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The Cost of Doing Business in Africa: Evidence from the World Bank's Investment Climate Data

Abstract

This paper looks at firm-level evidence on the African business environment from surveys undertaken for Investment Climate Assessments by the World Bank in 2000-2004. These surveys confirm a pattern of generally low "factory-floor" productivity, and show that this is partly due to business environment–related losses. The surveys also show the importance of high indirect costs in further depressing the "net" productivity of African firms relative to those in other regions. Reforms are moving forward but more slowly than is needed to accelerate growth; this raises the possibility that countries settle into a "low-level political equilibrium" sustained partly by structural and ethnic cleavages.

Keywords: Productivity, investment climate, manufacturing, economic development, Africa, firm surveys

JEL Classification: D240, L100, M210, O120, O550

1. INTRODUCTION

This paper draws on fifteen firm surveys undertaken for the World Bank's Investment Climate Assessments (ICAs) to better understand some of the factors underlying Africa's slow industrial growth and low levels of economic diversification. We focus on the impact of a range of losses and "indirect costs" identified in the surveys in reducing productivity and broader measures of competitiveness. Small, and relatively uniform in advanced economies, these costs and losses have a substantial effect in reducing the potential of manufacturing and the diversification of Africa's small, sparse, economies.

Section 2 places the firm-level analysis in context by noting three theories of comparative advantage that offer different, and relevant, perspectives on Africa's slow diversification: (i) countries' relative factor endowments; (ii) their ability to provide public goods to the business community in the form of a stable and low-cost business climate, and (iii) gains from agglomeration externalities and firm learning effects from "thick" markets. Macro-level comparisons show that Africa is indeed economically sparse, and also high-cost, as shown by deviations of aggregate price levels from those predicted by Purchasing Power Parity. Further, low-income high-cost countries as determined by this method tend to be those that have failed to diversify into manufactured exports.

Section 3 turns to the firm-level investment climate (IC) surveys and assesses the performance gap between African countries and comparators. As well as estimating conventional total factor productivity, we define a concept of *net total factor productivity* and consider the contributions of "factory-floor" productivity, indirect costs, and certain business environment–related losses to overall differentials in competitiveness. Our data suggest that these losses and indirect costs are crucial determinants of competitiveness.

We conclude with policy implications arising from this analysis and outline how these need to take into account the complex issues of political economy related to the segmentation of Africa's small business sectors by firm size, productivity and ethnicity.

2. COSTS, DENSITY AND COMPARATIVE ADVANTAGE IN AFRICA

What factors shape Africa's comparative advantage? Relative factor endowments certainly influence trade composition -- .with capital assumed mobile in the long run, Wood and Berge (1997) and Wood and Mayer (2001) show the relationship between relative endowments of skills and land (resources) per capita and the composition of exports. Regions higher up the skills/land spectrum export more manufactures relative to processed or primary goods and a larger proportion of higher-technology manufactures. A pessimistic view would argue that Africa's scant human capital and rich natural resource base dooms the continent to primary exporter status.

Factor proportions do not, however, fully account for Africa's low income level despite its resource abundance; neither do they explain the dynamic path of factor accumulation, mainly pervasive financial and human capital flight. [1] Comparative advantage also results from differences in productivity and costs that *do not* derive from relative factor abundance. Krugman (1980, 1981, 1983). One channel can involve the *business environment*: the nexus of policies, institutions, physical infrastructure, human capabilities, and geography that influences the costs and quality of key non-traded inputs and the efficiency with which firms and industries operate.[2]. Firms in traded sectors that are not particularly intensive in natural resources will be more sensitive to the business environment than those in primary production and extractive sectors because they require larger "inputs" of logistics, infrastructure, and regulation (Collier 2000).

The other channel can involve agglomeration effects: dynamic economies of scale generated by learning processes, "thick" markets, networks, and industry-specific spillovers (Krugman 1980, 1991). Evidence suggests that dynamic scale economies play a considerable role in shaping the structure of production, as illustrated by path dependence in the development of individual industries (Burgess and Venables 2004). But since individual firms do not internalize the social

[1] For estimates of financial and human capital flight, see Collier et al. (1999).

[2] For more discussion see *World Development Report 2005* (World Bank 2004a) and the series of Investment Climate Assessments put out by the World Bank from 1999 to 2004. See also http://www.worldbank.org/rped and http://www.fias.net.

value of the potential economies of scale from their entry into a particular industry, business environments have to be good enough on a number of crucial dimensions to stimulate investment and competition sufficient to launch the self-reinforcing process of industrial growth.[3]

How does Africa look in terms of these theories? First, its economies are indeed sparse. GDP per square kilometer (excluding South Africa) is one-tenth the level in Latin America and one-twentieth that in India. Manufacturing value added per hectare (excluding South Africa) is only 1.2 percent that of China. Moreover, the GDP of the median country is barely $3 billion, suggesting that effort to overcome high regulatory costs will not be rewarded by large market potential. Second, Africa lags in most of the dimensions of the *Doing Business* indicators (World Bank, 2004b) and price and costs are also high, considering Africa's low income level. Table 2.1 shows the ratios of actual price levels to those predicted by the "Balassa Effect", whereby lower relative prices for non-tradeables translates into lower overall price levels in poor, relative to rich, countries. Prices in Africa's low-income countries confound this prediction, being higher than in (richer) China and South Asia, and about 30% above income-predicted levels compared with 13-20% below. There is also some evidence that high costs are associated, at country level, with export structure. Among 42 low-income countries compared by Eifert, Gelb and Ramachandran (2005) price levels in those where manufactures comprised a major share of exports were typically well below those predicted by the Balassa effect while countries for which manufactured exports were negligible typically had prices well above predicted levels. This pattern held within Africa as well.

[3] Hausmann and Rodrik (2002) find that exports from Bangladesh, Dominican Republic, Honduras, Korea, and Taiwan are characterized by specialization in a narrow range of activities with surprisingly little overlap across countries. African examples of new industries such as Kenya's horticulture-floriculture sector and the garment sectors of Madagascar and Lesotho also suggest the importance of industrial clustering.

Table 2.1: Actual and Predicted Price Levels by Region, 1993–96

	OECD	LAC			MENA	ECA	EAP		SAR	SSA	
		South Am.	*Central Am.*	*Carib-bean*			*All*	*China*		*All*	*Poor***
Price Level	1.19	0.64	0.46	0.55	0.42	0.42	0.29	0.23	0.22	0.37	0.31
Ratio of price level to predicted price level *	1.07	1.16	0.93	1.07	0.93	0.90	0.91	0.80	0.87	1.07	1.28
Income per head (US $, market prices)	26,500	4,000	2,850	3,200	2,200	2,450	750	550	375	550	300

* A value of 1 implies that price levels for the group lie right on the Balassa trend-line. Values above 1 denote regions with higher costs than predicted.
** Excluding South Africa, Namibia, Botswana, Mauritius, and Cape Verde.

These macro-level results on density and costs are only suggestive, and limitations of the currently-available PPP deflators warn against deriving conclusions too strongly.[4] However, they do provide some evidence of the potential for higher costs in Africa to weaken industrial competitiveness and also offer an indication of the difficulties that low-income African countries face in seeking to benefit from agglomeration externalities. Firm surveys are used in the next sections to throw more light on these issues**.**

3. FIRM COSTS AND PRODUCTIVITY: EVIDENCE FROM INVESTMENT CLIMATE SURVEYS

This section turns to the microeconomic data gathered by the World Bank's Investment Climate firm surveys over 2001–2004. [5] We consider a range of losses and indirect costs that are estimated in these surveys, and show that they represent a significant drag on manufacturing competitiveness which often escapes attention in the literature on growth and firm performance. There are other types of costs and risks which are related to the business environments that are beyond the scope of this paper: see *World Development Report*, 2005 (World Bank 2004a) for a more complete discussion.

[4] The global relativities of PPP deflators are subject to considerable error and potential biases, in directions unknown. A new round of data collection is under way, but it will take some time for this effort to be completed.

[5] For more information, visit http://www.worldbank.org/rped or http://rru.worldbank.org.

3.1 Countries and the Surveys

Our cross-sectional data cover 15 countries: Eritrea, Ethiopia, Kenya, Mozambique, Nigeria, Senegal, Tanzania, Uganda, and Zambia, and as comparators Bangladesh, Bolivia, China, India, Morocco, and Nicaragua. Data include around 7,000 firms in six industry categories (textiles, garments, and leather; food and beverage processing; metals and machinery; chemicals and paints; wood and furniture; and other). Of these firms, around 2,700 are in Africa and 1,800 in Sub-Saharan Africa. There is a fairly large spread across firm size groups, although in the African and Latin American cases, more firms are micro, small, and medium enterprises relative to samples in Bangladesh and China.

Table 3.1 presents an overview of the economies. The Sub-Saharan African countries (hereafter referred to as "African") are small and generally poorer, along with India and Bangladesh, and tend to be more agrarian. Investment rates also tend to be lower, although Mozambique and Eritrea recently benefited from large investments. Manufacturing sectors in African countries tend to be modest with very low exports relative to China, Bangladesh, and Morocco.

There are also important differences between the African countries. The surveys in Ethiopia and Eritrea took place in the aftermath of a damaging conflict; this particularly affected Eritrea's economy, with continuing conscription creating severe labor shortages. By closing off access to Eritrean ports, the conflict also exacerbated the long-standing isolation of Ethiopia's economy, where state control of private activity is pervasive, with low levels of foreign direct investment (FDI), a high prevalence of "party-statal" firms, and a degree of tension between the government and the traditionally Amharic investment community. Nigeria also has been subject to considerable instability, and its oil-dominated economy has suffered from extremely poor governance and has not yet seen a major period of opening. These three economies are distinctive enough that we would be surprised to find "normal" results.

In contrast, Kenya, Mozambique, Senegal, Tanzania, Uganda, and Zambia share a recent legacy of wide-ranging policies to open their economies to trade and foreign investment. Of these, only

Senegal and Kenya have avoided severe disruption to their established business communities since independence, whether through revolutions and civil conflict (Uganda, Mozambique) or phases of socialist development and widespread nationalization (Mozambique, Tanzania, Zambia). In this group, Mozambique, Senegal, Tanzania, and Uganda would be considered as the better managed,[6] with Kenya suffering from an extended period of poor governance and Zambia having experienced an extended period of inconsistent reforms, macroinstability, and a series of controversial privatizations that strained relations among the government, donors, and a business sector traditionally dependent on mining-related activities.[7]

[6] Senegal, Tanzania, and Uganda are rated in the top tercile in Africa by the World Bank's Country Policy and Institutional Assessments (CPIA). Mozambique is also well rated, but weaker in some areas, especially financial sector performance.

[7] For a comparative review of some of these countries see Devarajan et al. (2001).

Table 3.1. Selected Economic Indicators, 2000–2002

Country	GNI per capita, $	Trade %GDP	Ag %GDP	Investment (FDI), %GDP	Manufacturing %GDP (growth)	Mfg, % exports	Capital per worker in mfg, $ median
Eritrea	160	111	21	39 (5.3)	8 (5.4)	-	20,600
Ethiopia	100	49	52	18 (1.2)	7 (5.0)	9.8	2,350
Nigeria	290	81	35	20 (2.4)	4 (3.7)	0.2	20,200
Kenya	360	57	19	14 (0.4)	13 (1.0)	22	9,150
Mozambique	210	79	23	40 (8.6)	13 (9.2)	7.5	5,400
Senegal	480	38	18	18 (1.3)	13 (7.3)	37	8,900
Tanzania	280	71	45	17 (3.7)	8 (5.9)	18	3,350
Uganda	250	40	31	20 (2.6)	10 (2.9)	6.5	1,800
Zambia	330	75	22	18 (2.9)	11 (4.5)	17	8,000
China	940	52	15	37 (3.7)	38 (8.7)	88	6,700
Bangladesh	380	33	23	23 (0.3)	16 (5.6)	92	1,050
India	480	31	23	22 (0.6)	15 (5.6)	77	2,050
Morocco	1,190	66	16	25 (4.2)	17 (4.0)	64	8,050
Bolivia	900	49	15	16 (9.3)	15 (1.9)	17	5,650
Nicaragua	720	73	18	29 (5.0)	14 (1.2)	13	2,450

Sources: Investment Climate Surveys (capital/worker) and World Development Indicators, World Bank.

3.2 Estimates of Gross and Net Total Factor Productivity: Africa in Comparative Perspective

This section compares the performance of African firms with those in the other countries. We begin with technical efficiency or (gross) productivity, a common focus in the literature, but then broaden the discussion. We first note the effect of business-environment related losses, identified in the surveys as percentages of sales, that depress measured productivity. Then we consider the cost of energy as well as a range of indirect costs such as transport, telecommunication, security, land, bribes, marketing etc, which are not often considered in the analysis of TFP. We net out these costs from value-added to yield a concept termed "net value added" and derive a corresponding measure of "net total factor productivity," which comes closer to influencing profitability. This broader view of firm performance, which extends beyond the traditional emphasis on factory-floor productivity and labor costs, is important to understand economic outcomes in Africa. Together with the losses that depress (gross) productivity, indirect costs associated with operating expenses—energy, transport, telecom, security, land, bribes, marketing, and so on—represent a heavy drag on net productivity and profitability in most African countries in our sample and serve as a brake on competitiveness.

It is important to note that some earlier analyses of firm survey data from Africa also attempted to account for indirect costs when measuring value added of firms (Biggs, Shah and Srivastava, 1995). However, due to lack of availability of comparator data outside Africa, these studies were not able to place Africa in a global perspective. In this paper, we use direct cost accounting as well as econometric techniques to investigate productivity and losses and costs, across African and non-African countries and to highlight their impact. In doing so, we do our best to deal with a number of confounding issues, including price differences across countries. No previous dataset that we are aware of has provided the level of detail on sales, costs, and inputs to reliably document these issues and study their implications.

Gross (Factory-Floor) Productivity

Much firm-level research focuses on productivity, examining differences in physical output produced for a given quantity of inputs. Econometric analyses of productivity often use data on the value of sales and inputs to estimate TFP, a "factory-floor" concept associated with firms' capacity to translate inputs into outputs. In the Cobb-Douglass form, the natural log of TFP is often estimated in the following manner:

$$[1] \qquad \ln(\overline{A}_i) = \ln(Y_i - M_i) - \alpha \ln(K_i) - \beta \ln(L_i) - \boldsymbol{\delta}\mathbf{Z}_i$$

where A is (in our terminology) "gross TFP", Y is sales revenue, M is raw materials, K is capital, L is labor, α is the capital share, β is the labor share, χ is the materials share, $\mathbf{Z}$ is a vector of sector and country dummies and interaction effects, and $\boldsymbol{\delta}$ the corresponding vector of parameters. In equation 1, Y-M is (gross) value added. This approach, sometimes estimated in Constant Elasticity of Substitution (CES) or translog form, or augmented in order to address endogeneity concerns, is the classic approach to firm performance at the micro level. [8]

[8] The usual concern is that a firm i, knowing its level of productivity A_i, will choose to use more flexible inputs (for example, L_i and M_i), so the OLS (ordinary least squares) estimates of α and β will be biased. Methods of dealing with the problem include obtaining panel data (a moot point for our analysis), instrumental variables (each of which has shortcomings), and structural approaches taken by Olley and Pakes (1996) and Levinsohn and Petrin (2003), which are subject to substantial problems (Ackerberg, Caves, and Frazer 2005). We acknowledge the theoretical

Many analyses of African industry have focused on gross TFP, including the World Bank's Investment Climate Assessments and several studies carried out using African firm survey data from the 1990s (World Bank 2001-2004; Biggs, Srivastava, and Shah, 1995; Soderbom and Teal 2003). These suggest that average TFP is quite low in African firms. Skills and human capital shortages and technology gaps are possible reasons for this. The IC surveys also suggest that hostile business environments depress firm sales due to losses related to infrastructure and service shortcomings, as discussed below.

Our data strongly support the proposition that gross TFP is lower on average in most African countries than elsewhere in the developing world. We estimated "gross"" total factor productivity for our pooled sample of 15 countries, using a number of methods to deal with some of the estimation and robustness issues.[9]

One of the difficult issues is the question of relative prices. Firms in different countries (or even different sectors or regions within a given country) likely face different prices for their outputs and for capital and intermediate inputs.[10] For instance, firms in remote areas may on the one hand receive rents from natural protection and market domination and on the other hand, pay

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issues but are not trying to replicate these approaches in our analysis. We have also estimated TFP using log sales on the left hand side and inputs as separate variables on the right hand side; the results are broadly similar to those using value added.

[9] One question of potential concern is the possibility of systematic bias in the response rates to questions on sales and costs. Response rates do differ across countries, but within countries they are remarkably uniform across categories of firms—domestic/foreign, ethnic/indigenous, exporter/nonexporter—that are known to correlate strongly with productivity. The only strong pattern in response rates is that micro firms (those with less than ten employees) tend to respond less often, which suggests that response rates to detailed sales and costs questions may have more to do with accounting and capacity. Fieldwork experience does suggest that minority firms, in particular, are likely to understate sales. If true, this will tend to accentuate the ethnic productivity gaps shown by the data. Although selection bias is always a concern in any survey, we think it unlikely to pose a major problem for the broad pattern of results.

[10] For instance, firms in remote areas with poor transport systems may on the one hand receive rents from natural protection and market domination and on the other pay high prices for capital equipment and raw materials.

high prices for capital equipment and raw materials. Productivity will appear higher where output prices are inflated and will appear lower where capital goods prices are inflated. To enable sensitivity analyses of the impact of pricing differences, we combine our data on aggregate price levels from Section 2 with information on the relative prices of investment and consumption goods from Sala-i-Martin and Artadi (2003). We adjust capital inputs using investment good prices and outputs using consumption good prices.[11]

Production function estimates from our gross TFP estimations shown in Table 3.2 indicate that the shares of capital and labor range across sectors from 0.26-0.40 and 0.58-0.86 respectively. Constant returns to scale cannot be rejected at the 5 percent level in any sector. Productivity differentials among sectors are large and in some cases significant; food and beverages and wood and furniture firms appear particularly productive, whereas metals and machinery firms appear less so. Alternative estimations (available on request) using translog production functions and stochastic frontier methods produce very similar results.

Using equation 1, we convert the residuals to an index of TFP relative to China, and report the results in Figure 3.1. African countries exhibit a wide range of productivity relate to the average TFP of China. [12] Indian, and Moroccan firms appear to be the next best performers, followed by

[11] A second and related point is that firms with substantial product-market power likely can sustain higher output prices and thus artificially appear to be more productive. Causation also runs in the other direction—more productive firms will likely win a larger share of their markets— so an appropriate approach for controlling for market power requires a multi-stage instrumental variables approach. Unfortunately, the quality of the market share data and the availability of instruments are poor. We have performed production function estimations with a very imperfect measure—self-reported market share--included directly as an independent variable; the pooled results suggest that the combined relationship (with causation in both directions) is strong, with the difference between near-zero market share and 25% (50%) market share associated with an output price differential of 9% (13%), and is much stronger in some African countries.

[12]To compare the effect of the price corrections, we re-estimated using nominal prices. The results in adjusted prices are perhaps a better reflection of underlying firm characteristics; the results in nominal prices may be a better reflection of how firms are actually doing in the sense that the local price levels determine profits, holding firm characteristics constant. The patterns in the results are similar, but countries with high price levels (especially Zambia, Senegal, and Tanzania) appear somewhat stronger using nominal figures.

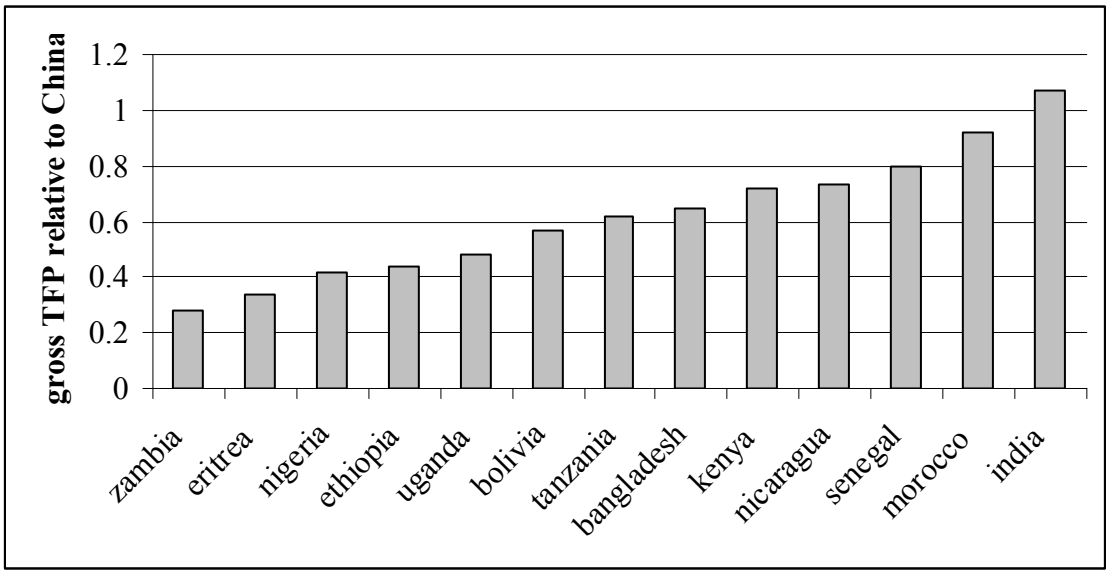
their Senegalese, Nicaraguan, and Kenyan counterparts, which are in the range of 75-80 percent of Chinese productivity. Ethiopia, Uganda, Tanzania, Nigeria, and Bolivia follow in the range of 45-60 percent, and Zambia, Eritrea, and Mozambique are in the range of only 30-35 percent of Chinese firms (Table 3.2 and Figure 3.1). These results are in line with most previous findings.

Table 3.2. Results of Equations [1], Ordinary Least Squares, Adjusted Prices

	Ã [1]	
	Coefficient	Std error
Constant	4.38	0.23
Log Capital	0.40	0.02
Log Labor	0.66	0.04
Bangladesh	1.11	0.11
Bolivia	0.96	0.13
China	1.53	0.11
Eritrea	0.43	0.19
Ethiopia	0.69	0.13
India	1.62	0.11
Kenya	1.20	0.14
Morocco	1.46	0.11
Mozambique	0.38	0.18
Nicaragua	1.21	0.12
Nigeria	0.67	0.15
Senegal	1.30	0.15
Tanzania	1.08	0.14
Uganda	0.80	0.14
Chemicals	0.27	0.35
Food & beverage	0.67	0.29
Metals & machinery	-0.06	0.31
Textiles, garments & leather	0.21	0.28
Wood & furniture	0.74	0.40
L*ch	0.11	0.06
L*fb	0.07	0.05
L*m	0.04	0.05
L*tgl	-0.12	0.04
L*w	0.20	0.08
K*ch	-0.04	0.03
K*fb	-0.07	0.03
K*m	-0.02	0.03
K*tgl	-0.14	0.03
K*w	-0.14	0.04
observations	7,011	
R^2	0.65	

Notes: Omitted country: Zambia. Omitted sector: other. Re-estimation without the "other" firms makes little difference to coefficients on factors or country dummy variables. Interaction terms are labor and capital interacted with sectors.

Figure 3.1. Average Gross TFP by country, relative to China



Results of Previous Analyses of African Productivity

Previous studies suggest that while factory-floor productivity is relatively low in many African countries, it is not low enough (relative to wages) to explain the continent's weak manufacturing competitiveness. For instance, in a study of garment industries, Cadot and Nasir (2001) find that the countries with the lowest factory-floor labor productivity (Mozambique and Ghana) are at roughly half the level of China, but that this differential is more than made up by lower wages (see table 3.3). If factory-floor productivity is the bottom line for competitiveness, garment firms in Madagascar, Kenya, Ghana, Mozambique, and Lesotho might dominate those in Chinese export-processing zones, with 40-60 percent of the physical unit labor costs (per men's casual shirt).

These findings mirror earlier work by Biggs et al. (1995), which suggests that African firms are well placed to compete on labor costs. Gelb and Tidrick (2000) cite evidence on the cost structures of African firms in the 1990s, suggesting that labor costs are a relatively small share of total costs (less than 20 percent) and that other types of costs may be more important. Eifert and Ramachandran (2004) note that the ratio of labor costs to value added at the firm level (a common proxy for unit labor costs) has less predictive power than previously suggested with

respect to manufacturing performance at the country level within Africa.[13] This finding indicates that the focus on factory-floor productivity and labor costs might be too narrow.

Table 3.3. Factory-Floor Productivity and Labor Costs in Garment Assembly

	Men's casual shirts per machine operator per day	Semi-skilled machine operator monthly wage	Labor cost per shirt
Madagascar	14-15	$55-65	$0.16
Kenya	12-15	$60-65	$0.18
Ghana	12	$30-45	$0.12
Mozambique	10-11	$40-50	$0.16
Lesotho	18	$82-95	$0.19
South Africa	15	$255	$0.65
India	16	$70-75	$0.17
EPZ China	18-22	$150	$0.29

Source: Cadot and Nasir (2001)

Much of the literature on the business environment spurred by the IC surveys has focused on explaining variation in (gross) TFP using "hard" (non-perceptions-based) indicators in areas such as infrastructure quality, regulatory burden, and product market competition.[14] On the one hand, studies that exclude country fixed effects find large effects of business environment variables on TFP (Batsos and Nasir 2004). However, the problem of unobserved variables is vast: Any explanatory variable that differs enough between Africa and its higher-performing comparators can produce large, significant effects. The indirect nature of linkages between business environment variables and TFP further compounds the omitted variables problem. On the other hand, studies that include fixed effects find a lesser role for business environment variables (Dollar, Hallward-Driemeier, and Mengistae 2003). In the case of variables that are essentially cross-country in nature (such as port quality), identification is very difficult. Pooled multi-country estimations—even those that include country dummies—are limited in understanding the complex interactions of the explanatory variables. If the binding constraints on firm performance

[13] The "most competitive" countries using this benchmark appear to be Eritrea and Nigeria, whereas Mauritius (Africa's only major manufacturing success story) and Uganda (which has experienced rapid growth in manufacturing over the 1990s) have relatively high unit labor costs.

[14] Some of this literature focuses on the propensity to export and finds this to be strongly correlated with productivity measures (Clarke 2004; Dollar, Hallward-Driemeier, and Mengistae 2003).

vary across countries, there is no reason to expect effects of similar magnitudes for individual business environment components across countries.[15] While further econometric on firm-level TFP with a set of business environment variables on the right hand side may advance the state of our knowledge, we take a different approach, first considering the impact of losses in reducing TFP and then including indirect costs available as percentages of sales. This does not include all business environment-related costs, risks and losses, but provides some idea of how aspects of the environment affect competitiveness. [16]

The Impact of Business Losses on Factory-Floor Productivity

The investment climate surveys provide information on a range of business losses which are helpful in understanding productivity shortfalls. One example is losses due to power outages. Variants of the following question were widely asked: "What percent of annual sales did you lose last year due to power outages or surges from the public grid? Please include losses due to lost production time from the outage, time needed to reset machines, and production ruined due to processes being interrupted." Similar questions were asked about problems with infrastructure-related issues such delays in logistics, and transport failures, all areas that may be plausibly interpreted as costs to the firm (that is, production or sales revenue would have been higher if the failures had not occurred). Unfortunately only losses due to power failures are systematically available for the countries in our sample.

African firms report substantially higher losses than their counterparts in higher-performing countries (Figure 3.2) , which translates into an equivalent decline in measured productivity. This result also holds up when regressing the log of gross TFP on losses from power outages. With an estimated coefficient close to 0.01, a reported loss of 1 percent of sales is statistically associated with 1 percent lower gross TFP. A substantial portion of the variance in measured productivity between China and several African countries (especially Zambia, Ethiopia, Kenya,

[15] In our data, productivity regressions on BE variables such as time to enforce a contract, number of inspector visits, and the percentage of senior management time spent dealing with regulation do not produce strong results.

[16] Recent work by Escribano and Guasch (2005) provides useful methodological bases that point in this direction.

Nigeria, and Tanzania) can be attributed to infrastructure and logistics-related losses rather than their intrinsic capabilities. In Kenya, for example, losses from power failures amount to 6% of sales for the median firm; in China, they are only 1% of sales. Interestingly, power failure is the one variable that Dollar, Hallward-Driemeier, and Mengistae (2003) found to be robustly associated with TFP.[17]

[17] Further econometric on firm-level TFP with a set of business environment variables on the right hand side may advance the state of our knowledge on productivity (Escribano and Guasch, 2005).

Figure 3.2. Losses from Power Outages, Percentage of Sales, 25th-75th Percentiles

The Impact of Indirect Costs on Productivity

We now focus on a range of indirect costs identified in various degrees of detail in the surveys. Table 3.4 displays the breakdown of indirect costs for each country at the level of detail available: some surveys disaggregate costs more than others. Energy is consistently the largest component of indirect costs, averaging around one-third of the total. Transport tends to follow in the range of 5-15 percent, land costs cluster at around 10 percent, telecom and security in the range of 2-8 percent, and water at around 2 percent.[18] Marketing is often a significant cost (8-16 percent) where it is known. A range of items fall under the heading "other costs," which typically includes items such as insurance, office supplies, travel costs, accounting, maintenance, and spare parts. This breakdown shows the relatively large burden of infrastructure and public services—energy, transport, telecom, water, and security costs—that together account for more than half of all costs described in this table.

Figure 3.3 provides a cross-country comparison of firms' cost structures, including labor (wages, benefits), capital (interest, finance charges, machine depreciation), raw materials, and other indirect costs. In strong performers such as China, India, Nicaragua, Bangladesh, Morocco, and Senegal, the combination of energy and indirect costs are 13-15 percent of total costs, around half the level of labor costs. In contrast, this combination in most African countries accounts for 20-30 percent of total costs, often dwarfing labor costs. It is worth noting that capital costs—also tightly related to the business environment—appear to be a major component of costs in Ethiopia, Nigeria, and Zambia.

Table 3.4. Composition of Indirect Costs by Country

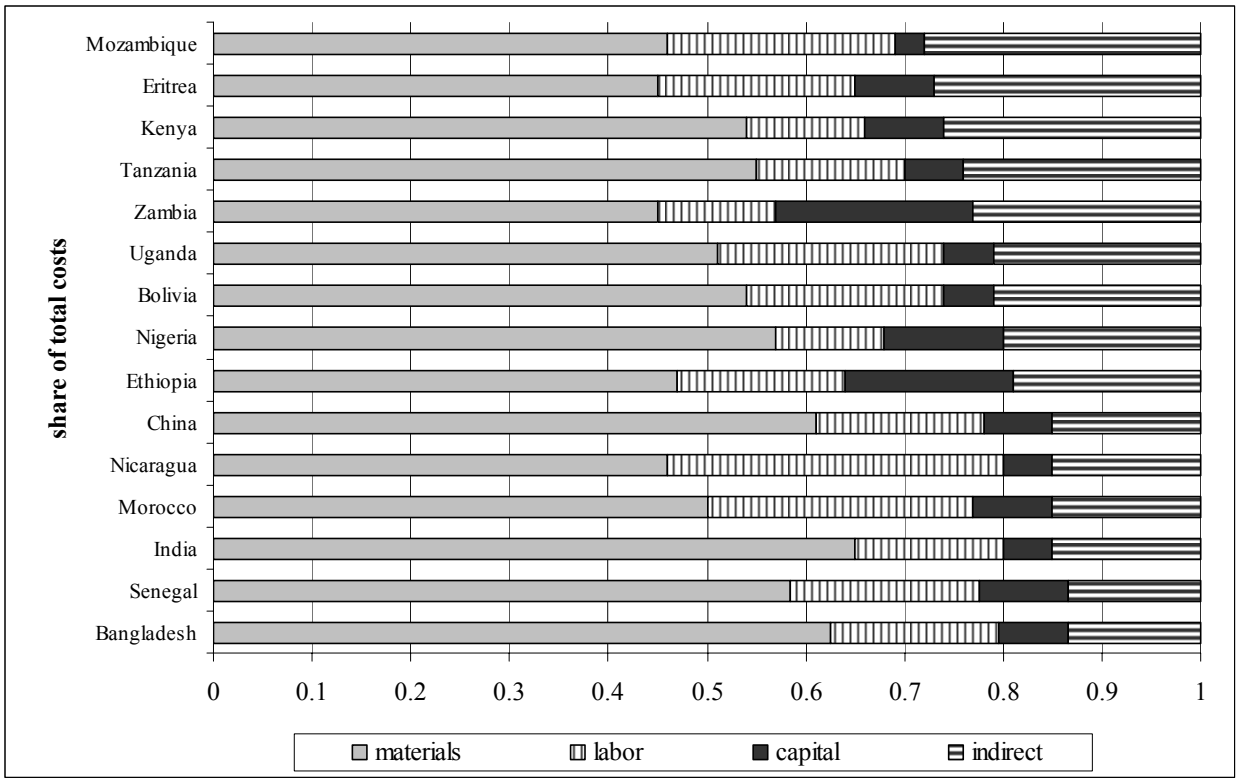
[18] We recognize that transport costs are often not included in measures of productivity because they do not directly affect the productivity of the firm. Our estimation of net value added lies somwhere between the strict definitions of productivity and profitability and consequently, we include the full set of indirect costs faced by the firm.

Category	Ban	Bol	Chi	Eri	Eth	Ind	Ken	Mor	Moz	Nic	Nig	Tza	Sen	Uga	Zam
Energy	0.18	0.16		0.26	0.45	0.37	0.35	0.51	0.20	0.32	0.28	0.59	0.59	0.21	0.32
Land rent	0.08	0.00	0.32		0.05	0.01	0.05	0.10	0.05	0.07	0.05	0.09	0.10	0.12	0.02
Transport	0.06	0.15	0.16	0.04	0.05	0.21	0.16	0.09	0.06		0.06				
Telecom	0.02	0.02		0.05	0.01	0.08	0.08	0.03	0.02		0.05				
Royalties	0.02	0.02			0.00	0.00	0.01	0.02				0.00			0.01
Water		0.05		0.02			0.02		0.01		0.02				
Subcontracting		0.05	0.18												
Security				0.00	0.02		0.07	0.03	0.02						0.04
Maintenance		0.04		0.09					0.08		0.32				
Spare parts		0.06													
Insurance		0.02	0.03						0.02						
Marketing		0.08	0.21	0.01					0.01		0.16				
Independent Professionals		0.03													
Office supplies		0.01							0.01						
Tickets, travel		0.02													
Export expenses		0.03	0.01												
Accounting				0.02							0.01				
Other costs	0.64	0.27	0.10	0.52	0.41	0.32	0.27	0.22	0.53	0.61	0.06	0.32	0.31	0.67	0.62

Note: The China ICS included energy costs as part of total raw materials costs; we assume that energy costs account for one-third of total indirect costs in China, equal to the average across the other 14 countries.

These cost breakdowns do not capture all factors that affect competitiveness. For instance, transport costs in Africa are much higher than in Asia and Latin America. To the extent that part of the excess is incurred indirectly in the form of higher prices for raw materials which we cannot directly observe,. figure 3.3 underestimates the magnitude of "real" indirect costs in Africa and the productivity gaps shown above are biased upwards, because African firms facing high transport costs may be using less physical raw materials than the dollar values suggest. Similarly, if particular services are complementary to capital and labor and firms choose to use less of these due to their high prices, there may well be a negative impact on sales and measured productivity. But on the other hand, if transport costs also raise the prices of outputs, the bias goes the other way. PPP adjusted exchange rates are a poor attempt to capture such subtle effects.

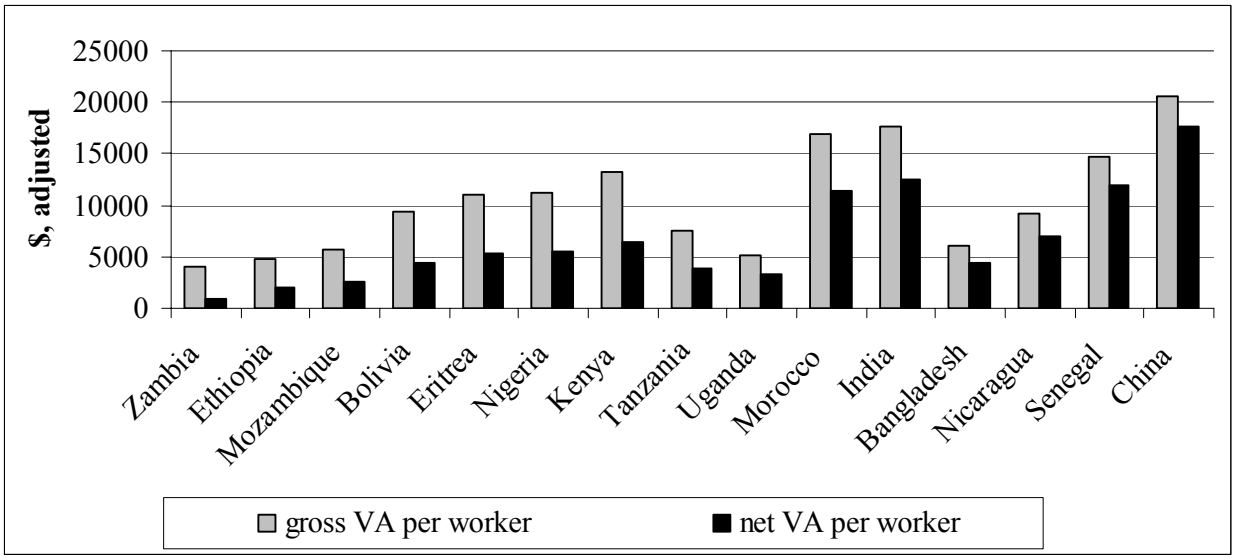
Figure 3.3. Cost Structures, Firm-Level Average by Country



Net value added is now defined as gross value added less indirect costs.[19] As such, it is a broader indicator of firm performance than gross value added. Figure 3.4 compares these two concepts of value added in per-worker terms. In high-performing economies with relatively low indirect costs, median net value added is a high share of gross value added: 67 percent (Morocco), 71 percent (India), 74 percent (Bangladesh), 76 percent (Nicaragua), 82 percent (Senegal), and 85 percent (China). For Bolivia, Eritrea, Mozambique, Nigeria, Tanzania and Kenya, the range is 42-51 percent, suggesting a significant disadvantages in these countries. For Zambia (22 percent), gross value added is already a small percentage of sales, so that indirect costs (including the cost of energy) badly squeeze the viability of manufacturing firms.

Figure 3.4. Gross and Net Value Added per Worker, $ Adjusted

[19] Note that energy is included in our definition of net value added by including it in indirect costs (rather than including it in raw materials), so our term *gross value added* does not quite correspond to those studies that include energy costs in raw materials. The breakdown of indirect costs and energy is given in Table 3.4. In the rest of this discussion, our use of the term "indirect costs" includes the cost of energy.



Note: Dollars are adjusted for purchasing power parity and cost of consumption versus investment goods.

Net TFP is then estimated as:

[2] $$\ln(\hat{A}_i) = \ln(Y_i - M_i - IC_i) - \alpha \ln(K_i) - \beta \ln(L_i) - \delta \mathbf{Z}_i$$

Where $\hat{A}_i$ is net TFP, *IC* is indirect costs, and (*Y-M-IC*) is net value-added. We estimate country averages of firm-level net TFP using country dummy variables to estimate gaps.[20] As before, several different methods were used to test for robustness including translog and CES functions and stochastic frontier methods. Again, all yielded very similar results for the country dummy variables. Therefore, we use the results for the simplest method--OLS estimates of a Cobb-Douglass production function. The index computed from the residuals of this estimation is shown in Table 3.5.

[20] In our data, some firms that have positive gross value added have high enough indirect costs that their net value added is negative. These firms are then dropped from the net TFP regression. This biases the estimated gap between net and gross TFP downward, because firms with low gross TFP are dropped. To correct for this, the estimated average net TFP level by country is corrected for the number of firms for whom net TFP is essentially zero.

Table 3.5: Estimation of [2]: Net Productivity Regression

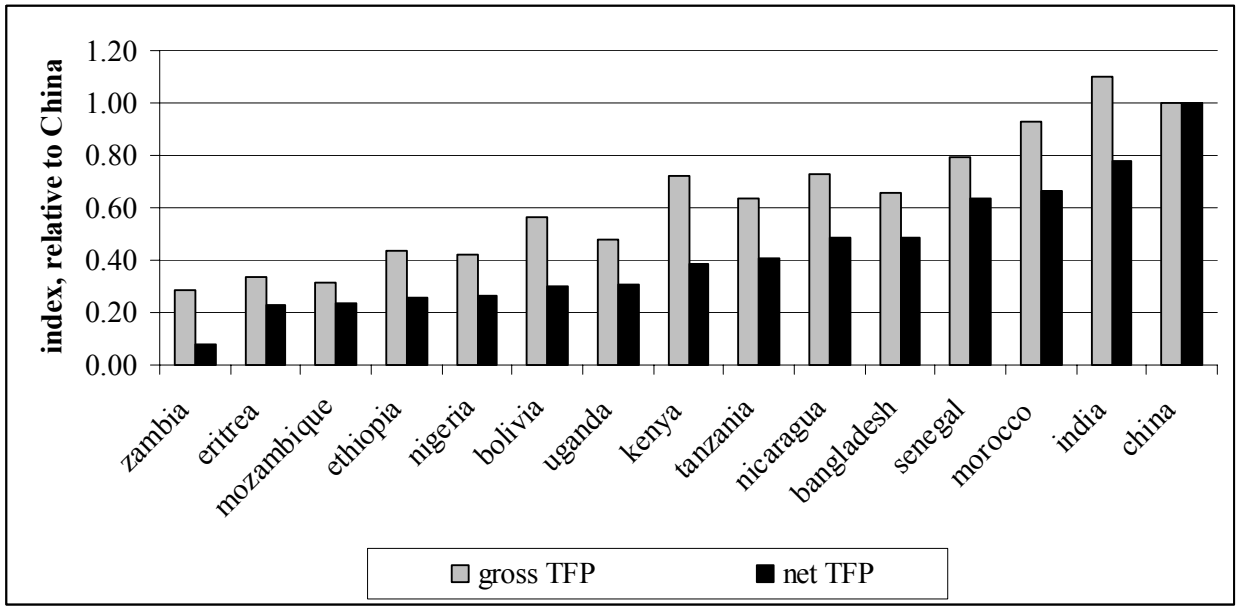
Variable	Coefficient	Std error
Constant	3.62	0.26
Log Capital	0.41	0.02
Log Labor	0.62	0.04
Bangladesh	1.70	0.14
Bolivia	1.42	0.15
China	2.27	0.14
Eritrea	1.16	0.23
Ethiopia	1.41	0.16
India	2.24	0.13
Kenya	1.61	0.17
Morocco	2.04	0.14
Mozambique	1.11	0.21
Nicaragua	1.79	0.15
Nigeria	1.18	0.18
Senegal	1.98	0.18
Tanzania	1.64	0.17
Uganda	1.36	0.16
Chemicals	0.49	0.39
Food & beverage	1.08	0.33
Metals & machinery	-0.07	0.34
Textiles, garments & leather	2.55	0.30
Wood & furniture	1.37	0.45
L*ch (interaction)	0.09	0.06
L*fb	0.11	0.06
L*m	0.03	0.06
L*tgl	-0.06	0.05
L*w	0.32	0.09
K*ch	-0.06	0.04
K*fb	-0.11	0.03
K*m	-0.02	0.04
K*tgl	-0.18	0.03
K*w	-0.22	0.05
observations		
R^2		

Notes: Omitted country: Zambia. Omitted sector: other. Re-estimation without the "other" firms makes little difference to coefficients on factors or country dummy variables. Interaction terms are labor and capital interacted with sectors.

The gap between African and other firms widens when we move from gross to net TFP, as indirect costs interact with other firm characteristics (Figure 3.5). African countries in the mid-range of 40-60 percent of Chinese gross TFP fall to 20-40 percent when net TFP is compared.

Kenya, which appears relatively strong on gross TFP, falls dramatically on net TFP as a result of very high indirect costs. Zambia, the most extreme case, falls from 30 percent to 10 percent. Only in Senegal—the strongest African performer on both gross and net TFP—is the effect of indirect costs relatively low. African countries have shortfalls in factory-floor productivity, but high indirect costs further weakens their relative performance.

Figure 3.5. Net and Gross TFP, Adjusted Prices



Profitability and Returns to Capital

We now turn to a brief discussion of profitability. In figure 3.6, profits and cost subcategories are divided by sales and arrayed vertically so that the sum of profits and costs is one. Few African surveys show manufacturing sectors with high profit margins; this is further reflected in the returns to capital. Senegal, Tanzania, and Uganda stand out here as the strongest African performers, Senegal because of its high productivity and low indirect costs, and Tanzania and Uganda because of low capital intensity and labor costs. These three compare favorably with Nicaragua and Morocco on profitability, because firms in the latter countries face extremely high labor costs. However, China and Morocco have relatively low labor costs, high productivity, and

low indirect costs, and firm profitability in these countries reflects these factors. Other than Senegal, Tanzania, and Uganda, returns in Africa are quite low, and sharply negative in Zambia.

Figure 3.6 shows that indirect costs squeeze African firms heavily. Moderate reductions would boost the viability of African manufacturing enterprises sharply, pushing many firms out of the red and making just-profitable firms much more lucrative. For most African countries, even reducing indirect costs as a share of total costs to the level of Senegal would have a greater effect on profit margins than would a halving of labor costs. Figure 3.7 and Table 3.6 present the results of alternative scenarios of cost reduction for African firms, showing profitability levels and rates of return with reductions in indirect costs versus reductions in labor costs. On a related note, the three African countries with high capital costs as a share of total costs (Zambia, Ethiopia, Nigeria) are also the three least profitable countries.

Figure 3.6. Cost Structures and Profits in Manufacturing

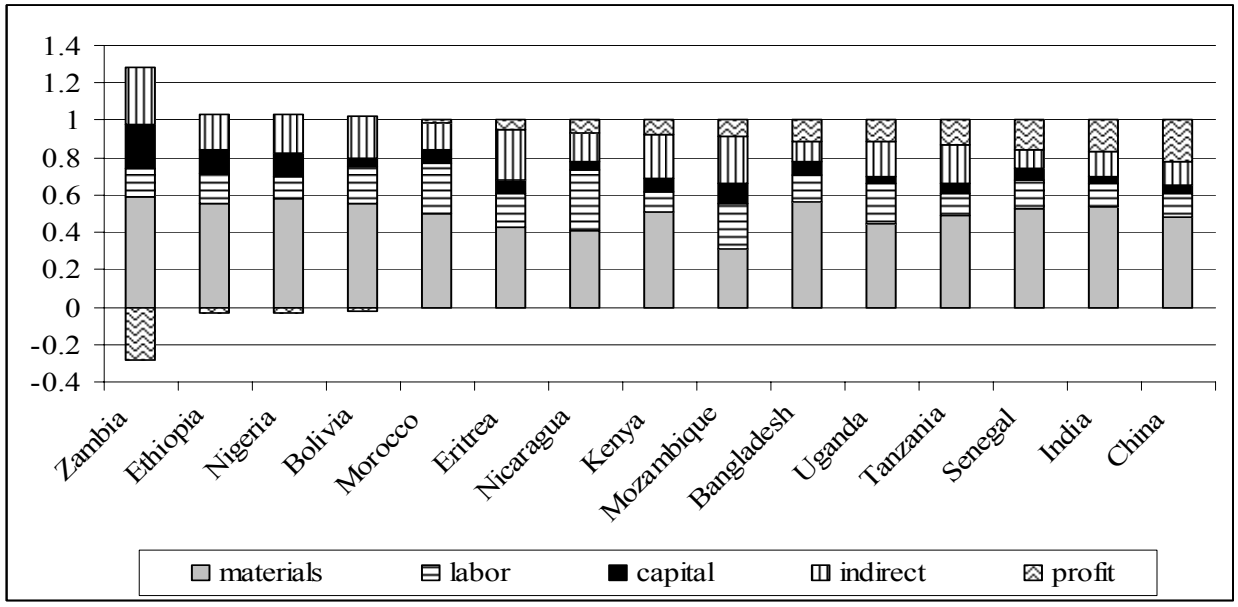
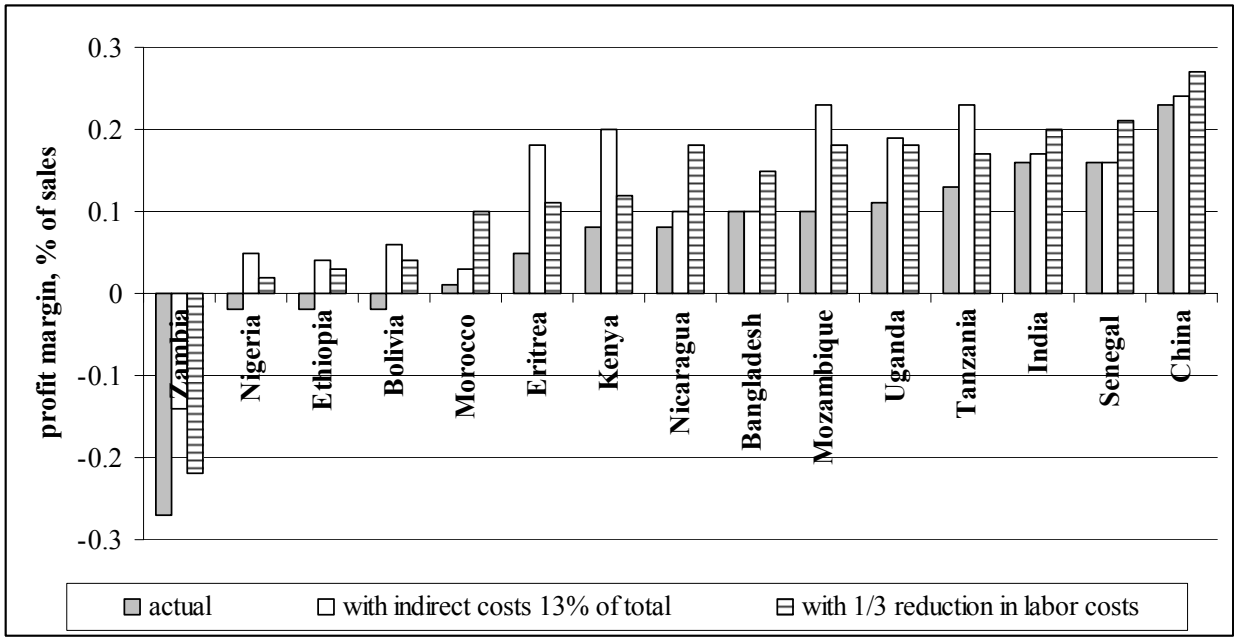


Figure 3.7. Profitability, Actual and Counterfactuals*



*means, 5th to 95th percentiles

Table 3.6. Return on Capital, Actual and Counterfactuals (Firm-Level Medians)

Country	Actual	With indirect costs reduced to 13% of total costs	With 1/3 labor cost reduction
Zambia	-0.18	-0.08	-0.12
Bolivia	0.00	0.10	0.07
Ethiopia	0.01	0.04	0.03
Morocco	0.02	0.03	0.08
Nigeria	0.02	0.04	0.03
Mozambique	0.03	0.14	0.08
Eritrea	0.04	0.07	0.05
Kenya	0.08	0.20	0.11
Uganda	0.16	0.31	0.29
Nicaragua	0.17	0.19	0.40
Senegal	0.21	0.21	0.28
Tanzania	0.26	0.57	0.33
Bangladesh	0.35	0.35	0.54
China	0.38	0.39	0.45
India	0.71	0.76	0.93

Note: Return on capital is calculated as profit / replacement cost of capital stock.

Reducing indirect costs might be expected to boost profitability by an equivalent amount, but the complex interactions between costs and firm behavior suggest that simple arithmetic is not always on target. For instance, firms facing lower indirect costs and more reliable power supplies may use different technologies and more business services, further increasing their productivity and profitability. Also, part of the increases in profit margins may accrue to workers in the form of rent-sharing and higher wages. This suggests that further research should study the implications of different types of costs in more sophisticated models of firm behavior.

4 CONCLUSION

The main issue raised in this paper is the importance of including business-environment-related losses and indirect costs in firm-level analysis. Not all costs characteristic of poor business environments are covered, only a set that is distinguished in firm surveys and expressed relative to sales revenues. Conventional or "gross" TFP, a "factory floor" concept, can be extended to a concept we term "net" TFP by incorporating indirect costs into a net analog of value-added, so including a wider span of operational costs born by the firm. Net TFP bridges between the

"technical" production relationship and firm profitability, and varies much more across countries than gross TFP. African firms rate low on gross TFP, in the range of 40-80% of China's level. This may reflect lower technical capabilities and business management skills, but part of the reason for the shortfall in measured performance is due to the larger losses sustained by African firms from power outages, logistical disruptions and possibly other factors. Lower wages can permit African firms to offset lower gross TFP, but their relative performance worsens further when net TFP is used to compare firms across countries. Net TFP reaches only 20-40% of that of China. For most African countries, reducing indirect costs even to the level of Senegal, the best performer in the African group, would have a greater impact on profit margins than halving labor costs. Further research is needed on the nature of losses and indirect costs, and their implications for firm behavior and profitability.

Why are these losses and indirect costs so high in Africa? Money is part of the problem—easing the severe infrastructure constraints identified in the surveys as contributing to high indirect costs requires major investments. But lowering costs also requires efficient maintenance and improvements in the delivery of business services, and this brings in the need to consider the political economy that underlies state performance and capacity. Business environments usually improve slowly, but some argue that in Africa, these reforms seem to have occurred even more slowly than elsewhere.[21] The structure of business sectors in Africa may provide part of the explanation for this.

African business sectors are heavily segmented on the basis of ethnicity, ownership and firm size. Surveys point to small clusters of large, foreign, and ethnic minority–owned firms that are quite different from their indigenous counterparts.[22] The performance of this small cluster is much stronger than the average; its firms are far more productive and more likely to export.

[21] Easterly (2003) observes that the World Bank has made several loans to Kenya for road improvements with little to show for it, and that the Bank argued no less than 14 times between 1990 and the present that Africa was about to turn the corner in terms of policy reform (Easterly 2003). Donors have contributed billions of dollars to road construction across Africa, but the overall quality of road networks has improved little due to poor maintenance.

[22] In some countries, ethnic fragmentation between indigenous groups is also an issue. For more on this in Ethiopia, see Mengistae (2001).

They also self-report high domestic market shares, and have been able to sustain their presence in Africa despite economic and political uncertainties. Studies such as Tangri (1999) and van de Walle (2001) suggest that this cluster relies on trust between its members and on alliances with the political elite to generate rents on a continuing basis. This may reduce competitive pressure and the drive to innovate and expand. Although the large firms face many of the same constraints as small firms, they are better able to adapt to it; for example, most large firms in Africa own a generator—except in Senegal where the power system works relatively well, and firms are notified well in advance of rolling blackouts—but not so for small firms. Finance is another service segmenting the private sector -- in many countries the share of large firms with access to credit is much higher than that of small firms.

Many minority-owned forms belong to networks. These are usually based on trust between members of a relatively small minority group, and help firms to overcome the limitations of poor business environments (Fafchamps 2004). Biggs and Shah 2004, show that the ethnicity of firms' proprietors remains an important determinant of access to credit and a number of other performance variables, even when other dimensions, such as the education level of proprietors and title to marketable assets are included as explanatory variables. At the same time, networks effectively exclude outsiders from many areas of business. Networks operate in many other regions, including fast-growing Asian countries, but their overall impact is likely to be different in Asia and Africa because of differences in economic density and market size. In Asia, their stifling effect on competition is likely to be small because of the competitive pressure of many firms belonging to many networks. However, in Africa's very small economies, the adverse effect of a few dominant networks or firms is likely to be far larger. Dominant firms in sparse economies are likely to weigh more heavily the risk that reforms encourage entry than firms in dense economies, and therefore are less likely to lobby aggressively for reform. At the same time, the fact that the business sector is dominated by a few large firms, usually minority or expatriate-owned, helps to sustain the ambivalent public attitude towards private-sector-led development noted, for example, in Afrobarometer surveys (Bratton et al. 2005). The danger is of a "low-level political equilibrium", with marginal reforms leaving Africa falling further behind the rest of the world.

How then can the momentum of reforms be accelerated? Survey data can help to pinpoint the most severe indirect costs faced by firms. In most countries, the availability and reliability of power emerges as a clear priority; transport and logistics-related losses and costs are also usually large, while telecommunications and security costs are important in some countries. Benchmarking some of these costs against those in more competitive countries, including within Africa itself, can help to prioritize investments, and also to build support for reforms among some of the constituencies that would benefit from them. These include industrial employees whose wages are now constrained because of the squeeze on net value added due to losses and indirect costs.

Partial reforms which create new opportunities for the private sector, level the playing field between indigenous and minority/expatriate firms, and encourage new entry and the clustering of firms, may be more politically acceptable than frontal assaults on longstanding systems of rent-sharing. Programs to mitigate political risk, for example, are currently only available to foreign investors; they should be extended to domestic investors on similar terms. It may be feasible to improve business services in limited, high-profile areas such as export processing zones within which service delivery standards can be benchmarked and regularly evaluated. This could help to address the problem of low firm density; reduce infrastructure costs and encourage technology diffusion and knowledge spillovers. Finally, the linkage between prolonged donor dependence and an adverse business environment could be more clearly drawn in discussions between donors and African governments, many of which are anxious to reduce their long-term degree of aid dependence and recover from the loss of autonomy that inevitably accompanies high dependence on donor funds.

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