 with an extended discussion of the policy lessons.

## **2. Why Firm Surveys?**

The main channels through which Africa's private sector can contribute to poverty reduction are by generating wage growth and more jobs. Everything else equal, increasing wages and employment result in higher total labor costs, which tend to erode firms' profits unless accompanied by better performance. This is why improved economic performance is vital in this context and a major reason why this has come to be a central concern to policy-makers and development analysts alike over the last decade. The survey data on African firms have been extensively used for research under this theme. Over the last ten to 15 years three major research programs can be identified - all connected to the World Bank one way or the other - which have involved the collection of survey data on African firms on a large scale. The first was the Regional Program on Enterprise Development (RPED) surveys, carried out in Burundi, Cameroon, Côte d'Ivoire, Ghana, Kenya, Tanzania, Zambia, and Zimbabwe between 1992 and 1995. Each survey typically covered about 200 firms, and firms were interviewed three years in a row in most countries (thus yielding panel data). Four industrial sub-sectors were covered – food, wood, textiles and metal – and large as well as small firms, including informal ones, were included. Data were collected on a wide range of variables, including sales and output, capital stock, entrepreneur characteristics, employment by occupational category, labor turnover, wages, and conflicts with workers. Data collection as part of the RPED slowed down after 1995,

and the World Bank subsequently initiated the Firm Analysis and Competitiveness Surveys (FACS) as the next large data collection program. The focus of the FACS was oriented towards larger firms outside SSA, and Morocco was the only African country surveyed as part of FACS.

At the end of the 1990s and in the early 2000s new survey initiatives took place in SSA, as Investment Climate (IC) surveys and the World Business Environment Survey (WBES) were fielded across a wide range of countries. The IC surveys carried out in SSA so far have been organized as part of the RPED, and have covered Kenya, Tanzania, Zambia, Zimbabwe, Mozambique, Nigeria, Eritrea, Ethiopia, Côte d'Ivoire, Cameroon, Senegal, and Mauritius. The nature of these surveys is similar to the earlier RPED surveys in terms of firm and sector coverage, but the survey instruments are more oriented towards investment climate issues and thus far the main objective appears to have been to collect cross-section data (as distinct from panel data). The WBES was launched in 80 countries and one territory in 1999 and 2000, including 17 countries in SSA (Batra, Kaufmann and Stone, 2003). The surveys in SSA covered between 52 and 137 firms per country, and both manufacturing and non-manufacturing firms were included. The bulk of the survey instrument was concerned with firm and business environment attributes (e.g. governance, regulations, economic policy, public services etc.). The WBES data is cross-section data.

The firm survey is not the only way of generating data useful for analysis of private sector performance and the role of the investment climate. In fact, because many aspects of the investment climate are constant across firms within an economy, it will sometimes be better to measure the key dimensions of the investment climate at the country level - perhaps by means of a few case studies - and then conduct the empirical analysis at the aggregate level. One major project based on such a procedure has generated the World Bank and IFC *Doing Business Database* (World Bank, 2005). This database contains data on various aspects of the regulatory environment facing private firms in a large number of countries and economic regions - e.g. how long it takes to start a business, how hard it is to hire and fire workers, how well contracts are enforced and so on. The construction of these data is based on case-studies of laws and regulations in each country and does not involve surveying individual firms.

While the case-study is a practical approach for collating data on national regulations, it is not suitable for measuring all aspects of the investment climate even if one's sole purpose is to create country-level variables. For instance, if one wants to know how long it takes on average for imported and exported goods to clear customs or how much money firms lose on average due to power outages, a firm survey is likely to be the only feasible approach. Further, firm surveys provide probably the best (the most representative) basis for reports on "the voices of the firms" (Batra et al., 2003) with respect to growth obstacles. The case-study and the firm surveys are thus best viewed as complementary methods, generating different kinds of complementary information.

When, then, are firm survey data most useful? We have already mentioned one obvious use of firm data, namely to construct aggregate investment climate measures (or any aggregate variable, for that matter). In some cases, the researcher's goal cannot be reached by relying on aggregate data. It may be that the researcher has to analyze differences across firms within an economy, in order to estimate, say, productivity dispersion - a conventional indicator of the degree of competition - or to find out whether credit constrained firms invest less than unconstrained ones. It is arguably in cases like this, when the *heterogeneity* across firms is of central interest, that firm data is most useful. Unless firm data are already available (which is often not the case in SSA), there is then really no substitute for the firm survey.<sup>5</sup> Indeed, perhaps the most striking general result that has come out of the work on the African firm survey data thus far is that there is substantial heterogeneity in performance across firms within countries. For instance, Bigsten et al. (1999a) analyze data on manufacturing firms in four African countries and report that for one quarter of the firms profit to capital ratios are more than four times lower than the median, while for another quarter of the observations profit rates are more than four times higher than the median (and this is not a result, primarily, of cross-country differences). A similar finding of large variability across firms holds for most of the key performance variables in the data (e.g. productivity, export intensity, investment).

The policy implications of heterogeneity in firm performance are potentially far-reaching. For instance, recent research has shown that there are important knock-on effects on labor market outcomes, which, as discussed above, provides the link

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<sup>5</sup> Industrial census data may exist but are typically much less detailed than survey data.

between firms and poverty. Söderbom, Teal and Wambugu (2005) show that, conditional on *all* observed and unobserved worker skills that are fixed over time, workers' earnings in Ghana and Kenya vary positively with firm size. That is, two identical employees who work in identical firms and receive identical wages in year 1, will get different earnings in year 2 if the two firms grow at different rates over this period. There is thus a direct link from firm performance, and changes in performance, to the standards of living of the individuals working in the firms. Substantial variability in performance will be associated with large income inequalities. Further, a lot of heterogeneity implies that it is quite pointless to talk about a "typical", or "representative", African manufacturing firm, since the average characteristics provide an accurate picture of rather few firms (with the average as the benchmark, African firms are typically atypical, as it were). The more heterogeneity, the more pertinent are questions relating to the causes and consequences of these differences across firms, and so the more pressing is the need for firm data. In our review of the research findings in the next section, we will therefore pay special attention to this issue.

One important distinction referring to the structure of data available is whether the data are cross-section or panel. The panel data structure – data in which the same firms are followed over time - is powerful, essentially because it provides an excellent basis for analysis of various aspects of firm dynamics (e.g. productivity growth or firm survival) and because it puts the researcher in a much stronger position to draw conclusions about *causal* effects (since time invariant "unobserved heterogeneity" can be controlled for). Most of the panel data available on African firms date back to the first round of RPED surveys in the early 1990s. These surveys resulted in panel data with at most three observations per firm, so these panels are still very short. The Centre for the Study of African Economies (CSAE) at Oxford University has organized follow-up surveys designed to lengthen the time dimension of the panels in Ghana, Kenya and Tanzania. Currently, the longest panel on African manufacturing covers twelve years of data on Ghanaian firms. In recent years, efforts have also been made to collate panel data on the individuals working in the firms in these three countries. This will enable researchers to better understand the nature of the income dynamics of these employees whilst employed, and how their incomes tend to change once the employees leave the firm. While the strength of panel data relative to cross-section data continues to be a matter of (sometimes intense) debate amongst



academics, our view is that the potential advantages are too significant to ignore. In fact, the result discussed earlier that there is a lot of heterogeneity across firms in Africa suggests that the case for panel data is particularly strong for this region. Panel data are costly to collect and the “returns” come in the medium and long term, when sufficiently long time series have been constructed. Nevertheless, without panel data the range of policy questions that analysts can hope to find answers to is inherently limited.

### **3. What Have We Learned?**

We begin this section with a review of what we have learned from the data about the business environment in which African manufacturing firms operate. We focus on market size, risk, access to credit, labor, and infrastructure. We then turn to issues to do with how firms choose to organize themselves and how firms do business. We end the section by looking in some detail at what we have learned about three key aspects of firm performance, namely firm growth, investment and technology acquisition, and exports.

#### **3.1 The Business Environment**

The business environment has emerged as the prime suspect as to why firm performance in Africa is poor, and improving the investment climate is seen as a policy priority for the continent (e.g. World Bank, 2004b, 2005). Batra, Kaufmann and Stone (2003) analyze the obstacles to business based on the WBES data. The leading constraint cited by the company managers in Africa is financing, followed by corruption, infrastructure and inflation. Pooling data across all regions, the authors find a negative and statistically significant relationship between taxes, regulations and financing and the growth in sales and investment.<sup>6</sup>

One implication of a poor business environment is that the costs for certain services important to manufacturers will be high. Eifert, Gelb and Ramachandran

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<sup>6</sup> Because Batra et al. (2003) include country fixed effects in the regressions, the interpretation of the results is that firms that rate the constraints as relatively severe compared to other firms *in the same country* tend to have relatively low growth rates. Thus the results indicate that a good local investment climate is good for local business. The results do not tell us whether firms in countries with poor average business environment conditions have lower growth rates of sales and investment than firms in countries with good average conditions.

(2005) show that African firms have high indirect costs - costs for transport, logistics, telecom, water, electricity, land and buildings, marketing, accounting, security, bribes, etc. – compared to firms in Asia, and that African firms suffer significant losses due to power outages, crime, shipment losses etc. Further, the economic risk in Africa is typically high, credit is either expensive or not available, skilled labor is relatively expensive and domestic markets are typically very small. It seems reasonable to suppose that these factors pose significant problems for manufacturers in Africa. In this section we review what has been learned from the firm data about these key characteristics of the business environment in Africa.

*i) Risk*

Entrepreneurs in Africa face significant uncertainty with regard to prices (including foreign exchange rates), demand, customer payment, reliability of infrastructure, corruption and so on. To investigate empirically the effects of risk is difficult, however, since risk is not easily measured. A common way of proceeding, especially in macroeconomic analysis, is to use some measure of volatility, e.g. in demand or the exchange rate. Gunning and Mengistae (2001) argue that this may be misleading, since the standard deviation of the exchange rate may not capture the credibility of the government's exchange rate policy. The African firm surveys, however, have included questions about expectations for macroeconomic variables (inflation, interest rates, exchange rate) and firm variables (employment, output). Firms were asked for example about their expectations about the extent of depreciation during the next 12 months. This kind of data has enabled researchers to get a much better handle on the effects of risk on investment. Using data on Ghanaian manufacturing firms, Pattillo and Söderbom (2001) find that firms that face a lot of uncertainty regarding future demand tend to have lower profit rates than firms facing less uncertainty. The authors argue that this is because high risk makes firms choose a conservative product mix which has a relatively low expected profit rate. Fafchamps, Gunning and Oostendorp (2000) show that Zimbabwean firms respond to risk by increasing their inventories, which is another example of how risk results in conservative behavior and additional costs. The most commonly cited effect of risk, however, is that on investment. Gunning and Mengistae (2001) conclude from their review of the evidence that

investments in African manufacturing have been held back by high risk rather than low returns on investments. We discuss this in detail in Section 3.4.

*ii) Access to credit*

Bigsten et al. (2003) look at formal credit market participation and credit constraints, based on survey data on firms in Burundi, Cameroon, Côte d’Ivoire, Ghana, Kenya, and Zimbabwe observed between 1991 and 1995. The authors use data on firms’ demand for external funds and whether loan applications were approved or not. Table 1, originally Table 2 in Bigsten et al. (2003), displays summary data on the frequency of loan applications, and, conditional on an application having been made, the outcome. These data suggest the demand for formal loans among African manufacturers is low: less than 20 percent of the firms in the sample had applied for a formal loan in the year prior to the time of the survey. Among those applying, the majority of firms obtain loans. There are large differences across the size distribution: among small firms loan applications are less common, and the success rate lower, than among larger firms. This is another example of considerable heterogeneity across firms.

**Table 1. Formal Credit Market Participation by Firm Size (percentages of firms)**

	Micro	Small	Medium	Large	All
Did not apply	92	82	80	75	82
Applied and did not receive	6	11	9	5	8
Applied and received	2	7	11	20	10

*Source:* Bigsten et al. (2003)

A firm may be credit constrained even if it does not apply for a loan. For instance, a firm may expect that an application will not be successful precisely because there are credit constraints, and may therefore decide not to apply in order not to incur the transaction costs. Based on information on why firms did not apply for a loan, Bigsten et al. identify three groups of firms: those without credit demand, and, among firms with credit demand, those constrained and those unconstrained. Table 2, which summarizes these data, shows that 55 percent of the firms in their sample have no credit demand, 33 percent are credit constrained, and 12 percent are unconstrained. Across the size distribution, the differences are large. Close to two-thirds of the micro

firms appear constrained, but only 10 percent of the large firms. About two-thirds of the large firms choose not to participate in the credit market, compared to only a third of the micro firms. The notion that the smallest firms are credit constrained is supported by regression results indicating that, controlling for other important factors such as expected profitability and indebtedness, the likelihood of a successful loan application varies with firm size. While this suggests banks are biased against small firms, the authors note that this result may reflect transaction costs on the part of banks. In any case, the size effect is substantial: for a micro firm to have an equal chance of getting a loan as a large firm, the micro firm needs to have an average return on fixed capital more than 200 percentage points higher than the large firm.

**Table 2. Credit Constraints by Firm Size**

	Micro	Small	Medium	Large	All
No credit demand	33	50	67	66	55
Demand, but rejected*	64	42	21	10	33
Received loan	3	8	12	23	12

\*Includes firms that suggested that a loan application would be rejected by banks

Source: Bigsten et al. (2003)

Another novel approach for analyzing the links between formal credit and company investment is adopted by Habyarimana (2004) who uses matched bank-firm data from Uganda, collected as part of the 2002 RPED, to estimate the effect of losing a banking relationship on firm performance. The background to this study is that four Ugandan banks were closed between September 1998 and 1999 because of imprudent banking practices. As a result, 30 percent of the firms in the sample lost one or several banking relationships. Habyarimana estimates that over the three years following the banking crisis, the average annual growth rate of employment among firms that lost a banking relationship was 2.3 to 4 percent lower than the average growth rate of unaffected firms. These estimates are obtained whilst controlling for firm fixed effects and time effects that are allowed to differ across sectors. Further, firms affected by the banking crises are more likely to report being credit constrained, suggesting that losing a banking relationship hampers investment.

### *iii) Labor and Skills*

It is a well documented fact that unit labor costs, defined as the total labor costs divided by either the value of output or value-added, tend to be higher in Africa than in other regions. It has been argued in several Investment Climate Assessments (World Bank, 2002; 2004c,d) that high unit labor costs, relative to international competitors, imply poor global competitiveness. Eifert, Gelb and Ramachandran (2005) have recently challenged this view, citing Eifert and Ramachandran (2004), who report that median unit labor costs are lower in Eritrea and Nigeria than in Uganda and Mauritius, and Cadot and Nasir (2001) who document higher average labor unit costs among firms in China than in Ghana, Lesotho, Madagascar, Mozambique and Kenya. The idea that Mauritian firms are less competitive than Nigerian ones, or that Chinese firms are less competitive than Ghanaian ones, seems counter-intuitive.

Some basic theory illustrates why it may be problematic to use the unit labor cost as a measure of competitiveness. Suppose the firm operates with a Cobb-Douglas technology and that factor prices – wages, the cost of capital etc. - are determined exogenously.<sup>7</sup> Suppose the firm seeks to minimize costs (or maximize profits), and consider the effects of an exogenous increase in the wage rate. Clearly a wage rise makes the firm less competitive, and so a useful competitiveness measure should reflect this. The theory implies, however, that if the firm can adjust its labor force without incurring adjustment costs, it will respond to the wage rise by reducing the number of employees by exactly the amount that leaves the unit labor cost unchanged. That is, even though the firm is in a weaker position after the wage increase, the unit labor cost measure fails to reflect this. An analogous result is obtained for changes in total factor productivity or in the demand for the firm's products. In fact, the only way of generating a low unit labor cost in this model is to reduce the output elasticity of labor – i.e. make output *less* responsive to changes in labor input. It is far from obvious that this would be an improvement in terms of competitiveness. The reason China has higher labor unit costs than Ghana could thus be that – for technological reasons - output is more responsive to labor input in China than in Ghana. This seems

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<sup>7</sup> The Cobb-Douglas specification, which is extremely popular in applied research, is written as  $\log Y = \log A + \sum_j \alpha_j \ln X_j$ , where  $Y$  is output or value-added,  $A$  is total factor productivity,  $X_j$  is input  $j$  and  $\alpha_j$  is the elasticity of  $Y$  with respect to  $X_j$ .

to us more plausible than inferring that Chinese firms are less competitive than Ghanaian ones.

Labor costs, and the supply of labor in general and specific skills in particular, are important issues for firm performance and especially for the link between performance and poverty reduction. One striking result that has emerged from the research on the firm data is how much larger are wages in large than in small firms. This is only partly explained by large firms employing more skilled workers than small ones. That is, there is a large proportion of the wage differential across firms of differing size that is not explained by a differential in skills. Söderbom, Teal and Wambugu (2005) show that, conditional on all observed and unobserved worker skills that are fixed over time, workers' earnings in Ghana and Kenya vary positively with firm size. The estimated effect is economically large, compared to other regions. In the preferred specification for Ghana, the estimated elasticity of wages with respect to firm size is 0.15; in Kenya it is 0.08. These numbers imply that as a firm grows from having, say, 20 employees to 40, wages will increase by 11 percent in the case of Ghana and 6 percent in Kenya.<sup>8</sup> While this might seem like good news for the employees, increasing wages results in higher total labor costs which, everything else held constant, tend to erode firms' profits. Improved performance in the form of higher productivity would help to countervail this effect. Söderbom and Teal (2004) investigate if there is any evidence of increasing returns to scale in Ghanaian manufacturing. Under increasing returns to scale, the proportional change in output is larger than an equiproportional increase in all inputs (i.e. a doubling of all inputs leads to more than a doubling of output, for instance), and so when firms grow higher average labor costs would be offset by higher input productivity. Söderbom and Teal find, however, only weak evidence for increasing returns and constant returns to scale is not rejected. They argue that the reason large firms can remain profitable is that they face lower capital costs than small firms. One possible reason for this is better access to formal credit.

Since rapidly rising labor costs are likely to constrain firm growth and exports, it is important to understand why this pattern is observed in the data. The standard explanation in the literature why wages are so closely connected to firm size is simply that large firms employ individuals that are more skilled than those employed by

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<sup>8</sup> Ghana:  $\exp(0.15\ln(40) - 0.15\ln(20)) - 1 = 0.11$ . Kenya:  $\exp(0.08\ln(40) - 0.08\ln(20)) - 1 = 0.06$ .

small firms, but as we have seen this does not appear to be the whole explanation for the relationship between firm size and wages in Africa. Kingdon et al. (2004) distinguish between labor market institutions and intra-firm organizational mechanisms as potential explanations for this result and labor market segmentation more generally. We summarize their arguments next.

As for the importance of labor market institutions, Kingdon et al. (2004) cite numerous studies providing evidence that unions play a central role in many African labor markets. The authors report estimates of the union premium ranging from 3 to 28 percent in Ghana, Kenya, Nigeria, South Africa and Tanzania, controlling for observed worker skills. The authors acknowledge, however, that systematic identification of the union effect is complicated by the factor that unionization is highly correlated with other leading explanations for labor market distortions including other regulations, monopoly power of producers, and firm size more generally. A related possible explanation is that there is rent-sharing as a result of a bargaining process between the firm and the workers. The idea is that when business is good the workers manage to bid up their wages by threatening to walk out if the firm refuses to accommodate their demands. Evidence of such rent-sharing effects on wages has been found for Ghana (Teal, 1996) and Zimbabwe (Velenchik, 1997).

It is also possible large firms pay relatively high wages in order to provide workers with incentives to exert effort as in efficiency wage models. Fafchamps and Söderbom (2004b) derive a theoretical model in which the size-wage relationship is generated by the cost of monitoring workers rising with firm size. Using worker-firm matched data across 10 African countries, and contrasting SSA with Morocco, their estimates indicate that a doubling in the number of production workers will increase the labor cost per unit of effort by 9 percent for Morocco and between 11 and 14 percent for SSA. This is the penalty large firms have to incur in order to motivate workers. This incentive problem appears to be more severe in SSA than in Morocco. The authors further find that an increase in total factor productivity leads to an *increase* in worker effort in Morocco but a *decrease* in SSA. High TFP firms in SSA hire fewer workers and supervisors (and produce less output) relative to what they would have done if the incentive structure had been similar to that in Morocco. Quantitatively, this effect on output is large: an increase in TFP by 1 percent increases output by 2.9 percent in Morocco but only by 1.3 percent in SSA. This is because a high TFP firm in SSA finds it more difficult than in Morocco to manage and supervise

its labor force so as to increase or maintain effort. The implications for firm growth are thus potentially quite significant.

The importance of labor market institutions relative to intra-firm organizational mechanisms, in terms of their effects on wage, is hard to assess based on the available research. What we do know is that the effects are economically large. In the case of Ghana, for instance, Söderbom and Teal (2004) estimate that if a firm with 350 employees faced the same wage as a firm with 20 employees, total costs in the large firm would fall by 20-25 percent.

#### *iv) Infrastructure*

Based on several studies of growth determinants in Africa, Collier and Gunning (1999) argue that poor infrastructure is a serious constraint to growth in the continent. Compared to other regions public expenditure as a share of GDP has been higher in Africa, while service provision has been worse. The poor infrastructure in Africa is likely to be a particularly severe constraint to manufacturing growth. Many firms spend own resources directly on buying infrastructure services or providing it on their own. One reason for the prevalence of small manufacturing firms in Africa (see below) is that the transport infrastructure is poorly developed, which creates pockets of demand that tend to generate small-scale localized producers. To be able to take advantage of international trading opportunities and to engage actively in the emerging system of outsourcing requires reliable and cheap infrastructure. Poor infrastructure thus presents a significant problem for exporters.

The firm surveys have generated a lot of information about how firms perceive infrastructure problems and recently also about time and monetary costs of different bottlenecks. Bigsten et al. (1999b) show that attempts to use data on perceptions to explain productivity is problematic. It is shown that the firms that rank infrastructure problems as very severe are at the same time the most productive ones. This is due to the fact that these are the firms that sell on larger markets and they are thus more dependent on the infrastructure. The use of objective measures – e.g. days in customs, days without telephone connections, days without electricity etc. - is a more promising approach, but so far little analysis is available on the impact of infrastructure on manufacturing firm productivity.



### **3.2 Organization and “Doing Business”**

The most conspicuous characteristic of Africa’s manufacturing sector is the preponderance of very small and informal firms, which operate side by side with a small number of large-scale factories. There is talk of a “missing middle” in the size distribution, i.e. that there are very few medium-sized firms. Commonly proposed explanations why the manufacturing sector has this structure links directly to the business environment discussed above. One seemingly plausible reason is that small firms do not want to grow in order to avoid excessive regulation, and underdevelopment spawns small firms because Engel effects skew demand towards simple items (baked goods, apparel, basic furniture etc.) In Box 1 we summarize informally the pros and cons of informal firm status. Bigsten, Kimuyu and Lundvall (2004) investigate if there are productivity differentials between formal and informal firms in Kenya, where the bulk of manufacturing employment is in the informal sector. The authors find no significant productivity difference between small informal and formal African owned firms. They also note that formal firms in Kenya have experienced significant problems in dealing with authorities relating to regulatory red tape, corruption, and lack of security. In a similar vein, Sleuwaegen and Goedhuys (2002) report that the proportion of firms that perceive regulations as an obstacle to growth is lower in the informal than the formal manufacturing sector in Côte d’Ivoire (the opposite is true for market conditions). With cost increases and no productivity gains from becoming formal, it may thus be rational for the African entrepreneurs to choose to start or remain informal. This is a problem, because in the informal sector there is little investment, little exporting, low wages and miniscule contributions to tax revenues. There is therefore a case for designing policies that aim to make informal firms absorbed into the formal sector. We return to this in Section 4.

### **Box 1: Why are most of Africa's firms informal?**

African economies have a very large share of informal manufacturing employment, and the informal firms have a vital role to play in the short term by providing a livelihood to a large number of people. Informality offers several benefits to the entrepreneur. Management requirements are less demanding and government policies and regulations, such as labor laws concerning minimum wages and workers' safety, can be circumvented. Informal firms need not adhere to working hour regulations and informal entrepreneurs may find it easier to control labor, and they can avoid taxes and fees as well as various urban planning regulations. There are also other regulations such as price controls, licensing, and laws pertaining to property rights that informal firms can avoid. When there are fluctuations in demand, an informal firm finds it easier to adjust because of its simple and flexible technology, and hence it can avoid some of the costs associated with idle capacity. The ease with which an informal firm can vary its employment level can save on wage costs.

These advantages must be weighted against the costs and risks associated with operating outside the rule of law. Informal firms risk being detected and punished for operating 'illegally'. They also receive fewer services from the state, most notably from institutions providing jurisdictional services such as protection against burglars and other policing, as well as contract enforcement. The informal firms may be unable to use formal channels of dispute resolution due to their uncertain legal status, and this also means that it is hard to get access to financial, banking, and other commercial services. Informal entrepreneurs cannot get access to trade fairs or use membership in umbrella organizations to their benefit. Small firms also tend to have few assets that can be foreclosed in the event of breaches of contract, and their transactions are so small that the monetary and time costs associated with court actions would not be justified in any case.

The business environment also impacts on how firms do business. Widespread market failures imply that firms face a lot of "holes" in important markets, such as those for insurance and credit. This is especially pronounced for the smallest firms. Fafchamps (2001) identifies two types of responses that aim to reduce the resulting transaction costs, namely development of relationships and the sharing of information within networks. Essentially, when search and verification costs are high, it makes sense to try to establish long-term relationships and share information with other market participants, in order to economize on such costs. The firm data have been extensively used to shed light on these mechanisms.

Trade credit is a good example of how supplier relationships can be utilized to fill in some of the holes in the formal credit market. Fisman (2001) argues that trade credit plays an important role in firm financing in Africa, mainly by enabling firms to manage raw material inventories more efficiently and by reducing the likelihood of raw material shortages. Trade credit may therefore contribute to higher productive efficiency. Fisman analyses these issues using the first waves of RPED data from

Côte d'Ivoire, Kenya, Tanzania, Zambia and Zimbabwe. In these data, trade credit is the dominant form of payment to suppliers for about a third of the firms. There is much variation across countries, however: in Tanzania, trade credit is the dominant form of payment for only 8 percent of the firms; in Zimbabwe the corresponding figure is 69 percent. Trade credit appears to be more important in countries where the average firm size is relatively high, suggesting that large firms are more likely to use trade credit than small ones. In the formal empirical analysis, Fisman finds that firms that use supplier credit have higher capacity utilization, and are less likely to have raw material stockouts, than firms that do not use trade credit. Further, he finds that these results are particularly strong among firms that are characterized as "constrained" in their access to formal credit. These results are robust to potential endogeneity of supplier credit, which may arise if firms use trade credit as a result of having high capacity utilization and/or substantial inventories, for instance.

Fisman (2001) suggests that these results imply that there may be significant productivity gains from an increase in the availability of supplier credit. He also makes the point, however, that unless we understand *why* some firms have access to credit while others do not, it will be difficult to provide solid advice to policy makers. The basic reason is that if lack of access to trade credit is driven by market failures – perhaps in the form of lack of public information on credit worthiness or poor contract enforcement – then policy measures designed to fix these problems would probably have the desired results; but if firms do not get trade credit because they are unreliable, pose a big credit risk, don't want any etc., then it is not clear that improving access should be a policy priority. Fisman and Raturi (2004) investigate if various firm and entrepreneurial characteristics affect the likelihood that firms in Ghana, Kenya, Tanzania, Zambia and Zimbabwe get trade credit. The main focus of this analysis is to see if trade credit is more common among firms that purchase inputs from suppliers that face a lot of competition. The authors find this to be the case, and interpret this finding as evidence that suppliers operating in a competitive market use credit as a means of creating buyer loyalty. The authors argue that this is consistent with a situation in which firms who want trade credit must establish credit worthiness, and because of information imperfections, they must do so every time they switch to a new supplier. This form of market failure thus creates rents for the suppliers and

increases costs for the manufacturers.<sup>9</sup> A related result is that documented by Fafchamps (2000), indicating that Asian and European entrepreneurs have better access to trade credit than entrepreneurs of African origin. His hypothesis is that this is due to ethnic networking in contract enforcement. Fisman (2000) provides similar results for Tanzania and Zambia.

While we may not have a complete picture as to why firms get trade credit, this research does suggest that strengthening credit market institutions may be important. In the specific context considered by Fisman and Raturi, the policy implication is that establishing efficient credit-rating agencies that keep a record of companies' credit histories would erode the *de facto* monopoly power of the suppliers and so lead to lower costs for manufacturers.

The most common information sharing mechanism is the referral system, where a customer or supplier approaches an economic agent with a recommendation from a joint acquaintance. When businessmen engage in shared social activities, the likelihood of finding common acquaintances increases as does the shared information. Well-connected agents are more likely to trade among themselves, since they can easily find and screen each other. Group membership thus provides network externalities and a competitive edge. Barr (2002) has shown that, in Ghana, there are two types of networks. The first is large and diverse, improving entrepreneurs' access to information and opportunities. Barr refers to this as an innovation-network. It is mainly enterprises with access to formal institutions, employing more advanced technologies and serving more diverse markets that benefit from such networks. The second type is a strong, dense, ethnically homogeneous local network, which mainly helps reduce uncertainty, but does not improve productivity. This is what is referred to as a solidarity network. The firms involved in this type of network are typically without access to formal institutions, employ simple technologies, and serve less diverse markets.

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<sup>9</sup> Further, there is evidence that ethnicity plays a role for whether firms use trade credit or not (Fisman, 2003). This too may be consistent with information imperfections.

### 3.3 Firm Growth

Without growth, the contribution of the manufacturing sector to economic development and poverty reduction will be modest. The firm surveys have taught us a lot about why some firms grow and other do not. From a policy point of view, a better understanding of the relationships between growth and certain firm characteristics is important, since it can offer guidance as to what type of firms are likely to be relatively successful and good at creating jobs in the future. Identification of such firms would clearly be informative to policy makers. The relationship between firm size and growth is of particular interest in the context of African manufacturing, since most firms in Africa are very small. How realistic is it to hope that some of these firms will grow and become successful large firms in the future? The relation between firm age and growth is also important. For example, if young firms grow quickly, policy measures aimed at encouraging entry may have significant growth effects in the short and medium term.

Ramachandran and Shah (1999) analyze firm growth (in terms of employment) in a RPED-sample of firms from Kenya, Zimbabwe, Zambia, and Tanzania. They draw on the learning model proposed by Jovanovic (1982), modeling firm growth as a function of firm age and firm size variables, plus various variables for entrepreneurial characteristics. They find that firm size and firm age are negatively correlated with firm growth. Sleuwaegen and Goedhuys (2002) obtain a similar result for firms in Côte d'Ivoire, as do Mazumdar and Mazaheri (2003) based on a pooled sample from Cameroon, Côte d'Ivoire, Ghana, Kenya, Tanzania, Zambia and Zimbabwe. Thus, the finding common across these studies is that growth is systematically higher among small and young firms than among large and old firms.

The negative relationship between size and growth suggests an important role for small firms in the development process, in that this is where we should expect to see most of the growth. It is important to recognize that this result may be spurious, however. The problem, dubbed by Davis, Haltiwanger and Shuh (1996) as the "The Regression Fallacy", arises whenever there are transitory fluctuations in size or whenever there are transitory measurement errors in observed size. The resulting bias in the estimated relationship between initial size and growth is negative, hence failure to address this problem can produce a picture of the growth of small firms that is too good. In view of this, the conclusion drawn by Sleuwaegen and Goedhuys (2002) that

the “...the results go against Gibrat’s law of random growth behaviour” may be premature. One way of dealing with the problem, proposed by Davis et al., is to use as a measure of firm size the average size over the observed period(s), rather than the initial size. Adopting this procedure, Mazumdar and Mazaheri (2003) present descriptive statistics indicating at most a weak negative relationship between size and growth in Cameroon, Côte d’Ivoire, Ghana, Kenya, Tanzania, Zambia and Zimbabwe. Harding, Söderbom and Teal (2004) use average instead of initial size in regressions modeling firm and productivity growth over a five-year period in Ghana, Kenya and Tanzania. They find no evidence that either form of growth is systematically linked to firm size.

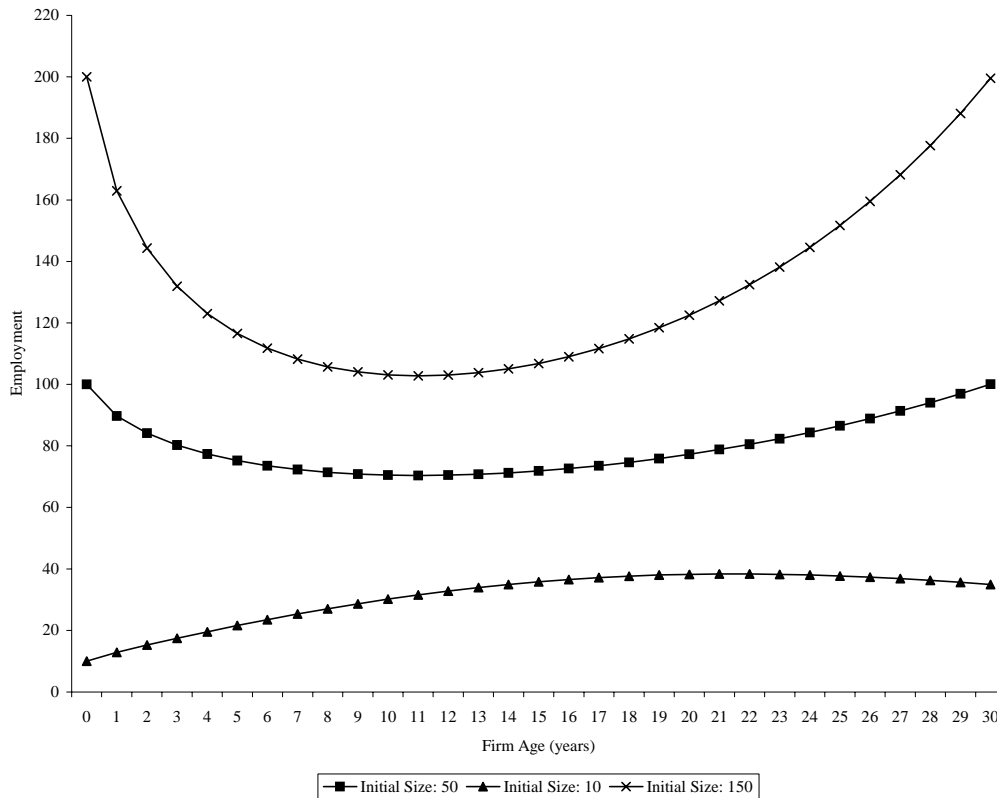
In reality the growth process is complex and it is possible that regressions in which growth is modeled as a linear function of initial size and age, along with a set of control variables, may be too restrictive. Sleuwaegen and Goedhuys (2002) acknowledge this and consider the role played by terms non-linear in size and age in the growth regressions. They find strong evidence of a positive interaction effect between age and size on growth. This result implies that, everything else equal, the relationship between age and growth is less negative (or more positive) for large firms than for small firms, and that the relationship between size and growth is less negative (or more positive) for old firms than for young ones. To facilitate interpretation of the results we show in Figure 1 predicted size as a function of initial size and age, based on the estimates reported in Sleuwaegen and Goedhuys (2002), Table 3, column 1. All factors except age and initial size are held constant. We consider a small firm (initial size 10 employees), a medium sized firm (100 employees) and a large firm (200 employees), and for reference we set the constant in the model to the value that generates zero growth over 30 years for the medium sized firm. The small firm has high growth rates initially and after 10 years it has grown from 10 to 30 employees. The growth rates fall over time, however, and eventually this firm starts to contract. For the large firm the pattern is the opposite. Employment falls rapidly in the initial years of operation but after 10-15 years the favorable age effect – i.e. the positive the interaction effect between size and age - kicks in and the firm starts to grow. Small and large firms thus have very different growth patterns: growth is observed among the initially small and young firms and among initially large and old firms.<sup>10</sup> These

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<sup>10</sup> Notice that results may not be robust to the regression fallacy problem discussed above.

results square with descriptive statistics indicating that few small firms ever grow up to become large (Biggs, Ramachandran and Shah, 1999, cited in Biggs and Shah, 2003).

**Figure 1: Firm Growth, Size and Age in Côte d’Ivoire**



*Note:* The predictions were generated based on the estimates reported in Sleuwaegen and Goedhuys (2002), Table 3, column 1. Specifically, we calculate total growth after *AGE* years using the formula  $(\exp(\hat{g}))^{AGE}$ , where

$$\hat{g} = \alpha - 0.157 \ln AGE - 0.199 \ln SIZE + 0.006(\ln SIZE)^2 + 0.041(\ln AGE \ln SIZE),$$

and  $\alpha$  is a constant set to a value that implies that the firm with initial size 100 will have the same size after 30 years. We then multiply initial size by  $(\exp(\hat{g}))^{AGE}$  to give predicted size after *AGE* years.

Firm characteristics other than size and age have been shown to matter for firm growth as well. Ramachandran and Shah (1999) find that firms controlled by minority entrepreneurs, Asian or European, did better than those controlled by indigenous entrepreneurs.<sup>11</sup> Secondary and university education are highly significant and positive for African entrepreneur while none of the entrepreneurial variables were significant in the non-African model. Their interpretation of these results is that non-Africans benefit from various advantages of being a minority such as access to informal networks, credit, informal contractual mechanisms etc. Networks that provide contractual mechanisms for access to credit, information and other inputs are beneficial for growth. For the African entrepreneurs education may serve as a substitute for access to these networks. Mengistae (1999) uses data from Ethiopian manufacturing firms to analyze whether there also are differences between indigenous ethnic groups. Controlling for the date of start-up, sector, time of observation, the education and prior experience of the entrepreneur, and unobserved establishment effects he finds that there is one group in Ethiopia that stands out, namely the Gurage. They started up larger and grew faster. Surprisingly enough the Gurage were the least educated ethnic group and also had least vocational training.

Related to the issue of firm growth is firm survival. Exit rates in African manufacturing are significant, and highest among the smallest firms (Söderbom, Teal and Harding, 2004; Van Biesebroeck, 2005b). The study by Söderbom et al. focuses on the role of total factor productivity in determining whether or not firms survive. The authors use a pooled panel data set of firms in Ghana, Kenya and Tanzania that spans a period of five years. They find that productivity impacts on firm survival among large, but not small, firms. Figure 2, taken from their paper, illustrates this finding. Standardizing productivity by the sample mean, the graph shows that exit rates among firms with 10 employees are relatively high and almost wholly invariant to productivity. In other words, being relatively productive does not prevent firms from going out of business if they are small. Among larger firms, however, exit rates do depend on productivity, which is consistent with a “survival-of-the-fittest” process,

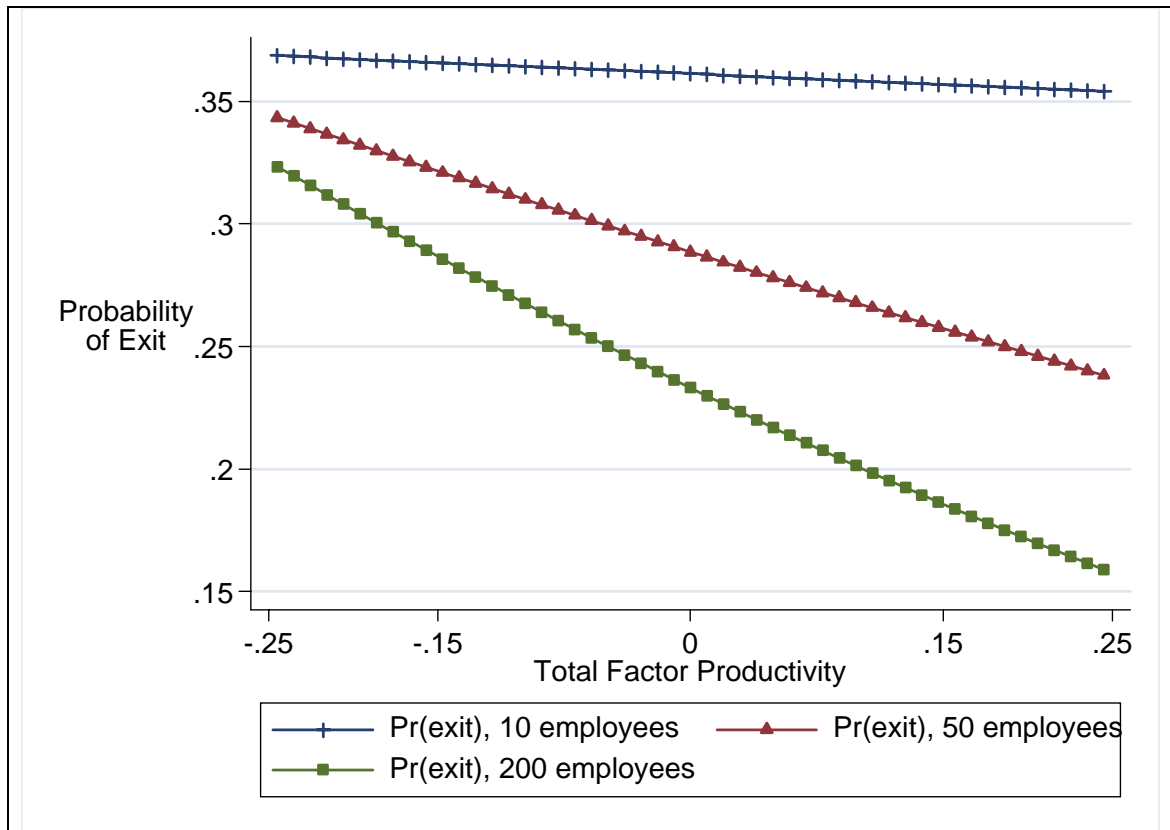
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<sup>11</sup> An early study into the relation between minorities and entrepreneurial success is that by Kilby (1983). The author argues that minority entrepreneurs often have superior initial endowments of capital, knowledge of markets and technology and have acquired traditions that help them raise productivity. The environment has also forced them to cooperate with fellow minority entrepreneurs, with whom they have built networks of trust that provides information, risk-spreading arrangements, favorable terms of credit and a larger pool of individuals to whom managerial responsibilities can be delegated.



documented in the U.S., the UK and a number of middle income countries. While the latter result is positive, in the sense that churning contributes to aggregate productivity gains for this category of firms, it must be borne in mind that most firms in Africa are very small. If small and productive firms could grow, this would have dramatic effects on their survival rates and therefore on aggregate productivity.

**Figure 2: Estimated Exit Rates as a Function of Size and Total Factor Productivity**



*Note:* The horizontal axis is interpretable as the percentage deviation in total factor productivity from the sample mean. The graph thus shows how exit rates change as total factor productivity changes from 75 percent of the sample mean to 125 percent of the sample mean.

Source: Söderbom, Teal and Harding, 2004.

Although we have learned a lot from the firm data about several aspects of firm growth, more research is needed in this area. There is still uncertainty as to the nature of the association between firm size and growth in African manufacturing. It may be that growth rates are in fact independent of firm size, in which case policy makers should not expect systematically higher growth rates in certain size segments of the sector. In order to address the methodological challenges that we have discussed it will be necessary to use data in which firms are observed over a relatively

long period of time. Access to panel data with a reasonably long time dimension is therefore important. Further, whether the fact that small and relatively productive firms have high exit rates is a cause for concern depends on why this result is observed. It would be socially wasteful if exit were in some sense involuntary, e.g. due to some uninsurable and temporary shock. However, if exit is “voluntary”, e.g. because the entrepreneur has found a more profitable occupation elsewhere, then it is less clear that this is a problem. Probing these issues further may be an interesting area for future research.

### **3.4 Investment and Technology Transfer**

In this section we review the evidence on what factors constrain investment and technology acquisition in Africa’s manufacturing sector. We begin with a discussion of the important issue of financial constraints and assess the empirical support of the common notion that such constraints have acted as a major impediment for investment in Africa. We then proceed to studies that have considered the effects of risk on investment. We finally discuss ways of obtaining better technology other than investment in fixed capital.

African financial markets are the least developed in the world, and it has long been a widespread view among development economists that this hampers growth. For investment, the main problem is that firms with profitable investment projects often cannot use external funds to finance such projects. Commonly cited reasons for financial imperfections are imperfect information, cumbersome contract enforcement and lack of competition among lenders.

That there are financial imperfections in Africa is not in dispute, however such imperfections will not translate into binding constraints unless firms have a desire to invest. Thus, if there are few profitable investment opportunities one would not expect lack of credit to be a real constraint on investment. One corollary is that one would not expect reforms of the financial market to lead to significant short-run positive effects on company investment in a period of recession. One of the first studies analyzing whether investment among African firms is hampered by lack of external finance is that by Bigsten et al. (1999a). These authors test whether investment is sensitive to changes in cash flow among firms in four African countries. The evidence indicates that there is a significant profit effect on investment, which suggests that credit constraints are present. With point estimates on the profit term ranging between

0.06 and 0.10, the magnitude of the effect is small, however: only between six and ten cents of an additional dollar earned in profits are invested.

Subsequent research based on RPED data confirms that investment is not particularly sensitive to changes in profits. In an in-depth analysis of the manufacturing sector in Zimbabwe 1992-94, Fafchamps and Oostendorp (1999) show that the cash-flow sensitivity of investment is low, even among small firms. Söderbom (2002) obtains a similar result for Kenya. Mazumdar and Mazaheri (2003) use a sample of six countries (adding Côte d'Ivoire and Zambia to the set of countries considered by Bigsten et al., 1999a), and report an estimated profit coefficient is 0.08, thus very similar to that of Bigsten et al. Mazumdar and Mazaheri also split the sample according to firm size, and obtain a profit coefficient equal to 0.09 in the sub-sample of small firms. They interpret the larger profit coefficient among small firms as evidence that small firms are more credit constrained than large ones. Reinikka and Svensson (2001) obtain a profit coefficient equal to 0.08 based on a sample from 1996-97 of Ugandan manufacturing firms. These authors too find a larger profit effect among smaller firms, which is consistent with the notion that credit access is more of a problem for small firms. The point estimate of the coefficient on profits among small firms is 0.11, and so quantitatively the effect is not particularly large even for small firms.

Now consider the effect of uncertainty on investment. There is hardly any second-hand market for used machinery in Africa, which means that investments largely have to be treated as sunk cost (i.e. they are “irreversible”). This is problematic in an environment where uncertainty about future rules of the game as well as market development is a standard feature. Theories of irreversible investment under uncertainty predict that investment will be slower to respond to demand shocks if uncertainty is relatively high. As mentioned in Section 3.1 testing empirically for the effects of risk is difficult, as risk is not easily measured. In this context, the design of innovative survey questions has been a major step forward. Pattillo (1998) uses panel data on Ghanaian manufacturing firms from 1994 and 1995 to test various hypotheses from models of irreversible investment under uncertainty. Based on data on entrepreneurs' subjective probability distribution over future demand, Pattillo calculates the variance of demand and uses this as the measure of uncertainty. Empirical results indicate that uncertainty has a negative effect on investment and this effect is more pronounced for firms with more irreversible investment. A similar

inquiry is undertaken by Darku (2001) based on firm-level data from a survey in Uganda in 1998. Constructing the measure of uncertainty in the same way as Pattillo (1998), Darku finds a negative relationship between uncertainty and investment, and documents that this effect is stronger among firms with more irreversible investment. These studies provide direct evidence that the effect of uncertainty on investment is negative.

High uncertainty results in a high risk premium in the required return on invested capital, suggesting that African manufacturing firms have high opportunity costs of capital. Bigsten et al. (1999a) argue that this is indeed the case. Using RPED data from Cameroon, Ghana, Kenya and Zimbabwe from the early and mid 1990s, Bigsten et al. report figures on average returns on capital that are much higher than among firms in more developed countries. This is clear from Table 3, which shows some of the figures reported in Bigsten et al, along with data from Uganda, taken from Reinikka and Svensson (2001). While there is a striking similarity in the average investment rates across all countries considered, the rates of returns on capital are much higher in Africa than in the European countries. The authors infer from this that the cost of capital is relatively high in Africa, and maintain that this is consistent with a negative effect of uncertainty on investment. A similar view is taken by Fafchamps and Oostendorp (1999), arguing that uncertainty is a plausible explanation as to why investment has remained low in Zimbabwe despite of the structural changes introduced by ESAP.

**Table 3. Investment rates and returns on fixed capital in eight countries**

	Investment rate	Average return on fixed capital
Cameroon	0.11	1.36
Ghana	0.13	3.63
Kenya	0.11	1.82
Uganda	0.12	0.75
Zimbabwe	0.12	0.85
Belgium	0.13	0.18
France	0.11	0.12
Germany	0.12	0.16
UK	0.12	0.13

Source: The data on all countries except Uganda were reported in Bigsten et al. (1999a). The Ugandan data were reported in Reinikka and Svensson (2001).

Using the same data set as in their 1999 study with Zambia added, Bigsten et al. (2005) examine more closely if investment is affected by irreversibility and fixed adjustment costs. In such models firms will not invest anything unless the marginal return on capital exceeds some threshold level, and so one would expect to see a significant share of zero investments in the data if the theory is right. Table 4, taken from Bigsten et al. (2005), summarizes the proportions of non-zero investments in this data set by country and firm size. With the exception of Zimbabwe, in all countries and size categories the proportion of positive investment is lower than 0.5. That is, the majority of the firms in these categories do not invest anything during a whole year. There is a weak positive relationship between firm size and the propensity to invest, although among the largest firms in Ghana only one in five firms invest in a representative year. In Zimbabwe investment activity is generally higher than in the other countries. With a third of the firms in the whole sample refraining from investing in a typical year, however, the proportions of zero investment is not negligible. The authors also show that investment is “lumpy”, i.e. whenever firms do invest they invest a lot. This suggests that fixed adjustment costs may be important. However when analyzing the decision to invest more formally, the evidence points to irreversibility as the main explanation of low investment in Africa. Reducing uncertainty, or improving the market for second hand fixed capital, is therefore likely to impact positively on investment.

**Table 4. Proportions of Non-Zero Investments Among Firms in Six African Countries**

Employment	Cameroon	Ghana	Kenya	Uganda	Zambia	Zimbabwe
$1 \leq 5$	0.21	0.31	0.44	n.a.	0.29	0.53
$5 < \leq 20$	0.29	0.44	0.40	n.a.	0.29	0.51
$20 < \leq 100$	0.24	0.48	0.41	n.a.	0.28	0.63
$> 100$	0.38	0.20	0.44	n.a.	0.38	0.71
Total	0.29	0.32	0.42	0.52	0.31	0.66

*Note:* The table is based on data from a sample of 821 firms.

*Source:* Bigsten et al. (2005).

One of the main objectives of carrying out investment is to get access to better technology. There are other ways by which African firms can access better technology, however. Foreign direct investment (FDI) can lead to transfers of technology if multinational enterprises transfer technological information to their subsidiaries. Firms that export learn about general conditions and available technology in the international market. Technology licensing arrangements can be established to transfer technology directly. However, so far direct transfers of technology via technology-contracts and the like to African manufacturing firms have been very limited (see e.g. Bigsten and Kimuyu, 2002, on Kenya). Because of this, trade or FDI are potentially important channels for technology transfers in Africa. While there is fairly strong evidence that African firms become more productive as a result of exporting (see Section 3.5), we do not yet know if this is due primarily to technological innovations, exposure to foreign competition, or something else. In any case, for technology transfers to be effective firms must be able to absorb the technology. This will be facilitated by the existence of an intellectual infrastructure such as laboratories and universities. Also required is an ability to adapt imported technology to local circumstances (Tybout, 2000). Why technology transfer to Africa's manufacturing sector is slow is as yet unclear. However, it would not seem unreasonable to assume that market failures play a role. Asymmetric information, for instance, makes it hard for buyers to assess the value of technological information.

The general picture that emerges from the research on investment in African manufacturing is one where uncertainty has played a big role whereas credit might not have been a severe constraint. There is some evidence that lack of credit has been a problem for small firms, but although the profit effect on investment is larger for small than large firms (Reinikka and Svensson, 2001), it is still small by the standards of what has been reported for other regions. The analysis of firms' borrowing behavior by Bigsten et al. (2003), reviewed in Section 3.1, points to a similar picture: on average the desire for formal credit has been relatively modest, although among very small firms there is relatively high demand for credit. The most likely explanation why credit (or the lack of credit) has not been a major factor in explaining why investment has been low over the last decade is that during this period few firms in these countries could identify strong investment opportunities. This does not mean that the reforms of the financial systems implemented in many African countries in the 1990s were unnecessary. The reason these reforms have appeared ineffectual thus far is that the constraints that were relaxed as a result were in fact not binding at the time. When firms expand the need for formal borrowing will increase, and the financial reforms may turn out to have a higher pay-off when this happens. However, with hindsight it could be argued that priority should have been given in the 1990s to facilitating exports and productivity growth over credit.

### **3.5 Exports**

We have already touched upon the issue that manufacturing firms in Africa operate in small domestic markets. In order to expand production, firms must therefore orientate part of their production towards exporting. Two issues then arise. First, what are the factors that prevent African firms from entering the exports market? The answer to this question will shed light on how policy can be designed to facilitate entry to the international market. Secondly, are there any benefits, other than market enlargement, associated with exporting? In answering this question we focus on the notion that firms may become more productive as a result of contacts with foreign customers and pressure to be internationally competitive.

One can identify at least two key factors that determine whether a firm will participate in the exports market: the level of the entry barrier, and the cost efficiency of the potential exporter. In their influential paper on the decision to export, Roberts and Tybout (1997) stress that it is likely to be quite costly for a firm to enter the

exports market for the first time. For instance, it may be necessary for the exporting firm to set up a marketing department to investigate marketing channels, meet export orders etc. It also seems likely that the quality of the investment climate has a bearing on the magnitude of entry costs, but we have no rigorous empirical evidence to support this assertion. While entry costs are typically not observed, Roberts and Tybout argue that indirect evidence of costly entry can be obtained by testing for an effect of previous exports status on current status. The idea is that, in the absence of entry costs, firms will switch in and out of the exports market independently of whether they have exported in the past. If there are significant entry costs, however, then firms that have incurred these costs in the past (and thus will not have to incur them again) will be more likely to export in subsequent periods than firms that have not, simply because exporting is less costly for the insiders than for the outsiders. In their empirical application, which is based on data on manufacturing plants in Colombia, Roberts and Tybout find strong evidence that insiders are more likely to export than outsiders. This indicates that entering the exports market is associated with significant fixed costs.

Bigsten et al. (2004) carry out a similar analysis based on firm-level RPED data from Ghana, Cameroon, Kenya and Zimbabwe from the early 1990s. Controlling for a number of other factors including firm specific time invariant heterogeneity, they find that past export status has a significant effect on the propensity to export. The magnitude of this effect is large: for the “average” firm that did some exporting in the previous period, the likelihood of exporting in the current period is about 0.57 while the likelihood of exporting for an otherwise identical firm that did not export in the previous period is 0.18. Thus, for a non-exporting firm with the average characteristics, entering the export market raises the probability that this firm will export in the next period from less than one in five to more than one half. This is the effect of entry costs. Van Biesebroeck (2005a) obtains a similar result on a larger sample of nine SSA countries. There are at least two important policy implications. First, if incentives can be created for firms to enter the exports market, they are likely to remain in the exports market for some time. Second, large entry costs imply that there is a set of firms that remain focused on the domestic market even though they are internationally competitive. By reducing or eliminating the entry costs, these firms will get access to a larger market.



The second factor that determines whether a firm will export is its cost efficiency. Clerides et al. (1998) derive a model where exporting is associated with a fixed cost, incurred in every period of exporting. The authors show that, in this model, firms with marginal costs below some threshold choose to export, while firms with marginal costs above the threshold remain focused on the domestic market. Thus, this model predicts that relatively efficient firms will self-select into the export market. A number of studies have tested for self-selection based on data from both developed and developing countries. On balance, these papers present quite strong evidence that efficient firms do indeed self-select into the export market.

The paper by Bigsten et al. (2004) analyzes whether there is any evidence of self-selection into exports markets. They find this effect to be relatively weak. Van Biesebroeck (2005a) finds a somewhat stronger self-selection effect on a larger sample. Both studies report results suggesting that causality runs in the other direction, i.e. from exporting to efficiency. We discuss this next.

The fact that exporters tend to be more productive than non-exporters is a well-known result that seems to hold both in rich and poor countries. Mengistae and Pattillo (2004) report a positive correlation between productivity and exporting among firms in Ethiopia, Ghana and Kenya. The question of whether this is because exporting actually *causes* efficiency gains has received a lot of attention in the recent literature. From a policy perspective, whether or not firms in developing countries can “learn” from exporting is an important issue. As we have seen, the domestic markets for manufactures are typically very small in Africa, so industrialization will partly have to be through exports. Under learning-by-exporting the competitiveness gap can be reduced endogenously through increased international trade. As discussed in the previous paragraph, one methodological challenge in testing for learning-by-exporting effects is that causality may run in the other direction, i.e. efficient firms may self-select into the export market. Therefore, efficiency and exports may be correlated even in the absence of learning effects. Clerides et al. (1998) propose an econometric framework that can be used to tease out the relative importance of learning effects and self-selection effects. Using this framework, Bigsten et al. (2004) find relatively strong evidence of learning effects, in the sense that participating in the exports market has positive effects on total factor productivity in subsequent periods. Van Biesebroeck (2005a) uses similar methods and obtains results that confirm evidence of learning effects.

Two further points relating to the Bigsten et al. (2004) paper are worth stressing. The first is that the finding that firms seem to learn from exporting is not the typical finding in studies looking at this issue for other regions. One possible explanation is that the potential gains from exporting are large in Africa because of high trade restrictions in the past and a large technological gap to developed countries. In such economies exporting offers the maximum scope for the increased discipline of competition, and contact with foreign customers provides the maximum scope for learning opportunities. Arguably, if exporting induces efficiency in any environment, it should do so in these economies. The second point is that a productivity gain of 7-8 percent in an output production function corresponds to productivity gains in terms of value-added of 20-25 percent in the short run and up to 50 percent in the long run. These estimates are in line with the results reported by Van Biesebroeck (2005a). The quantitative effect of exporting, thus, is far from negligible.

#### **Box 2: Macroeconomic Policy Reforms in Cameroon**

In 1994 Cameroon implemented major policy reforms which included tariff reduction and rationalization, increased domestic taxes as well as attempts to reduced corruption and evasion. Gauthier, Soloaga, and Tybout (2002) use data for Cameroon on prices and quantities of the firms' major inputs and output to compute the effects of tariff changes and tax reforms. Before the reforms that tariff structure was highly diversified with rates ranging from 0 to 500 percent. The structure encouraged evasion and stimulated attempts to get special treatment by authorities. This case-by-case treatment was hardly beneficial for efficiency. With the reform more than half the firms lost their privileges after 1992/93. For firms operating under the normal regime, though, average customs rate fell from 66.8 percent in 1992/93 20.2 percent in 1994/95. This means that in the case of Cameroon was a leveling of the playing field, which would tend to improve resource allocation in the economy.

The average effect of the reforms was to drive up the unit cost per unit of revenue by 8 percent. This was mainly due to the fact that tariff reductions on outputs fell faster than the protection rates on inputs. The impact varied quite a lot across firms, and the signals thus differed across categories. In the decomposition of the various effects it actually turns out that productivity gains reduced unit costs by as much as 8.5 percent. The average nominal tariff rate fell from 68 percent to 27 percent. It is also shown that exporters did much better than non-exporters because they managed to increase their productivity by as much as 19.1 percent.

#### **4. Policy Implications and Priorities**

We believe the manufacturing sector can contribute to the reversal of Africa's poor economic performance. In this section we outline what, in view of what we have learned from the firm surveys, we think must be done in order to maximize the likelihood of this happening. A necessary condition for such a strategy to be successful is that it is firmly based on the current reality. This is where we begin.

Industrial development in the world in recent years has been characterized by a rapid globalization of production, facilitated by liberalization of international economic relations and changes in the nature of corporate activity and international investment. Production systems have become increasingly integrated across national borders. Firms world-wide have been exposed to increased competitive pressure and in large parts of the world production and international trade have grown rapidly. In many ways, this is a new global reality for Africa's manufacturing firms who not long ago were protected from international competitive pressure. On the domestic scene, the state of the business environment is still very much a legacy of those past times when being efficient and internationally competitive was not all that important. Poor infrastructure and high utility costs hold back competitive production and drive up costs, thus undermining the potential for output expansion. Excessive regulations result in entrepreneurs forming very small and informal firms rather than formal organizations that have export potential and contribute to tax revenues. The fact that key market institutions - such as laws, courts, business associations, lobbies, quality control, protection of property rights and enforcement of contracts - are underdeveloped means that personal relationships play a central role when firms make their output and input decisions, which hampers market integration.

In this reality, African policy makers face a choice between three broad alternatives. The first is to revert to essentially isolationist policies that protect the industrial sector from international competition and encourage supply to the domestic market. Such policies have been widely implemented in Africa in the past without any obvious success, and we can see no reason why they would yield better results this time around. The second option is status quo. So far, Africa has failed to take advantage of the new opportunities arising from the globalization of production. This is partly because the process of liberalization and opening-up has been slower and less pervasive in Africa than in other regions, but also because key elements of the

investment climate in Africa are simply not good enough. Foreign firms deciding to outsource part of their production face a trade off between lower costs of production and increasing time costs, transport costs, and coordination costs generally. With poor infrastructures, cumbersome bureaucratic practices, poor supporting services or even corruption, outsourcing to Africa will be associated with high costs. Clearly under status quo where nothing is done about these problems, Africa will continue to experience a large amount of missed opportunities. It is hard to see how such a strategy can yield growth and create jobs on a scale necessary for significant poverty reduction.

The third broad policy option is to create incentives for African firms to strive to participate and be competitive in international markets. In our view, this is the most likely route to better economic performance. This view is directly supported by some of the findings based on the firm data. Harding, Söderbom and Teal (2004) find that the strongest explanatory factor of productivity growth over five years among firms in Ghana, Kenya and Tanzania, is the competitive pressure faced by the firms. Firms that face little competitive pressure, and have high profits as a result, record slower subsequent productivity growth than firms that face a lot of competitive pressure. Thus, opting to embrace, rather than to shy away from, increased competition is likely to improve the performance of manufacturing firms in Africa. Secondly, as discussed in Section 3.5, there is relatively strong evidence that participation in exports markets is a source of improved firm performance. We do not yet understand fully why this is so – it could be that international competition “disciplines” firms to get better organized and become more efficient, or that contacts with firms and customers in developed countries help to speed up the rate of technology transfer. Nevertheless, we know from the data that these positive effects exist. Apart from the productivity effect, international trade leads to concentration of investments in the more efficient sectors according to comparative advantages as well as the exploitation of scale advantages.

While the rewards to participation in international markets may be significant, pursuing such a strategy also puts big demands on both firms and governments in Africa. Without more investment in modern technology and without a drastically improved business environment, we cannot see how African firms will be able to compete internationally on anything but a very modest scale. Results will not come

over night, but to get started a wide range of reforms are needed. Key policy steps, in our view, are as follows.

First, governments must for an extended period of time pursue a macroeconomic policy that is both sound and credible to domestic and international investors. The whole issue of governance is central, because if governance is poor, uncertainty will persist and investors' response to other initiatives will be weak. We know from the firm data that uncertainty is a major factor in explaining why investment among African manufacturing firms has been low over the last decade. Reducing the uncertainty related to movements in the exchange rate and pursuing credible export programs is of course important to promote exports. Overall, the government needs to string together several years of good governance and good policies. This can be hard in a situation where people do not see quick results, and resisting policy reversals and populist policies will therefore be a challenge.

Second, scarce resources – land, skills, physical capital, raw material - must be channeled towards firms that are productive and in good position to export. One important issue is what to do with the now very large informal manufacturing sector in Africa. Two types of policy measures are conceivable here. The first involves designing policies purporting to encourage informal firms to grow and become formal. From the firm data we have some indications of how policy makers can best facilitate a transition process. Based on Kenyan firm data, Bigsten, Kimuyu and Lundvall (2004) argue that the informal sector is large primarily because being formal is costly. Formal firms in Kenya have experienced big problems in dealing with authorities relating to regulatory red tape, corruption, and lack of security. Informal firms, by and large, sidestep these problems, and so incur lower costs. Thus, addressing the basic governance and investment climate issues would be a step in the right direction as far as trying to encourage entrepreneurs to operate within the realm of the formal sector instead of outside it. The second type of policy is oriented towards facilitating good performance by informal firms within their current informal environment. Importantly, we know from the firm data that some of the key economic fundamentals, e.g. total factor productivity, in informal firms are relatively good (Bigsten, Kimuyu and Lundvall, 2004). However, capacity-building efforts have so far largely neglected the needs of informal firms, while formal firms have been the primary beneficiary of policies in areas such as vocational training. One likely welfare loss stems from the lack of access to credit, and hence foregone investment, for

informal firms, which is due to their ambiguous legal status, lack of proper accounts, and the lack of credit-rating procedures relevant to informal firms. Because of the small absolute size of the loans required by informal firms, it should be feasible to support alternative procedures for the provision of credit.

Third, putting the emphasis on exports requires significant improvements in the investment climate. With poor infrastructure and a weak regulatory system, Africa is at a disadvantage in this context, and reforms are urgently needed. Not all reforms may be required at once, however, and focusing growth efforts on a specific sector or location can save money. There is clear-cut evidence that sound economic policies make a difference. In Madagascar, for instance, the creation of an efficient export processing zone led to a very rapid expansion in the textiles and garment sector, and in Mauritius the investment climate played a major part in transforming the economy in less than 20 years. In some cases, access to firm-level panel data has made it possible to measure the effects of macro policies on different types of firms with greater precision than what has been possible with aggregate data. Gauthier, Soloaga and Tybout (2002) provide a case study of the Cameroonian experience, see Box 2.

The basic point is that Africa must try to take advantage of the existing opportunities, and take action where the problems are most acute. We know that African manufacturing firms have the potential to perform well. We mentioned in the introduction that one of the most striking results that have come out of the work on the firm data is that there is large variation in performance within sectors and countries. In recent years, while most firms may have experienced limited success, some have performed very well. These tend to be exporters. To enable more firms to achieve similar levels of performance, the adoption of new technology and orientation towards new markets must feature as key components of African industrial policy. Policies that provide incentives and means to firms to adopt a scientific strategy are likely to result in better performance, provided policies also facilitate exports. Countries that cannot break out of the current situation, where most manufacturing firms focus on supplying the domestic market with basic and cheap products, are unlikely to see a significant expansion of jobs in the sector. In such countries, manufacturing will not play a major role in reducing poverty.

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