

Explaining Africa's (Dis)advantage

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January 2013



Abstract

Africa's economic performance has been widely viewed with pessimism. In this paper, firm-level data for around 80 countries are used to examine formal firm performance. Without controls, manufacturing African firms perform significantly worse than firms in other regions. They have lower productivity levels and growth rates, export less, and have lower investment rates. Once geography, political competition and the business

environment are controlled for, formal African firms lead in productivity levels and growth. Africa's conditional advantage is higher in low-tech than in high-tech manufacturing, and exists in manufacturing but not in services. The key factors explaining Africa's disadvantage at the firm level are lack of infrastructure, access to finance, and political competition.

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Explaining Africa's (Dis)advantage¹

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JEL codes: F20, F51, D22, D24, L51, L53, L60, L80, O10, O30.

Key Words: Africa, business environment, finance, infrastructure, party monopoly.

Sector Board: FSE.

¹ We are grateful for very useful comments, discussions, help, and criticism from Yaw Ansu, Jing Cai, Hinh Dinh, Weili Ding, Luosha Du, Li Gan, Philip Keefer, Steve Lehrer, Dimitris Mavridis, Howard Pack, Vincent Palmade and Jean-Philippe Platteau. Three referees' and Magaret McMillan's constructive comments have significantly improved the quality of this paper. Helen Yang offered superb research assistance. This study has been financed by the Japanese PHRD TF096317, the Dutch BNPP TF 097170, along with the Africa Region of the World Bank. The views expressed here are the authors' own and do not reflect those of the World Bank, its executive directors, or its member countries.

I. Introduction

In the 1960s, Africa's economic growth was similar to South Asia (Collier and Gunning 1999a). However, between 1970 and 2000, the average GDP per capita growth rate was only 0.5 percent per annum, and sub-Saharan Africa is now the poorest continent.² In the decade before the recent financial crisis, however, the continent experienced a resurgence in growth. Growth in GDP for the continent averaged 5.9 percent annually (World Economic Forum 2009). Is this trend sustainable? How can Africa keep growing? What are the key policies that facilitate Africa's economic performance?

This paper sheds light on these questions using micro data. We use recent surveys of the World Bank's Enterprise Survey for more than 80 countries. We combine these surveys with other cross-country datasets on politics, macro policies, geography and the business environment, to study the determinants of performance of formal manufacturing firms. Our goal is to explore the key factors behind Africa's disadvantage, if any, relative to other regions.³ We focus in particular on African firm performance relative to firms in countries from other continents with GDP per capita below 3000 U.S. dollars. We look at a comprehensive set of firm performance outcomes, including static efficiency, dynamic efficiency, export shares, and investment rates.

Our paper adds to the literature explaining Africa's economic performance (see Collier and Gunning 1999a, 1999b; Bigsten and Soderbom 2006). There are many previous studies examining one aspect of firm performance (such as investment rates, sales growth, exports, or productivity), often using one or several African countries' firm-level data. However, there is no

² The numbers are based on World Development Indicators of the World Bank.

³ In the rest of this paper, we use SSA and Africa interchangeably. Africa does not include the North Africa region in this paper. It is important to keep in mind that all firms in the World Bank Enterprise Survey that we use consist of formal firms. In a few African countries, informal firms were also surveyed, but the number of countries is too small to merit a full scale cross-country firm-level study.

study, as far as we know, that examines all these key determinants of African development at the firm level, with both large African and non-African firm samples. We aim to be comprehensive in including potential explanatory variables: firm characteristics, geography, infrastructure, access to finance, political and institutional factors, and (other) aspects of the business environment (including labor flexibility, corruption, international competition, domestic competition, and crime).⁴ In light of the limited financial and administrative capacity of reformers and policy makers—capacity that is especially constrained in Africa—it is important to identify the key constraints to growth (Hausman et al. 2005).

Our broad focus on firm performance thus differentiates our paper from the existing studies of African firms, which tend to focus on a single outcome at a time and miss important aspects of how African firms behave and perform. Without controls, we find that formal African manufacturing firms have significant disadvantages across all performance measures, including productivity, labor productivity growth, sales growth, investment rates and export intensity. Yet if we control for infrastructure, access to finance, the political and business environment, African firms *lead* in productivity levels and growth rates. We interpret the positive premium for African firms, after controlling for the political and business environment, as suggesting that there is no inherent African disadvantage. Taken at face value, if one could adjust observable policy or environmental factors, African firms possess an intrinsic advantage. For export intensity and investment rates, the Africa dummy is insignificant. Whatever makes African firms lag behind can thus be explained by observable differences in a few key elements of the environment.

We then break down the differences between African and other manufacturing firms to identify which factors explain constraints on performance. Infrastructure and access to finance

⁴ See Xu 2011 for a survey of this growing literature.

prove to be of paramount importance in explaining Africa's disadvantage relative to similar income countries. Party monopoly also plays an important role. The longer a single political party remains in power, the lower are firm productivity and sales growth rates. In contrast, many elements thought to be important for explaining African performance are found to matter less: geography, crime, domestic and international competition do not matter as much.

This paper also adds to the literature on the effects of the (broadly-defined) business environment. We obtain several novel findings. First, modern telecommunications development is of critical importance. Second, even relative to formal finance, trade credit plays an especially important role in developing countries. Third, political monopoly is negatively associated with productivity growth rates and firm expansion. Finally, different policies have distinct implications for structural change. Telecom development, for instance, is structure-neutral: it helps manufacturing and services about equally and facilitates both low- and high-tech manufacturing. In contrast, development of banking helps services more than manufacturing, and corruptions hurts services more than manufacturing. Some tariff protection helps high tech manufacturing but not low-tech manufacturing. Party monopoly hurts manufacturing much more than services.

In each of the survey countries of the World Bank Enterprise Survey (WBES) included in this paper, firms of all sizes and ownership are covered for both manufacturing and services. The survey questions are broad, including detailed quantitative measures which allow us to infer firm performance such as labor productivity levels and growth rates, TFP, sales growth, investment rates and export intensity. Moreover, the survey asks detailed questions, both subjective and objective, on the political, institutional, and business environment that a firm faces, such as infrastructure issues, regulatory burdens, corruption, crime, and access to finance.

To produce comprehensive measures of the business environment, we supplement the WBES data with cross-country data on the political and business environment: telecommunications, infrastructure quality, the incidence of domestic conflicts, and political competition.

We address the potential endogeneity of the business environment in several ways.⁵ First, we mainly rely on objective measures of the business environment. Subjective answers may be based on firms' performance directly, and may be determined by country-specific factors such as exposure to the media and development history. Second, we do not directly use firms' answers on the business environment. Instead, we rely on city-industry-size averages of firm answers to gauge the local business environment. This local measure is less subject to the reverse causality issue associated with firm-level answers, and may provide a better proxy for the actual business environment. Finally, to check for possible omitted variables, we control for additional local and country-level determinants of firm outcomes, and show that our key results remain robust. However, with observational data, it remains true that endogeneity issues—especially in the context of a horse race between various alternative explanations—can never be ignored. This is especially true when many conventional instruments proposed for a particular variable (such as institutions) are often correlated with other channels in the residual of the performance equation (Bazzi and Clemens 2010; Morck and Yeung 2011). We thus resort to as many robustness checks as possible, and offer a coherent story to tie various findings together (Rosenbaum 2010). We offer a menu of facts and explanations, and we invite readers to offer alternative explanations for what we find here.

⁵ See also Dollar et al. 2006, Aterido et al. forthcoming; Xu 2011

II. Data and Measurement

The main data sources for this paper are the World Bank's Enterprise Surveys (WBES) in around 80 countries. The WBES data are collected by the World Bank to benchmark the investment climate in developing countries across the world and to understand the determinants of firm performance and behavior. In each country the survey was based on the universe of eligible firms obtained from the country's statistical office with stratified random sampling with replacement, and the result is a representative sample of the non-agricultural private economy in the country.⁶ Stratification was based on three criteria: the sector of activity, firm size, and geographic location.⁷

For each country in the sample, we use the most recent survey available. Consequently, this paper focuses on explaining cross-country differences in firm performance, but by controlling for industry effects we will focus on differences within specific industries. With our primary focus on the manufacturing sector, we will mainly use the manufacturing sample of around 12000 firms. The number of countries in sub-Saharan Africa is 32 (see the Appendix for the list of the SSA countries).⁸ Typically the stratified sampling yields 100 to 1000 firms per country.

The WBES includes questions on various aspects of the business environment, including infrastructure, regulation burdens, corruption, and access to finance. The availability of these indicators about the business environment allows us to simultaneously control for various aspects of the business environment. The survey has both objective and subjective measures of the

⁶ Thus wholly state-owned firms are not in the sample.

⁷ See Ayyagari, Demirguc-Kunt, and Maksimovic (2011) for more detailed description of the WBES.

⁸ In the data set, Ghana is included but we exclude it because we suspect the quality of the data is too poor—for instance, its labor productivity is almost always 400 log points higher. We note that the data period for Ghana, 2007, was around the period that Ghana experienced currency rebasing. We thank Margaret McMillan for pointing this out.

business environment. In general we rely on objective measures to avoid endogeneity of firm responses. We avoid using the so-called subjective measures, which record a firm's perceived obstacles to doing business. Only for questions related to crime do we use the subjective measures due to its importance in less developed countries and the lack of alternative data sources.

For indicators of the business environment from WBES, we do not directly use individual answers because we believe they are endogenous. We thus use the local average of the business environment as a proxy for the local business environment (Dollar et al. 2005; Hallward-Dreimeier et al. 2006; Aterido et al. forthcoming; Xu 2011). In particular, we opt to rely on a city-industry-size cell as the basic unit for measuring the local business environment. In computing the mean for a firm, the observation for the firm itself is excluded to avoid endogeneity. The business environment has been shown to differ vastly across regions (Almeida and Carneiro 2009; Hallward-Dreimeier and Pritchett 2010; Xu 2011) so we allow for a city-specific dimension. The literature also suggests that firms of various sizes face different business environments. In particular, small firms are particularly vulnerable to expropriation (Beck et al. 2005; Cull and Xu 2005), so we allow the business environment to differ by size. To implement the empirical strategy, we define a firm to be small (large) if the firm has fewer (more) number of employees than the median-sized firm of the city-industry cell.⁹

We also rely on cross-country data to capture important elements of the business and political environment that the Enterprise Surveys do not measure, including elements such as geography, infrastructure, the political and institutional environment, and macroeconomic policies. Aiming to be comprehensive, we combine measures of the business environment from

⁹ When the city-industry-size cell has fewer than 5 observations, we replace the cell mean with the city-industry mean as a proxy of the local business environment.

WBES with other measures of the political, institutional and business environment at the country level. We describe below how we measure our key variables.

Infrastructure. Two related measures capture the extent of modern communication infrastructure: telephone density (from WDI indicators), and the local (i.e., city-industry-size) share of firms using websites for their businesses (based on WBES). Since telephone density and local web intensity are closely correlated, and they both measure the use of modern telecommunication, we rely on factor analysis to obtain their principal factor, and call it Telecom.¹⁰

Geography has been suggested as an important reason for Africa's lack of development (Collier and Gunning 1999; Sachs and Warner 1997). In particular, Africa has more landlocked countries, which heightens the need for coordination with neighboring countries. Given the significantly higher trade costs associated with borders, being landlocked necessarily impedes international trade. Another somewhat subtle aspect of geography for Africa is its small population in general. The low fertility of land and other aspects of geography imply that African countries tend to have sparsely populated land. To capture the geographic elements above, we thus rely on (1) a dummy variable for whether a country is landlocked and (2) domestic market size, as proxied by country population. We also explore in robustness tests the importance of natural resource endowments, such as the share of land in tropical areas.

Political and institutional factors. This category includes three political and institutional factors that might influence firm performance. The first is ethnic fractionalization, a key feature that affects many formal and informal institutions in Africa (Easterly and Levine

¹⁰ One omission in our measure of infrastructure is the lack of road network data. While the WDI has data on paved roads, the data are very unreliable. For instance, India is said to have longer road network than China, a possibility that is instantly dismissed for anyone who has travelled to both countries. The WDI road data simply do not capture the quality of roads well. In contrast, the measures we adopt here make more sense in our judgment.

1997). Ethnic fractionalization has been suggested as an important explanation for poor African performance (see Collier and Gunning (1999) and Easterly and Levine (1997)).

The second component is basic property rights protection. Cross-country evidence suggests that countries with worse property rights have lower aggregate investments, worse access to finance, and slower economic growth (North 1990; Knack and Keefer 1995; Acemoglu, Johnson and Robinson 2001). Acemoglu and Johnson (2005) find evidence that property rights institutions (i.e., those related to government expropriation) tend to be more important than contracting institutions (e.g., those safeguarding private transactions). Some new firm-level evidence also points to the importance of property rights (Johnson, McMillan and Woodruff 2002; Cull and Xu 2005) and the adverse effects of corruption. Potential mechanisms for the property rights effects include better external finance (Demirguc-Kunt and Maksimovic 1998), better asset allocation (Claessens and Laeven 2003), and a higher share of large formal firms (Demirguc-Kunt et al. 2006). To capture the protection of property rights, we rely on political competition, in particular, the number of years that the ruling party has been in power from the Data of Political Institutions (DPI, based on Beck et al. 2001 and Keefer 2007). Our reasoning is that the longer a ruling party has been in power, the more absolute power the ruling party has, and the higher the risk of unconstrained government expropriation.¹¹ There are clearly alternative explanation for this party monopoly variable. For instance, a ruling party with

¹¹ This intuition seems to capture the reality of most developing countries well. However, some argue that several East-Asian countries also have low political competition as measured by this variable but seem to have performed well in the past several decades. Gehlbach and Keefer (2010a, 2010b) suggests that this may be due to much better ruling party institutionalization in East Asian countries relative to other countries. Institutionalized ruling parties facilitate development in autocratic countries for two main reasons. First, they tend to have broad party bases so that the party represents broad rather than narrow constituent interest. Second, there are institutionalized rules about removing incompetent or shirking party-leading rulers. Thus the party can credibly commit to remove bad leaders, and leaders as a result work hard and perform well. As Acemoglu and Johnson (2012) argue, an effective state machinery, that is, a bureaucracy that is effective and competent and has centralized power to tax and implement infrastructure investment, can bring about growth by itself, and the question is whether such growth are sustainable due to the lack of incentives for innovations.

monopoly power may behave like “stationary bandits” in contrast to “roving bandits”, and therefore internalize the benefits of providing a good business environment and property rights protection so that the party has a sustained economic payoff over the long run (Olsen 2000). This stationary bandit interpretation of party monopoly thus implies a positive effect on economic performance rather than the negative effect predicted by the expropriation-risk interpretation. We shall thus allow the empirical results to distinguish between these two opposite interpretations.

In later sensitivity checks, we also include alternative measures of protection of property rights, including voice and accountability, executive competition, and government size. While the first two measures are clearly related to the protection of property rights of citizens from government expropriation, the size of government captures the de facto power of government, and could be viewed as de facto protection of property rights.¹²

The third component of political and institutional factors is whether a country experienced any armed domestic conflicts in the previous ten years. This variable is related to the political structure of a country (Acemoglu and Robinson 2012). In countries with no strong centralized power, armed conflicts may develop as challengers attempt to grab power from incumbents by violence. To capture basic domestic safety, we use a dummy variable on whether domestic armed conflicts occurred in the past 10 years, based on Gleditsch et al. (2002) and updates of UCDP/PRIO (2010).

Business environment. The first element of business environment that we measure is the extent of corruption. We use the WBES measure of corruption which is the local average of

¹² There are alternative interpretations for government size, but here we just mean to use it as a sensitivity check, and the key conclusions do not hinge on our classification.

bribes to the government normalized by firm sales. This is directly comparable across countries, and avoids some of the flaws of subjective perceptions of corruption. Previous research has shown that firms in developing countries (such as Uganda and China) are hurt more by corruption than by taxation (Fisman and Svensson 2007; Cai, Fang and Xu 2011). Since we have very few measures of crime across countries, we use one subjective measure from the dataset: firms were asked the extent to which they view crime as an obstacle to their expansion. We thus construct a variable called *Obstacle_crime*, which is the local share of firms that view crime as a moderate or major constraint.¹³

The second element of the business environment that we measure is labor market flexibility. Some recent studies suggest that stringent labor regulations can have serious adverse effects (Xu 2011). For instance, cumbersome labor regulations are associated with smaller firm size, more informality and higher unemployment in India and Brazil (Amin 2009a, Almeida and Carneiro 2009; Li, Mengistae and Xu 2011). Minimum wages in Indonesia were found to have large negative effects on employment (Harrison and Scorse 2010). Labor market flexibility is proxied by an index of the difficulty of firing workers at the county level (*Firing Difficulty* hereafter) (Botero et al. 2004). Firing Difficulty is an index measuring the cost of firing 20 percent of a standardized firm's workers (10% are fired for redundancy and 10% without cause). The cost of firing a worker is calculated as the sum of severance pay and any mandatory penalties established by law or mandatory collective agreements for a worker with three years of tenure with the firm.

The third element of the business environment captures product market competition. Given the multifaceted nature of product market competition, we employ several measures to

¹³ The data set also has the share of sales lost due to theft and vandalism during transportation. For manageability of table length, we do not include this variable in our list of explanatory variables.

capture this. The first is the country-industry-year import tariff, a high level of which means lower international competition for domestic producers. Related, a larger presence of foreign firms also represents stronger competition (see Aitken and Harrison 1999). Foreign firms in developing countries tend to be more productive, as shown later in this paper. The third measure captures domestic country-industry level competition (“Competition_ind”), as measured by $(1 - \text{markup}_{CI})$. Markup_{CI} is the country-industry average of firm-level markup (i.e., $(\text{value added} - \text{labor costs})/\text{sales}$). A higher value of Competition_ind implies more competition (Aghion et al. 2005). Fourth, in sensitivity checks, we also include a subjective measure of informal competition as well as the effect of entry barriers, proxied by the minimum capital required (% of income per capita) for starting a business (from Doing Business data set). A higher ratio implies higher entry barriers and less competition.

Access to finance. There is a large literature on the linkages between access to finance and economic development (see Levine 1997). While most of this literature focuses on access to formal finance such as bank loans and overdraft facilities, there is a growing literature that examines the impact of access to informal finance (Cull and Xu 2005). Following this literature, we include access to both formal and informal finance, and investigate whether they have different effects on firm performance. Access to formal finance is measured as the city-industry-size share of firms with access to overdraft facilities, as in Dollar et al. (2005). Access to informal finance is measured as the city-industry-size share of firms that grant trade credit (to other firms).¹⁴

¹⁴ We have also tried using the local share of firms *receiving* trade credit. These two variables are, not surprisingly, very closely correlated. This fact, coupled with the fact that the latter measure has significantly fewer observations, leads us to use the former trade credit measure in our empirical analysis.

III. How does Africa stack up against other countries?

To examine African manufacturing performance, we include both static and dynamic measures of performance. We compare both total factor productivity (TFP) and labor productivity (in logs). Labor productivity is measured as sales (in constant 2005 U.S. dollars) divided by the number of employees. TFP is derived from estimating an industry-specific production function and measured as the residual from such a production function.¹⁵

To see Africa's dynamic momentum, we also examine African firms' labor productivity growth, sales growth and investment rates. TFP levels (measured across countries) may not fully capture differences in productive efficiency since they may be affected by differences in markups and prices (Foster et al. 2008). The advantage of using growth in labor productivity is that we can filter out the component of markup ratios and price differentials if they are relatively stable over a short time period. Moreover, growth in labor productivity perhaps better captures the gains from improvements in efficiency over time, including those originating from technological and organizational efficiency, and increasing competition.¹⁶

For both labor productivity and sales growth, we use growth during a three-year period since we only have data going back for three years at the firm level. Following Davis and Haltiwanger (1995), we compute sales growth rates as (sales this year – sales three years

¹⁵ We later also allow for industry-income-level-specific technology, proceeding as follows. We classify all countries into 4 categories of income levels based on the quartiles of GDP per capita. We allow for income-category-industry specific coefficients for capital and labor for the value added production function. We also include income-category-industry dummies to capture common income-category-industry productivity.

Capital is measured as replacement value of capital stock. This is the only feasible measure of capital we can obtain from the data. It is perhaps useful to point out that our TFP measure is likely less reliable than the other performance measures. To measure capital reliably in any country is a daunting task, and to measure it consistently and reliably in 89 countries with differences in accounting systems and survey implementation is even more challenging. The questionnaire designs tend to be the same across countries, but there are minor differences across countries and regions.

¹⁶ While an even better measure would be the growth rate of TFP, the data set only asks sales and employment in the survey year and three years earlier, so that multiple observations of TFP cannot be computed.

ago)/average; labor productivity growth is constructed similarly. To measure the exposure of African firms to global markets, we also compare firm-level export intensity, defined as the share of exports in total sales.

Since our primary focus is to shed light on what determines the performance of non-rich African countries, we exclude from our SSA sample the richest four countries: South Africa, Botswana, Mauritius and Namibia, which have GDP per capita higher than 3000 US dollars (in 2005 value). The countries in our new African sample consist of all SSA sample countries that have GDP per capita lower than 3000 U.S. dollars (in 2005 value) at the time of each country's survey.¹⁷ However, later in the paper we also report the results when including the four richest African countries.

Evaluating African economic performance necessarily entails comparing Africa with other countries. We thus construct two comparison groups for Africa. The first, *the average comparison group*, consists of countries in non-SSA countries with per capita GDP lower than 3000 U.S. dollars (in 2005 value). The second, *the better comparison group*, consists of the top half countries of the average comparison group in terms of performance. We measure country performance in the following way. We first standardize each of the six performance measures so that each now has a mean of zero and a standard deviation of 1. We then add up the six standardized measures to form an aggregate performance measure. Countries whose mean aggregate performance ranks in the top half of the average comparison group are defined to be members of the better comparison group.

¹⁷ As mentioned in an earlier footnote, we also exclude Ghana.

Mean Differences across African and non-African firms

African manufacturing firms are 4 to 5 years younger than the two comparison groups (see Table 2). They have slightly lower state ownership but significantly higher foreign ownership, by 6 (4) percentage points relative to the average (better) comparison group. They show higher ownership concentration, with the largest owner claiming 82 percent of firm ownership, higher than the average (better) comparison group by 8 (11) percentage points. African manufacturing firms are much smaller, with the log number of employees lower than the average (better) comparison groups by 72 (104) log points.

Geography in Africa is characterized by a higher tendency to be landlocked and a smaller domestic market. Africa is slightly more likely to be landlocked than the average comparison group (but this difference is statistically insignificant), but significantly more likely to be landlocked than the better comparison group (28 versus 8 percent). African countries also have smaller populations, with the population of the average country lower by 67 (146) log points than those in the average (better) comparison group. Furthermore, African countries (excluding the top four richest countries) still have much lower average GDP per capita at \$497, about 1000 dollars lower than both comparison groups.

Africa displays stronger political monopoly—the logarithm of the number of years that the ruling party in an African country has been in power is greater by 51 (25) log points than the average (better) comparison group. In addition, African firms have to confront violence and crime to a greater extent. In terms of the incidence of major or minor domestic conflicts in the previous 10 years, Africa has a higher tendency than the average comparison group (56 versus 41 percent). Surprisingly, the better-performing group actually has a similar past history of domestic conflicts. Relatedly, Africa exhibits the highest level of ethnic diversity. The ethnic

fractionalization (or diversity) in Africa, at 0.72, is much higher than the average (better) comparison group by 0.32 (0.37).

Infrastructure in Africa is significantly worse, an outcome expected in light of its low income level. The telecom index is much lower in Africa than the two comparison groups. The overall business environment clearly is worse in Africa than both comparison groups. To begin with, African firms have to pay higher bribes to get things done.¹⁸ African firms' average share of bribes to the government as a share of sales at 2.9 percent, is significantly higher than the average comparison group by 1.4 percentage points, and higher than the better comparison group by 1.8 percentage points. The subjective perception of crime as a moderate or severe obstacle is higher for Africa. Africa also exhibits lower labor flexibility, with higher firing costs. African firms also face less competition, both domestically and internationally. The average industry-level tariff rate in Africa, for instance, is about 50% higher than both comparison groups. The country-industry level index of competition is also significantly lower in Africa than in both comparison groups.

African firms also have worse access to finance, both formal and informal. The local average share of firms with overdraft facilities is 23 percent, 22 (13) percentage points lower than the average (better) comparison group.¹⁹ Equally important, African firms also have less access to trade credit: the local share of firms granting trade credit is 27 percent, which is 27

¹⁸ This is very similar to the fact that firms in the poorer regions in China tend to spend more on entertainment costs (for government officials) in China (Cai et al. 2011).

¹⁹ Note that the better comparison group actually has lower access to formal finance than the average comparison group, suggesting that access to formal finance is perhaps not crucial for firm performance for countries at low income levels.

percentage points lower than the average comparison group, and 30 percentage points lower than the better comparison group.²⁰

To summarize, African firms face a more daunting business environment in almost all respects. They operate in poorer, smaller economies that are more likely to be landlocked and they have inherited a history of armed conflict. Infrastructure is much poorer, access to both trade credit and other forms of credit is lower, and regulatory barriers in the form of labor market regulations and other types of regulations are higher. Political monopoly is more significant, tariffs are higher, and the payment of bribes is also higher. Only the firm characteristics in our sample play a positive role, as the African firms in the sample are on average younger, and more likely to have foreign equity participation.

Differences in (unconditional) firm performance

In this section, we report our comparison of the unconditional means for different measures of firm performance, including labor productivity, total factor productivity (TFP), sales growth, exports and investment. Later in the paper, we will report the “conditional” performance for African firms, after controlling for observable characteristics of the environment. Given the much more difficult environment faced by African firms as described above, we would expect poorer performance on the part of African firms in the unconditional means.

For the average comparison group, Africa manufacturing firms have significantly worse outcomes for five out of our six performance measures. Log labor productivity in Africa is lower by 48 log points (statistically significant). Labor productivity growth is lower by 8.6

²⁰ Note the rank order of trade credit prevalence corresponds to the order of firm performance, which suggests that trade credit may play an important role in explaining regional economic performance, a conjecture confirmed later.

percentage points, and TFP is lower by 33 log points. Sales growth is similar. Export share is lower by 8.8 percentage points (statistically significant), with African firms exporting at only half the level of exports for the average comparison group. Qualitatively consistent with a number of previous studies (Bisten et al. 1999, Gimah-Brempong and Traynor 1999, Devarajan et al. 1999),²¹ investment intensity in Africa is lower by 3.6 percentage points (14 versus 17.6 percent).

The difference with the better comparison group is more pronounced. The labor productivity lag is at 77 log points, and the TFP lag is 53 log points. While the sales growth difference remains insignificant, the labor productivity growth lag is 9.9 percentage points. The export share is significantly lower by 13.3 percentage points, and the investment rate is significantly lower by 9.3 percentage points. To summarize, relative to similar-income countries and the better comparison group, growth and productivity levels of formal manufacturing firms in African countries are across the board significantly behind (except in sales growth), and African firms exhibit much lower export capacity and investment levels.

Determinants of firm performance (conditional differences)

We now investigate how the business environment affects firm performance, and explore how African firms compare when we control for the external environment. The empirical specification is as follows:

$$Y_{icj} = \alpha Firm_i + \beta_1 Geography_c + \beta_2 infrastructure_{cj} + \beta_3 PoliInst_c + \beta_4 busiEnvi_{cj} + \beta_5 finance_{cj} + u_j + \varepsilon_{icj} \quad (1)$$

²¹ There is inconclusive evidence about whether investment in Africa is efficient. Devarajan et al. (1999) argue for inefficiency based largely on cross-country data, while Gunning and Mengistae (2001) argue for efficiency based on firm-level African data.

where Y is the firm performance indicator, and i , c , and j represent firm, country, and local levels. Y could be log labor productivity (or TFP), the labor productivity growth rate, the rate of sales growth, export intensity, or the investment rate.²² *Firm* is a set of basic firm-level controls including firm age, state and foreign ownership, and the ownership share of the largest owner. For the sales (labor productivity) growth rate equation we control for initial sales (labor productivity) three years ago to allow for regression toward the mean. *Geography* includes log country population and a dummy equal to one for landlocked countries. *Infrastructure* includes the telecom index (measured at the local, that is, the city-industry-size, level). *PoliInst* represents the category of political and institutional factors, and includes log party years, any conflict in the past ten years, and ethnic fractionalization. *BusiEnvi* indicates business environment consisting of firm-level foreign ownership, average country-industry foreign ownership, firing difficulty, the local average bribe, country-industry tariff levels, country-industry competition index, and the average perceived level of crime at the local level. *Finance* includes the local share of firms having access to an overdraft facility, and the local average for access to trade credit. We also include industry dummies, so that comparisons are between firms within the same sectors across countries. The error term captures unobserved variables and measurement errors.²³ Since the error terms within a country may be correlated due to omitted common factors or shocks, and many of our explanatory variables are aggregate variables, we

²² Log labor productivity is trimmed of tail one percent to avoid the outlier issue. Results are similar without trimming.

²³ Since we have many control variables, and the coverage of both the Enterprise Survey and cross-country sources differ for some countries, dropping the observations with any variable missing would result in the loss of the majority of the sample, and render our empirical exercises much less representative. For variables with significant number of missing observations, we thus resort to imputation, using the predicted value based on the following basic controls: the country-level urbanization level, the regional dummies (Africa, East Asia and Pacific, East Europe and Central Asia, South Asia, Middle East and North Africa), the manufacturing dummy, and firm size dummies (10-20, 20-60, and 60+ employees). Why do we use the manufacturing dummy in imputation when our analysis largely focuses on the manufacturing subsample? While we largely use the manufacturing subsample for most of analysis, we do use the service subsample in some sensitivity checks.

cluster the standard errors of each equation at the country level (Moulton 1990). We also report White standard errors to allow for heteroskedasticity.

The base results from equation (1) are reported in Table 4. Once we control for firm characteristics and the business environment, the coefficient on the Africa dummy is positive and large for TFP (38 log points), labor productivity (76 log points), labor productivity growth (12 percentage points), and sales growth (12 percentage points). Thus conditional on our key variables, Africa does not lag behind in productivity and growth—in fact it is ahead of other regions. Taken at face value, if one could adjust the daunting list of geography, infrastructure, political, economic and institutional factors to the levels elsewhere, Africa possesses an inherent advantage.²⁴ For export intensity and investment rates, the Africa dummy switches from negative and significant to merely insignificant. Whatever makes African firms lag behind can thus be fully explained by our control variables.

Firm characteristics matter a great deal in explaining firm performance. *First*, younger firms tend to have lower labor productivity but not TFP. The positive correlation between age and labor productivity is consistent with the conjecture that entrants learn in the initial years (Sleuwaegen and Goedhuys 2002). Younger firms also have lower labor productivity growth rates but higher investment rates. *Second*, and maybe surprisingly, state ownership is positively and significantly associated with labor productivity, labor productivity growth, sales growth, and export share in value added. This is surprising in light of the large literature that suggests that private ownership is superior in delivering firm performance (see Megginson and Netter (2001) for a summary). But other evidence suggests that state owned enterprises could outperform

²⁴ In this paper we do not have a measure of the extent of clustering. Previous literature suggests that clustering may be important for explaining firm performance (see Long and Zhang 2011).

private enterprises when there is sufficient competition (Bartel and Harrison (2005)) or no strong monitoring mechanism associated with dispersed private ownership (Xu, Zhu and Lin 2005).²⁵ Also, state ownership is not significantly associated with higher TFP, which could indicate that labor productivity levels and growth rates are associated with higher capital investments on the part of the state. *Finally*, a large ownership share of the largest owner is negatively related to labor productivity, labor productivity growth, sales growth, and export share.

Geography and Infrastructure. Both measures of geography are mostly uncorrelated with firm growth or productivity levels. A larger country (in terms of population) is associated with lower export intensity, consistent with the interpretation that large domestic markets as captured by population size typically have smaller export shares.

The telecom index, our proxy of infrastructure, is positively and significantly associated with all measures of productivity, labor productivity and sales growth, and export intensity. Modern telecom infrastructure thus emerges as an important force behind enabling better firm performance, both in level and in growth.²⁶

Political and institutional factors. The number of years that the ruling party has been in power is negatively associated with TFP and labor productivity levels, but is statistically insignificant. In contrast, this proxy for party monopoly is significantly correlated with labor productivity and sales growth rates. The findings here are the opposite of the “stationary bandits”

²⁵ Alternatively, the positive state effects could reflect selection bias—the state keeps the best assets for themselves, or such firms maintain more monopoly power in the market.

²⁶ One may wonder whether the results of telecom are due to the high correlation between telecom development and GDP per capita. Indeed, their correlation is high at 0.81. To assuage this concern, we control for income per capita in a sensitivity check (not reported). Our key results remain intact. Conditional African advantages become even larger: for TFP, 0.50; log labor productivity, 0.89; sales growth, 0.13; labor productivity growth, 0.14. The magnitudes of telecom are slightly smaller in most cases but remain highly significant: for TFP, 0.30 (vs. 0.48 in base specification); log labor productivity, 0.59 (vs. 0.78), sales growth, 0.10 (vs. 0.12); labor productivity growth, 0.11 (vs. 0.13); export share, 0.06 (vs. 0.03); investment rate, 0.07 (and significant at 1 percent level vs. 0.01 and insignificant). Note that the telecom effects on export and investment become even more pronounced.

hypothesis which suggests that a long time horizon for rulers leads to better economic outcomes. Similarly, countries that experienced domestic conflicts in the previous ten years tend to have lower productivity and both growth rates, but the effects are statistically insignificant.

Ethnic fractionalization has been suggested to have important adverse effects on macro outcomes (Easterly and Levine 1997; Collier and Gunning 1999a). However, our micro evidence does not bear this out. Indeed, ethnic fractionalization is robustly and *positively* correlated with labor productivity levels and growth. We cannot, of course, rule out the possibility that ethnic fractionalization has adverse effects through its indirect effects on other variables such as party monopoly, and that ethnic fractionalization adversely affect macro outcomes through the non-firm channels such as the provision of public goods.

Business environment. The local share of bribe payments in sales is negatively related to sales growth. This result is consistent with other studies in developing countries. The effect of crime, largely negative for most outcomes, is negative and significant only for export share. One of the key components of managerial discretion, firing costs, is associated with higher TFP and labor productivity, which likely reflects the fact that managers hire fewer workers and substitute them with capital when firing costs are higher. Firing costs are also associated with lower sales growth, which may reflect firms' lower willingness to expand when it is difficult to reduce the number of workers if necessary.

Foreign ownership has positive and significant effects on all outcomes except for the investment rate. This can reflect a number of mechanisms such as better access to finance and/or technological and managerial know-how. Foreign presence in an industry, as proxied by the share of foreign ownership within a country-industry cell, reduces investment rates (significantly) and labor productivity (insignificantly). This may reflect the market stealing effects of foreign

entry (Aitken and Harrison 1999). We do, however, find positive spillover effects of foreign ownership on export shares, which is also consistent with Aitken, Hanson, and Harrison (1997). Foreign presence in an industry is, therefore, positively associated with boosting export orientation, perhaps reflecting information sharing on export destinations and products. Finally, our measure of domestic competition is significantly and positively associated with investment, but negatively and significantly associated with productivity levels and growth. The negative correlation with productivity level could simply reflect the fact that our productivity measure contains price effects (Foster et al. 2008). The negative correlation of productivity growth and competition could reflect the well-known Schumpeterian conjecture that a firm needs some monopoly rents for innovation and therefore productivity growth.

Financial access. Access to bank finance (i.e., overdraft facilities) is positively correlated with TFP and labor productivity, yet it is also *negatively* correlated with export intensity. The positive correlation of formal finance and productivity is consistent with the macro finance-growth literature (Levine 1997). The negative correlation with export intensity, somewhat puzzling, suggests that formal financing may encourage firms to focus more on the domestic market.²⁷ Interestingly, the prevalence of *trade credit* has a stronger positive correlation with labor productivity, labor productivity growth, sales growth, and export intensity. Thus, informal finance may have played a stronger role in facilitating local development in developing countries than formal finance.

Alternative TFP Measure

²⁷ One possibility is that with better access to formal finance, domestic firms can develop with less financial constraints, which then imply a less pull for foreign-owned firms who have comparative advantage in exporting.

As discussed earlier, our TFP measure is derived from estimating an industry-specific production function and measured as the residual from such a production function.²⁸ Alternatively, we could allow for technology heterogeneity in a number of different ways. In one sensitivity check, we classify countries into four income groups based on the income level, and we allow for income-level-industry-specific technology (i.e., factor shares).²⁹ We obtain TFP as the residual in such a production function.

The results exploring this alternative specification for TFP are reported in Table 5. The conditional advantage for Africa remains similar in magnitude (0.41 vs. 0.38), but becomes statistically insignificant. Most of the point estimates are robust to this alternative specification, but statistical significance increases in some cases and declines in others. Most of the results focusing on the importance of firm age, foreign ownership, and domestic competition remain intact. The effect of party monopoly remains negative but becomes significant, while the importance of bribes switches from negative to positive. The results thus seem to be sensitive to the choice of TFP estimators. This is not surprising since in the more nuanced income-level-industry-specific technology estimator, our estimates focus on within-income-group variations. Nevertheless, the key message that Africa's disadvantage disappears when we control for infrastructure, access to credit, and the business environment remains intact.

Do the large Africa premiums reflect multicollinearity?

The large and positive *conditional* African premiums for TFP, labor productivity, labor productivity growth, and sales growth may surprise many. Does the positive and significant coefficient for the Africa dummy merely reflect the close correlation of this dummy variable with some of the aggregate (national or local) variables? Alternatively, could the positive Africa

²⁸ In this paper, we only consider the Cobb-Douglas production function.

²⁹ And industry-income-level-specific intercept.

premium merely reflect the fact that some variables are endogenous and their inclusion in the regressions bias the estimates of the Africa dummy? One solution is to leave out potential endogenous variables one at a time, and see if our estimate of the Africa effect is robust to these omissions. In Table 6, we run a series of regressions for each of the dependent variable, dropping one aggregate variable at a time, and ascertain that the Africa dummy always retains the same sign, and remains largely significant and with similar magnitudes in the TFP, labor productivity, labor productivity growth, and sales growth equations.

Omitted variable bias

As with any study using cross-sectional data, a legitimate concern is that the effects of our business environment variables may merely reflect those of omitted variables. To consider this possibility, we examine the robustness of our key results when we include more controls. In particular, we add more controls for openness, political and institutional factors, the business environment, and natural resource endowments. First, we capture openness with a measure of imports and export as a share of GDP. Sachs and Warner (1997) find cross-country evidence that Africa's disadvantage can be partly explained by the lack of openness.

Second, we add more political and institutional factors, including voice and accountability from ICRG, executive competition from DPI, and government size to capture the de facto power of the government.³⁰ We control for government size because we are concerned that the strong negative effects associated with political monopoly may merely capture the association of political monopoly with (the omitted) government macro policies. Since the

³⁰ Moreover, we have also tried adding inflation rate or a dummy variable of high inflation rate to proxy for macro risks, and have not found it matter.

negative effect of political monopoly may reflect other omitted governance variables, we also further control for “voice and accountability” and executive competition.

Third, some argue that Africa is particularly affected by a “natural resource curse”. Some economists have argued that SSA countries are more likely to be located in tropical areas, which have poorer quality of soil and a worse disease environment and are therefore bad for development (Sachs and Warner 1997). Other economists have argued that countries with a heavy reliance on natural resource exports tend to have worse economic performance due to a number of reasons such as the lack of diversification. To capture the natural resource curse, we include three measures: the share of land area in the tropics, the ratio of petroleum exports to GDP (lagged by one year), and the ratio of raw material exports to GDP, lagged by one year.³¹

Fourth, since the business environment is a large category that covers many aspects, we try to control for further subjective measures, including the local share of firms viewing the following as moderate or severe constraints: electricity, transport, informal competition, tax rate, land access, financial access, and labor regulation. Since entry barriers are particularly important (Klapper, Laeven and Rajan 2006), we also control for an objective measure of entry barrier, namely, the logarithm of minimum capital to start a business (from Doing Business).

Overall, our results are generally robust (see Table 7). Africa’s advantage in TFP and labor productivity remain, with small changes in magnitude. However, the African conditional disadvantage in export intensity becomes more pronounced, at 5 percent and significant. The positive effects of telecom and the negative effects of bribes become significant for investment rates. The negative effect of firing difficulty on productivity growth also becomes significant. The negative effects of political monopoly on productivity and sales growth rates remain

³¹ The first measure is from <http://www.cid.ha>, while the latter two are both from WDI of the World Bank.

qualitatively similar but less significant, not surprising since we are controlling for many aggregate governance variables closely correlated with party monopoly.

The entry-barrier measure, the minimum capital to start a business, has a negative association with TFP, labor productivity and its growth rate, but a positive association with export intensity, perhaps because such entry barriers tend to foster large firms that have higher export capacity.³² We do not find that the two proxies of natural resources matter in a robust way. Openness to trade is significantly associated with higher TFP and higher labor productivity, but tariffs have an insignificant impact.

Adding four rich African countries

So far our “Africa” consists of SSA countries excluding the four richest sub-Saharan countries (i.e., South Africa, Namibia, Mauritius, and Botswana), all of which have GDP per capita exceeding 3000 U.S. dollars (in 2005 value). Some may want to know how all of SSA is doing. To shed light on this, in this section we define Africa to include the four rich SSA countries. The results suggest that the conditional advantages of African firms drop significantly but do not disappear. The coefficient on the Africa dummy remains positive for all outcomes but remains significant at the 1 percent level only for labor productivity growth. The coefficients for the other variables are very similar, and some results become stronger—the negative effects of party monopoly on productivity are now significant, for instance.³³ Thus adding the four rich countries in fact reduces Africa’s conditional advantage. Thus conditional advantages for Africa are stronger for the relatively poorer African countries.

³² Most of the locally-perceived constraint variables are not statistically significant, and often they are the wrong sign (results not reported in the table to save space). This is consistent with the perception that objective measures tend to out-perform subjective measures of the business environment (Dethier et al. 2008).

³³ The results are available upon request.

IV. Further Considerations

In this section, we provide further sensitivity checks, and then investigate how the effects of the business environment differ in several key dimensions. We want to understand whether African firms have a distinct conditional performance advantage depending on their industries and technologies.

Manufacturing versus services

So far we have focused on how African manufacturing firms fare relative to those in other regions. However, do the results differ if we look at services? Different sectors may rely to a greater degree on the political and business environment. Since WBES has no good capital data for services, we cannot estimate TFP for services. We thus focus on comparing the other five measures. The results, in Table 8, indicate significant sector-level differences, and suggest that most of the business environment variables have stronger effects in manufacturing than in services.

Perhaps the most interesting finding is that the conditional Africa advantage is large in manufacturing but non-existent in services. Similarly, party monopoly significantly reduces growth in manufacturing but not in services. Since in developing countries manufacturing tends to out-perform services in productivity (McMillan and Rodrik 2011), one possible implication is that party monopoly might shift a country's sector structure to less productive sectors, and lower a country's overall allocation efficiency. Interestingly, foreign ownership has no positive spillovers on exports in services but has significant spillovers in manufacturing. The strong positive effects of ethnic fractionalization in manufacturing is much more muted in services.

In contrast, bribes seem to have more adverse effects for services, as seen in the negative and significant coefficients for labor productivity level and growth. In addition, sales growth rates of service firms are more affected by the availability of formal finance than manufacturing firms.

Low-tech and high-tech manufacturing

Does the conditional African advantage differ by the level of sophistication of particular manufacturing industries? This question is interesting since countries at different stages of development often display distinct areas of comparative advantage (Lin 2009, 2010; and Lin and Monga 2010), and industries with varying level of technological sophistication and specific investments may need different supporting institutions and business environments (Lin 2010).

Since our sample African countries are largely located at the less sophisticated end of the technology spectrum, Africa's comparative advantage likely is in low-tech rather than high-tech manufacturing. We classify the manufacturing sectors as low-tech manufacturing if enterprises are in food and beverages, leather, wood processing and wood products, simple metal products, textiles, or garments. We classify as high-tech manufacturing firms in metal and machinery, electronics, chemical and pharmaceutical products, non-metal and plastic, automobile and parts.³⁴

Table 9 shows that the conditional Africa advantage is indeed higher in low-tech manufacturing. For labor productivity the Africa advantage is 88 log points for low-tech manufacturing, but 72 for high-tech manufacturing. The conditional Africa advantages for labor productivity growth and for sales growth are larger and significant only for low-tech

³⁴ The data set has "other manufacturing", which is not classified as either since we don't know its nature.

manufacturing, at around 15 percentage points in both cases. Interestingly, the conditional Africa advantage in investment is higher for high-tech industries.

The dependence on modern infrastructure is strong for both types of industries. While party monopoly has adverse effects on productivity levels and growth for both low- and high-tech industries, corruption is associated with a more adverse effect on high-tech than on low-tech manufacturing. Similarly, crime has much more severe negative effects on high-tech than on low-tech manufacturing.

Firing costs are associated with more adverse effects for high-tech than for low-tech manufacturing industries as well. Finally, tariff promotion is only associated with positive effects in high tech industries—suggesting that trade incentives only work in promoting new, not existing areas of comparative advantage. The importance of different industrial policy instruments for encouraging sectors with a “latent” comparative advantage is reviewed in Harrison and Rodriguez-Clare (2010).

Selection bias associated with the size of the informal sector

So far we have found a large and positive conditional Africa premium in productivity, productivity growth and sales growth. A concern is that the Africa premiums merely reflect selection bias. In particular, only formal firms are present in our data. Since it is possible that African countries have a relatively higher share of informal firms, and more able firms tend to self-select into the formal sector, then the African premiums may reflect a smaller group of high-ability firms self-selecting into the formal sector.

This is a valid concern. Schneider et al. (2010) offer estimates of the relative size of the informal sector in the whole economy for around 160 countries, and is the best data on informal

sector available.³⁵ By this informality index (which captures the share of the informal sector in the whole economy), Africa does have a relatively high level of informality. Africa's average of 42.3 percent (ranging from 30.3 to 56.4 percent) is slightly above the average of 41.6 for the similar-income group (ranging from 15.1 to 66.1%), and the average of 37.3% for the non-Africa group (ranging from 15.1 to 66.1%). To make sure that the non-African sample has a similar level of informality, we now retain the African sample and the non-African sample with the informality index overlapping with the African informality range, that is, from 30.3% to 56.4%. The results are reported in Table 10.

The conditional TFP advantage, which was statistically significant with a coefficient of 0.38, now has a coefficient that is roughly 1/2 smaller, and is no longer significant. However, selection bias apparently cannot explain the overall pattern of conditional African premiums in other outcomes: the labor productivity premium increases from 0.76 to 0.83; the labor productivity growth premium from 12 to 19 percentage points, and the sales growth premium from 12 to 25 percentage points, all statistically significant.

There are several other notable findings. First, the negative effects of party monopoly are slightly stronger in countries with higher informality. Second, telecom has even more pronounced effects in high-informality countries. Third, access to finance, both formal and informal, is less closely correlated with firm performance. This is not surprising since the external finance needs for small and informal firms tend to be weaker due to less capacity and desire to expand.

³⁵ Ayyagari et al. (2011) similarly relies on this informality index to address concern about selectivity based on informality.

The overall patterns in Table 10 suggest that some forces of selection could explain a small part of the conditional African premiums, but that the selection story is far from the whole story. The conditional African premiums in labor productivity, its growth, and sales growth remain intact and significant. High-informality countries also limit the influence of finance, but amplify the influence of party monopoly and telecom.

V. Explaining Africa’s Disadvantage

We now examine why Africa falls behind the better comparison group—by reporting $100 * \beta_X (X_{Africa} - X_{better}) / \Delta y$, the percentage of outcome differences attributable to the independent variables X . Here y is the outcome variable, and “better” stands for the better comparison group. β_X refers to the coefficient for a generic variable X . The coefficients are drawn from our baseline specification in Table 4. X_{Africa} and X_{better} refer to the mean for Africa and for the better comparison group, and Δy refers to the outcome difference between Africa and the better comparison group. For simplicity, we only report the statistically significant and quantitatively important effects (i.e., accounting for more than 4% of the outcome difference in absolute value), and we only report those variables that are of policy concern. The results are in Table 12.

The key factors explaining Africa’s disadvantage are infrastructure, access to finance, and party monopoly. Telecom, our proxy for infrastructure, is consistently the number one factor in explaining the African disadvantage: accounting for 114% of the 66 log points disadvantage in TFP, 142% of the 85 log points disadvantage in labor productivity, 172% of the 12 percentage point disadvantage in labor productivity growth, 535% of the 3.4 percentage point

disadvantage in sales growth rate, and 40% of the 13.5 percentage point disadvantage in export share.³⁶

Finance, and mainly informal finance, is consistently the number two factor in explaining the African disadvantage—11% of the TFP disadvantage, half of the labor productivity disadvantage, 59% of labor productivity growth disadvantage, all of the sales growth disadvantage, and a quarter of the export share disadvantage.

Party monopoly proves to be quantitatively important as well, accounting for about half of the labor productivity growth disadvantage, and about 130% of the sales growth disadvantage. Thus party monopoly proves to be a key deterrent of firm growth and productivity improvement.

Two components of the business environment, corruption and firing difficulty, are important in accounting for sales growth, accounting for about 80% of the sales growth disadvantage. But they do not affect other key performance measures. So their importance pales in comparison with the tripod of infrastructure, finance and party monopoly.

There are also several factors that contribute significantly to reduce Africa's disadvantage. The foremost of them is ethnic fractionalization, which would contribute to African *advantage* in TFP of 20%, in labor productivity of 37%, and in labor productivity growth of 59 percent. Another key African advantage is lead in foreign ownership, which contributes to a 7% advantage in labor productivity growth, a 22% advantage in sales growth, and a 14% advantage in export share.

³⁶ It is perhaps useful to point out here that the importance of telecom does not reflect its high correlation with GDP per capita, as pointed out earlier.

VI. Conclusions

In this paper we use a comprehensive cross-country firm-level data to understand how formal African firms stack up against those in other regions. We also explore whether Africa's political and business environment can explain its performance shortfalls (if any), and what the key factors are for explaining Africa's performance. We begin by comparing the unconditional means of various performance measures. We find that formal African manufacturing firms show significant disadvantages in all measures of firm performance. In the unconditional means, African firms exhibit lower total factor productivity (TFP) levels, lower labor productivity levels and growth rates, lower sales growth, and lower investment rates and export orientation.

Once we control for key differences in firm characteristics, geography, infrastructure, political and institutional factors, business environment, and access to finance, Africa manufacturing firms actually exhibit a *conditional advantage* in productivity levels and growth, as well as sales growth. This conditional advantage remains reasonably intact across a variety of robustness checks and additional specifications. Most importantly, the negative and significant coefficient on the Africa dummy becomes either positive or insignificant when controlling for observable factors in the environment faced by these firms. The implication is that African entrepreneurs are not inherently disadvantaged. In light of the highly challenging environment, they actually perform better than those in other regions of the world at similar income levels.

The conditional advantage for African firms is higher in low-tech than in high-tech manufacturing, and in manufacturing than in services. The key factors in explaining Africa's disadvantage in firm performance relative to better-performing similar income countries are infrastructure, lack of access to finance and political monopoly. The impacts of telecom and finance, especially informal finance, are felt across the board. In contrast, the damages of party

monopoly are mostly revealed in dynamic performance measures such as productivity growth. Some elements of business environment, mainly labor regulation and corruption, also have effects. Some other elements often viewed as important in the literature, in contrast, do not matter much: geography proves to be unimportant, as are crime, tariffs, and domestic conflict. Not surprisingly, higher foreign participation has helped Africa consistently. We also obtain some findings that suggest that different policies have distinct implications for structural change. Telecom development, for instance, helps manufacturing and services about equally, and helps low- and high-tech manufacturing about equally, and is therefore sector-neutral. In contrast, development of banking helps services more than manufacturing, and corruption hurts services more than manufacturing. Some tariff protection helps high tech manufacturing but not low-tech manufacturing. Party monopoly hurts manufacturing much more than services. Since manufacturing as a sector has relatively high productivity growth in developing countries (McMillan and Rodrik 2011), party monopoly may hurt development by lowering manufacturing productivity levels and growth.

The findings in this paper have direct policy implications. The first implication is somewhat optimistic for Africa. The results indicate that conditional on the political and business environment, African firms actually have advantages in their productivity levels, productivity growth rates, and sales growth rates—at least no disadvantage relative to other countries with similar GDP per capita. So there is no inherent Africa “curse” that hinders its development; only a need for action to address the poor political and business environment. This is consistent with Africa’s growth record before the 1970s and the growth record in the past decade.

Second, our results show that the key factors that affect African manufacturing firms are infrastructure, access to finance, and party competition. What is especially important in terms of improving financing is to facilitate inter-firm trust and contracting so that trade credit is easily extended. Since these key variables are mostly related to the functions of the state, reforms to the state are likely to have the largest effects in improving African competitiveness.

This research suggests that there are several ways for African firms to shift gears and move towards a positive reinforcing cycle of development. Given the paramount importance of infrastructure, how to develop Africa's infrastructure remains a key policy challenge. To increase access to finance and especially trade finance, complementary institutions such as contract enforcement mechanisms for trade credit disputes could be considered. Given the key importance of reducing party monopoly for our results, political competition and accountability would be the critical factor for inducing better firm performance. Finally, foreign ownership has yielded positive benefits across the board. This suggests that additional foreign entry would improve competitiveness and promote development.

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Table 1. Definition of variables

Variable	Definitions
<i>TFP</i>	Total factor productivity.
<i>ln(LP)</i>	Log(sales per worker). From the Enterprise Survey of the World Bank.
<i>LP growth</i>	(Three-year) labor productivity growth rate at the firm level, computed as (labor productivity this year – labor productivity three years ago)/average. All monetary values are in this paper is in constant U.S. dollars in 2005.
<i>Sales Growth</i>	(Three-year) sales growth rate at the firm level, computed as (sales this year – sales three years ago)/average.
<i>Export share</i>	Export value over sales.
<i>Inv/VA</i>	The value of investment over total value added for a firm. Investment is the sum of new purchases in equipment and land. Trimed of tail one percent.
<i>lnL</i>	The logarithm of the number of employees.
<i>Firm age</i>	Firm age.
<i>Foreign</i>	The share of foreign ownership.
<i>Ind avg Foreign</i>	Country-industry (employment-weighted) average of foreign ownership.
<i>Ownership largest</i>	The ownership share of the largest owner of the firm.
<i>GDP per capita</i>	GDP per capita in constant U.S. dollars. From WDI.
<i>Ln(population)</i>	Log of the population of the country. From WDI.
<i>Trade</i>	The ratio of the sum of the values of imports and exports over GDP. From WDI.
<i>govConsumption/GDP</i>	The ratio of total government consumption over GDP. From WDI.
<i>Landlock</i>	The dummy variable indicating that a country is landlocked.
<i>Share of land in tropics</i>	The share of land areas in Koeppen-Geiger tropics, from http://www.cid.ha .
<i>Voice and accountability</i>	The index of voice and accountability, measuring perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. From ICRG.
<i>Ln(partyYears)</i>	Logarithm of the number of years that the ruling party has been in power, from DPI (Beck et al. 2001; Keefer 2007).
<i>Any Conflict</i>	The dummy variable of any domestic armed conflicts in the previous 10 years, from Gleditsch et al. (2002) and UCDP/PRIO (2010).
<i>EthnicFrac</i>	Ethnic fractionalization, a larger value implies more ethnic diversity, from WDI.
<i>Firing difficulty</i>	An index measuring the cost of firing 20 percent of the firm's workers (10% are fired for redundancy and 10% without cause). The cost of firing a worker is calculated as the sum of the notice period, severance pay, and any mandatory penalties established by law or mandatory collective agreements for a worker with three years of tenure with the firm. Based on Doing Business (Botero et al. 2004).
<i>Executive competition</i>	An index measuring the competition for the executive branch of the government, from DPI (Beck et al. 2001; Keefer 2007).
<i>Min capital to start business</i>	A proxy for entry barriers, the minimum capital required (% of income per capita) for starting a business, from Doing Business of World Bank.
<i>Telecom</i>	The principal factor for two telecom-related variables: (i) log of the number of mainline phones per 10000 inhabitants in a country (from WDI); (ii) the city-industry-size share of firms using website for business (from the Enterprise Survey). Size is defined as large and small based on whether the firm is above or below the median of the cell. When the cell size falls below 5 firms, we use the city-industry mean instead. All proxies for business environment based on firm answers are dealt with in the same way as here.

Table 1. Definition of variables (Cont'd)

<i>Variable</i>	Definitions
<i>Bribe</i>	The city-industry-size average of the share of bribes to government divided by sales.
<i>Bank</i>	The city-industry-size share of firms having access to overdraft facility, as a proxy of access to formal finance.
<i>Trade Credit</i>	The city-industry-size average of the share of output sold in the form of supplier credit, as a proxy for local access to informal finance.
<i>Competition_ind</i>	The Lerner index of competition, constructed as $(1 - \text{markup}_{CI})$, and markup_{CI} is the country-industry average of firm-level markup. Firm-level markup is computed as $(\text{value added} - \text{labor costs})/\text{sales}$. A larger value implies greater competition.
<i>Tariff</i>	Country-industry-year level of import tariffs.
<i>Obstacle_crime</i>	The city-industry-size share of firms that view crime as a moderate or severe constraint.
<i>Obstacle_InformalCompete</i>	The city-industry-size share of firms viewing “practices of competitors in the informal sector” as a serious obstacle.
<i>Obstacle_landAccess</i>	The city-industry-size share of local firms that view access to land as a moderate or severe constraint.
<i>Obstacle_electricity</i>	The city-industry-size share of firms that view electricity access as a moderate or severe constraint.
<i>Obstacle_transport</i>	The city-industry-size share of firms that view transport as a moderate or severe constraint.
<i>Obstacle_tax</i>	The city-industry-size share of firms that view tax burdens as a moderate or severe constraint.
<i>Obstacle_finance</i>	The city-industry-size share of firms that view finance access and costs as a moderate or severe constraint.
<i>Obstacle_laborRegulation</i>	The city-industry-size share of firms that view labor regulation as a moderate or severe constraint.
<i>Petroleum export/GDP_{t-1}</i>	The ratio of petroleum exports to GDP, lagged by one year, from WDI.
<i>Raw material export/GDP_{t-1}</i>	The ratio of raw material exports to GDP, lagged by one year, from WDI.

Table 2. Differences between Africa and the Two Comparison Groups

Variable	T-test for <i>median</i> difference		
	Africa	Africa – the average comparison group	Africa – the better comparison group
Performance measures			
TFP	-0.585	-0.329** (0.043)	-0.525*** (0.052)
ln(LP)	8.792	-0.483*** (0.030)	-0.769*** (0.035)
LP growth	-0.115	-0.086*** (0.015)	-0.099*** (0.017)
Sales Growth	0.066	-0.009 (0.015)	-0.010 (0.017)
Export Share	0.073	-0.088*** (0.006)	-0.133*** (0.007)
Investment/Value-added	0.140	-0.036*** (0.009)	-0.093*** (0.011)
Firm characteristics			
lnL	2.937	-0.720*** (0.026)	-1.043*** (0.030)
Firm age	12.667	-5.344*** (0.313)	-3.795*** (0.348)
State ownership	0.007	-0.004*** (0.001)	-0.007*** (0.002)
Ownership largest	0.820	0.080*** (0.006)	0.112*** (0.007)
Basic country characteristics and geography			
GDP per capita	497.408	-1051.850*** (14.546)	-1047.308*** (15.626)
Ln(pop)	16.067	-0.669*** (0.025)	-1.461*** (0.026)
Landlock	0.278	0.034** (0.009)	0.197*** (0.008)
Infrastructure			
Telecom	-1.278	-1.333*** (0.011)	-1.563*** (0.012)
Political and institutional factors			
Ln(partyYears)	2.571	0.507*** (0.024)	0.252*** (0.026)
Any Conflict	0.561	0.152*** (0.009)	0.013 (0.011)
EthnicFrac	0.715	0.315*** (0.004)	0.373*** (0.004)
Business environment			
Foreign	0.163	0.064*** (0.006)	0.044*** (0.007)
Bribe	0.029	0.014*** (0.0006)	0.018*** (0.0005)
Obstacle_crime	0.397	0.091*** (0.004)	0.093*** (0.005)
FireCosts	0.389	0.082*** (0.004)	0.016*** (0.004)
Competition_ind	0.588	-0.028*** (0.003)	-0.034*** (0.003)
Tariff	0.144	0.052*** (0.002)	0.051*** (0.002)
Finance			
Bank	0.232	-0.222*** (0.005)	-0.129*** (0.005)
Trade credit	0.270	-0.270*** (0.004)	-0.299*** (0.005)

Notes: One-sided test. The asterisks *, ** and *** indicate significance at the 10, 5 and 1 percent levels.

Table 3. Industry distribution for Africa, the Average Comparison Group, and the Better Comparison Group

	Poor Africa (without the four rich countries)	Average Comparison Group	Better Comparison Group
Textiles	0.020	0.066	0.050
Garments	0.120	0.164	0.174
Metal & Machinery	0.065	0.105	0.170
Electronics	0.007	0.027	0.045
Chemical, pharmaceutical	0.040	0.104	0.086
Wood and furniture	0.021	0.023	0.023
Non-metal and plastic	0.041	0.103	0.132
Automobiles and parts	0.000	0.002	0.003
Other manufacturing	0.451	0.174	0.111

Notes: Manufacturing sample only.

Table 4. Explaining Firm Performance, OLS results

	TFP		Ln(Labor Productivity)		Labor Productivity Growth		Sales Growth		Export Share		Investment/VA	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Poor Africa	0.377**	0.189	0.762***	0.279	0.122*	0.066	0.121*	0.069	-0.019	0.039	0.015	0.040
Firm characteristics												
Ln(firm age)	-0.059***	0.023	0.119***	0.023	0.044***	0.009	-0.019	0.012	0.001	0.004	-0.025***	0.005
State Ownership	0.548	0.349	0.706***	0.199	0.241**	0.094	0.296***	0.096	0.174***	0.054	0.139	0.085
Ownership largest	-0.019	0.087	-0.279**	0.126	-0.088***	0.032	-0.123***	0.030	-0.047**	0.018	0.001	0.014
Ln(labor productivity 3 years ago)					-0.191***	0.020						
Ln(sales 3 years ago)							-0.093***	0.007				
Geography												
Ln(population)	0.073	0.094	0.152	0.137	0.020	0.031	0.013	0.027	-0.031***	0.007	-0.001	0.009
Landlock	-0.145	0.197	0.071	0.271	-0.041	0.073	-0.061	0.077	-0.014	0.016	0.039**	0.019
Infrastructure												
Telecom	0.485***	0.086	0.777***	0.105	0.131***	0.039	0.117***	0.041	0.034**	0.016	0.013	0.018
Political and institutional factors												
Ln(party years)	-0.148	0.094	-0.154	0.138	-0.090**	0.039	-0.074*	0.042	-0.005	0.011	0.002	0.012
Any conflict in past 10 years	-0.130	0.159	-0.311	0.257	-0.089	0.066	-0.050	0.070	0.032	0.021	-0.031	0.023
Ethnic fractionalization	0.350*	0.204	0.838***	0.301	0.189**	0.085	0.155	0.103	-0.047	0.039	-0.041	0.041
Business environment												
Foreign	0.336***	0.082	0.719***	0.074	0.184***	0.027	0.173***	0.030	0.204***	0.030	-0.004	0.010
Bribe	-1.796	1.481	-1.445	1.879	-0.759	0.607	-1.233**	0.624	-0.117	0.266	-0.091	0.305
Obstacle_crime	0.231	0.265	-0.011	0.478	-0.112	0.094	-0.093	0.088	-0.101***	0.036	-0.063	0.048
Firing difficulty	0.814***	0.277	0.877**	0.389	-0.093	0.096	-0.269***	0.103	-0.014	0.035	-0.005	0.042
Competition_ind	-2.431***	0.371	-0.876**	0.354	-0.255***	0.090	-0.106	0.090	0.036	0.044	0.159***	0.055
Tariff	0.336	0.415	0.314	0.584	0.192	0.175	0.308	0.192	0.133	0.168	0.028	0.112
Country-industry Average of foreign	-0.013	0.241	-0.524	0.363	-0.009	0.081	0.088	0.082	0.185***	0.042	-0.094***	0.035
Finance												
Bank	0.557***	0.173	0.587***	0.218	0.110	0.070	0.083	0.084	-0.072**	0.032	-0.032	0.044
Trade credit	0.158	0.261	0.898**	0.390	0.260***	0.094	0.188*	0.102	0.163***	0.039	0.076	0.048
N observations	9,770		12,764		10,482		10,729		13,818		10,002	
R square adjusted	0.127		0.338		0.243		0.135		0.162		0.024	

Notes: *, **, and *** represent statistical significance at the 10, 5 and 1 percent levels. White standard errors, clustered at the country level. Coefficients for industry dummies not reported.

Table 5: Sensitivity checks with respect to Total Factor Productivity (TFP) measure

	Industry technology (Basic Specification from Table 4)		Income-category-ind tech	
	Coefficient	Standard Error	Coefficient	Standard Error
Poor Africa	0.377**	0.189	0.405	0.266
Firm Characteristics				
Ln(firm age)	-0.059***	0.023	-0.046	0.029
State ownership	0.548	0.349	0.854*	0.442
Ownership largest	-0.019	0.087	-0.097	0.093
Geography				
Ln(population)	0.073	0.094	0.137	0.116
Landlock	-0.145	0.197	0.161	0.273
Infrastructure				
Telecom	0.485***	0.086	0.131	0.111
Political and institutional factors				
Ln(party years)	-0.148	0.094	-0.277*	0.144
Any conflicts in 10 years	-0.130	0.159	-0.426*	0.249
Ethnic fractionalization	0.350*	0.204	-0.015	0.361
Business environment				
Bribe	-1.796	1.481	4.913***	1.758
Obstacle_crime	0.231	0.265	-0.280	0.392
Firing difficulty	0.814***	0.277	0.498	0.475
Comeptition_ind	-2.431***	0.371	-2.301***	0.613
Tariff	0.336	0.415	0.745	0.547
Foreign	0.336***	0.082	0.431***	0.095
Country-industry avg of foreign	-0.013	0.241	0.093	0.386
finance				
Bank	0.557***	0.173	0.256	0.298
Trade credit	0.158	0.261	0.040	0.437
N	9,770		9,770	
R-Square Adjusted	0.127		0.054	

Notes: *, **, and *** represent statistical significance at the 10, 5 and 1 percent levels. White standard errors, clustered at the country level. Coefficients for industry dummies not reported.

Table 6. The coefficient for Africa When Dropping One Explanatory Variable at a Time

	TFP		Ln(labor productivity)		Labor productivity growth		Sales Growth		Export Share		Investment/ Value added	
Base (no dropping)	0.377**	0.189	0.762***	0.279	0.122*	0.066	0.121*	0.069	-0.019	0.039	0.015	0.040
When dropping:												
Ln(firm age)	0.376*	0.192	0.733***	0.276	0.114*	0.065	0.119*	0.068	-0.017	0.039	0.022	0.040
State	0.374**	0.190	0.760***	0.279	0.121*	0.066	0.120*	0.069	-0.018	0.039	0.015	0.040
Ln(population)	0.317*	0.167	0.648***	0.237	0.107	0.067	0.111	0.071	0.002	0.038	0.013	0.041
Ln(party years)	0.241	0.155	0.622***	0.211	0.040	0.064	0.054	0.076	-0.023	0.036	0.017	0.036
Any conflicts in 10 years	0.336**	0.170	0.667***	0.251	0.096	0.068	0.107	0.071	-0.008	0.040	0.007	0.040
Ethnic fractionalization	0.457**	0.206	0.959***	0.318	0.167**	0.072	0.158**	0.073	-0.030	0.037	0.006	0.038
telecom	0.178	0.205	0.429	0.307	0.064	0.065	0.071	0.064	-0.033	0.036	0.010	0.037
Foreign	0.402**	0.193	0.807***	0.286	0.130*	0.067	0.126*	0.069	-0.005	0.039	0.015	0.040
Country-ind avg of foreign	0.376**	0.183	0.735***	0.273	0.122*	0.065	0.126*	0.070	-0.009	0.040	0.011	0.040
Firing difficulties	0.296	0.204	0.680**	0.278	0.129**	0.065	0.146**	0.072	-0.016	0.041	0.017	0.041
Bribe	0.362*	0.191	0.754***	0.284	0.117*	0.067	0.112	0.070	-0.019	0.039	0.015	0.040
Crime	0.336*	0.198	0.762***	0.288	0.132*	0.069	0.129*	0.069	-0.007	0.043	0.020	0.042
Bank	0.389**	0.196	0.756***	0.277	0.125*	0.066	0.124*	0.069	-0.018	0.040	0.015	0.040
Trade credit	0.364**	0.178	0.690***	0.267	0.100	0.065	0.105	0.071	-0.032	0.040	0.010	0.041

Notes: Each row reports the coefficient or standard error of the (poor) Africa dummy for all the outcome equations. For the “base” row, no variables are dropped. For row “x”, only “x” is dropped from the list of explanatory variables. *, **, and *** represent statistical significance at the 10, 5 and 1 percent levels. White standard errors are clustered at the country level.

Table 7: Sensitivity checks with Additional Controls

	TFP	Ln(labor prod.)	Labor Productivity Growth		Sales Growth		Export Share		Investment/Value Added			
Poor Africa	0.301*	0.174	0.716***	0.215	0.146**	0.069	0.110	0.070	-0.050*	0.030	-0.035	0.029
Geography: ln(population)	0.164***	0.050	0.202**	0.086	0.016	0.019	-0.012	0.020	-0.030***	0.008	-0.008	0.009
landlock	-0.327**	0.155	-0.219	0.172	-0.135**	0.054	-0.152**	0.075	0.005	0.019	0.033	0.021
Infrastructure: Telecom	0.188**	0.090	0.522***	0.145	0.112**	0.048	0.117**	0.046	0.044**	0.017	0.035*	0.018
Poli. and inst.: ln(party years)	-0.103	0.072	-0.137	0.103	-0.063**	0.027	-0.046	0.029	-0.002	0.009	0.003	0.009
Any conflicts in 10 years	0.118	0.113	0.019	0.177	-0.002	0.045	-0.003	0.055	0.001	0.020	-0.065***	0.022
Ethnic fractionalization	0.158	0.209	0.743**	0.340	0.248**	0.108	0.234*	0.127	0.007	0.026	0.058	0.038
Business environment: Bribe	-0.517	1.308	0.391	1.548	-0.370	0.360	-0.998*	0.516	-0.308	0.192	-0.537**	0.230
Obstacle_crime	-0.489***	0.184	-0.709***	0.267	-0.264***	0.063	-0.168**	0.071	-0.091***	0.032	-0.048	0.037
Firing difficulty	0.004	0.230	0.056	0.288	-0.179**	0.091	-0.285**	0.116	0.012	0.040	0.030	0.040
Competition_Ind	-2.635***	0.368	-1.115***	0.237	-0.368***	0.076	-0.169**	0.082	0.109***	0.039	0.179***	0.046
Tariff	0.575*	0.333	0.317	0.360	0.129	0.162	0.218	0.168	0.057	0.138	-0.098	0.079
Foreign	0.395***	0.076	0.715***	0.072	0.194***	0.028	0.182***	0.030	0.214***	0.031	-0.008	0.010
Country-ind avg foreign	0.132	0.194	-0.480**	0.245	-0.026	0.065	0.078	0.066	0.196***	0.040	-0.065	0.041
Finance: Bank	0.453***	0.158	0.323	0.270	0.049	0.079	0.007	0.081	-0.067***	0.024	-0.052	0.037
Trade credit	0.088	0.180	0.733***	0.216	0.152**	0.067	0.110	0.068	0.178***	0.043	0.103**	0.041
Openness: Trade	0.006***	0.002	0.006**	0.003	0.001	0.001	-0.001	0.001	-0.000	0.000	-0.000	0.000
More poli./inst.: voice & accountability	0.455***	0.123	0.487***	0.160	0.139***	0.052	0.020	0.059	-0.092***	0.019	-0.089***	0.022
Executive competition	-0.041	0.057	-0.116*	0.064	-0.044	0.027	-0.028	0.033	0.014*	0.007	-0.007	0.010
Government size	0.036***	0.009	0.040***	0.015	0.006*	0.003	0.002	0.004	-0.002	0.002	-0.002	0.002
Natural resource: petro. exp/GDP lagged	2.063	1.336	2.290	1.888	1.180*	0.614	0.834	0.685	-0.358*	0.202	-0.447	0.384
Raw material exp/GDP lagged	-1.604**	0.674	-1.357	1.031	-0.024	0.440	-0.153	0.533	-0.139	0.091	0.262	0.226
Share of land in tropics	-0.322*	0.185	-0.382	0.309	-0.009	0.070	-0.038	0.062	0.010	0.018	0.015	0.020
More business environment:												
Ln(min capital to start busi.)	-0.048*	0.029	-0.105**	0.043	-0.019*	0.010	-0.008	0.011	0.014***	0.004	0.003	0.004
More subjective bus env controls	yes		yes		yes		yes		yes		yes	
Firm controls, industry dummies	yes		yes		yes		yes		yes		yes	
N	8,700		11,236		9,325		9,545		12,165		8,828	
R-Square Adjusted	0.163		0.411		0.246		0.132		0.182		0.043	

Notes: *, **, and *** represent statistical significance at the 10, 5 and 1 percent levels. Intercept not reported. White standard errors are clustered at the country level. For all equations we also control for all firm characteristics, and subjective indicators of the business environment (including average local obstacle scores in electricity, transportation, informal competition, tax rate, land administration, financial access, and labor regulation) . For simplicity, we do not report them here.

Table 8. Services only

	Ln(labor productivity)		Labor productivity Growth		Sales Growth		Export Share		Investment/ Value added	
Poor Africa	0.219	0.209	0.019	0.063	0.042	0.063	-0.003	0.011	-0.010	0.017
Firm characteristics										
Ln(firm age)	0.098***	0.027	0.032**	0.014	-0.020	0.015	0.008***	0.002	-0.018***	0.006
State	-0.165	0.182	0.172	0.112	0.231**	0.108	0.030	0.025	0.058	0.088
Ownership largest	-0.054	0.115	0.023	0.035	-0.006	0.035	-0.003	0.007	-0.001	0.018
Ln(sales 3 years ago)					-0.104***	0.008				
Ln(LP 3 years ago)			-0.192***	0.013						
Geography										
Ln(population)	0.048	0.075	0.005	0.018	0.004	0.017	-0.010***	0.003	-0.000	0.005
Landlock	0.178	0.203	0.028	0.055	-0.016	0.056	-0.013*	0.007	0.028**	0.014
Infrastructure										
Telecom	0.683***	0.122	0.154***	0.037	0.119***	0.038	0.008	0.006	-0.032***	0.012
Political and institutional factors										
Ln(party years)	-0.054	0.100	-0.035	0.030	-0.017	0.032	-0.002	0.004	-0.007	0.007
Any conflict in past 10 years	-0.121	0.176	-0.026	0.046	0.011	0.050	0.010	0.009	-0.015	0.013
Ethnic fractionalization	0.508*	0.261	0.035	0.078	0.048	0.078	0.019	0.014	-0.053*	0.030
Business environment										
Bribe	-3.794*	1.936	-1.961***	0.670	-2.029***	0.743	0.142	0.130	-0.245	0.188
Obstacle_crime	0.065	0.312	0.024	0.070	-0.037	0.065	-0.006	0.016	-0.024	0.025
Firing difficulty	0.818**	0.393	0.106	0.113	-0.065	0.108	-0.003	0.016	-0.003	0.028
Competition_ind	-0.254	0.407	0.048	0.120	0.142	0.111	0.023	0.017	0.093	0.060
Tariff	0.742	1.704	0.226	0.546	-0.654	0.618	0.022	0.116	-0.662*	0.400
Foreign	0.725***	0.087	0.171***	0.029	0.183***	0.031	0.057***	0.011	0.013	0.013
Country-industry avg of foreign	0.000	0.328	-0.025	0.087	0.070	0.090	-0.000	0.019	0.029	0.031
Finance										
Bank	0.661***	0.228	0.167**	0.076	0.228***	0.082	0.004	0.020	0.002	0.029
Trade credit	0.969***	0.347	0.193**	0.097	0.105	0.104	0.072***	0.024	-0.002	0.035
N	8,930		7,177		7,352		9,901		6,004	
R-Square Adjusted	0.293		0.220		0.120		0.043		0.021	

Notes: *, **, and ***: statistical significance at the 10, 5 and 1 percent levels. White standard errors are clustered at the country level. Industry dummies also controlled for.

Table 9: Determinants of Firm Performance by Industry Sophistication

	Low-Tech Manufacturing						High Tech Manufacturing					
	TFP	Ln(LP)	LP gr.	Sale gr.	Exp. Sh.	Inv/VA	TFP	Ln(LP)	LP gr.	Sale gr.	Exp. Sh.	Inv/VA
Poor Africa	0.211 (0.207)	0.879*** (0.277)	0.141* (0.072)	0.150* (0.083)	-0.071 (0.049)	0.005 (0.049)	0.465 (0.310)	0.719** (0.363)	0.062 (0.086)	0.059 (0.075)	0.053 (0.047)	0.099** (0.049)
Geography												
Ln(population)	0.074 (0.087)	0.159 (0.145)	0.010 (0.032)	-0.005 (0.027)	-0.036*** (0.009)	-0.002 (0.011)	0.207* (0.125)	0.272** (0.137)	0.031 (0.030)	0.021 (0.024)	-0.024*** (0.009)	0.006 (0.009)
Landlock	-0.412** (0.200)	-0.091 (0.280)	-0.071 (0.074)	-0.058 (0.076)	0.006 (0.023)	0.080*** (0.025)	0.144 (0.267)	0.290 (0.276)	-0.069 (0.075)	-0.131 (0.085)	0.006 (0.023)	0.022 (0.026)
Infrastructure												
Telecom	0.343*** (0.099)	0.757*** (0.136)	0.165*** (0.044)	0.146*** (0.041)	0.022 (0.029)	0.022 (0.028)	0.368** (0.149)	0.701*** (0.157)	0.124** (0.053)	0.142*** (0.054)	0.057*** (0.021)	0.027 (0.018)
Poli & inst.												
Ln(party years)	-0.144* (0.084)	-0.243* (0.146)	-0.085** (0.039)	-0.060 (0.040)	0.012 (0.015)	0.007 (0.015)	-0.335** (0.137)	-0.172 (0.122)	-0.074* (0.040)	-0.049 (0.044)	-0.011 (0.013)	0.013 (0.015)
Any conflicts in 10 yrs	-0.092 (0.145)	-0.331 (0.271)	-0.055 (0.064)	0.010 (0.065)	0.049* (0.027)	-0.023 (0.025)	-0.351 (0.228)	-0.378 (0.241)	-0.037 (0.058)	-0.009 (0.064)	0.025 (0.028)	-0.031 (0.027)
Ethnic frac.	0.366 (0.224)	0.680* (0.347)	0.257** (0.105)	0.203* (0.115)	0.003 (0.060)	0.009 (0.047)	-0.403 (0.346)	0.615** (0.304)	0.178** (0.086)	0.266** (0.111)	-0.101** (0.042)	-0.120** (0.051)
Business environ.												
Bribe	-1.613 (2.235)	0.767 (2.738)	0.345 (0.923)	-0.821 (0.938)	-0.638 (0.443)	-0.780** (0.374)	-2.200 (2.173)	-2.818* (1.697)	-1.463** (0.744)	-1.465 (0.893)	0.236 (0.395)	0.072 (0.311)
Obstacle_crime	0.303 (0.241)	0.002 (0.509)	-0.054 (0.096)	0.025 (0.091)	-0.134** (0.054)	-0.035 (0.066)	0.130 (0.399)	-0.179 (0.341)	-0.277*** (0.097)	-0.311*** (0.093)	-0.052 (0.039)	-0.133*** (0.051)
Firing difficulty	0.622** (0.300)	0.833** (0.392)	-0.054 (0.104)	-0.246** (0.110)	-0.004 (0.050)	0.016 (0.058)	0.713** (0.353)	0.239 (0.365)	-0.269** (0.106)	-0.364*** (0.120)	-0.003 (0.023)	-0.005 (0.037)
Competition_ind	-2.415*** (0.548)	-0.807 (0.652)	-0.441*** (0.144)	-0.263 (0.187)	0.078 (0.119)	-0.032 (0.194)	-2.299*** (0.566)	-1.026 (0.641)	-0.397** (0.184)	-0.204 (0.188)	0.084 (0.073)	0.179** (0.081)
Tariff	-0.209 (0.449)	0.380 (0.665)	0.206 (0.193)	0.296 (0.219)	0.046 (0.146)	0.119 (0.108)	3.046** (1.438)	1.321 (1.320)	1.300*** (0.320)	1.476*** (0.389)	-0.255 (0.263)	0.372 (0.259)
Foreign	0.247** (0.104)	0.632*** (0.096)	0.193*** (0.037)	0.223*** (0.038)	0.235*** (0.034)	0.003 (0.018)	0.419*** (0.145)	0.649*** (0.105)	0.136*** (0.048)	0.141*** (0.054)	0.224*** (0.051)	0.011 (0.020)
Country-ind avg of foreign	-0.046 (0.320)	-0.683* (0.382)	-0.013 (0.100)	0.076 (0.102)	0.317*** (0.075)	-0.031 (0.063)	-0.266 (0.363)	-0.621* (0.366)	-0.013 (0.091)	0.068 (0.093)	0.069 (0.049)	-0.197*** (0.051)
Finance												
Bank	0.348* (0.184)	0.519** (0.248)	0.082 (0.079)	0.022 (0.085)	-0.037 (0.037)	-0.031 (0.052)	0.765** (0.309)	0.398 (0.275)	0.116 (0.104)	0.117 (0.113)	-0.069 (0.049)	-0.008 (0.043)
Trade credit	0.175 (0.302)	0.593 (0.460)	0.192* (0.108)	0.232** (0.108)	0.204*** (0.070)	0.076 (0.069)	0.579** (0.279)	1.433*** (0.344)	0.181** (0.078)	-0.007 (0.103)	0.155** (0.070)	0.082 (0.053)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,872	5,950	4,860	4,964	6,489	4,596	2,855	3,621	3,047	3,136	3,944	2,739
r2_a	0.097	0.294	0.235	0.126	0.180	0.019	0.158	0.324	0.238	0.146	0.183	0.064

Note. *, **, and *** represent statistical significance at the 10, 5 and 1 percent levels. Intercept not reported. Standard errors are clustered at the country level. Industry dummies also controlled for.

Table 10. Using the sample with the same informality index as Africa

	pooled						similar informal index					
	tfp	lnLPs	LPgrow	saleG	exportSh	inv_VA	tfp	lnLPs	LPgrow	saleG	exportSh	inv_VA
Poor Africa	0.377**	0.762***	0.122*	0.121*	-0.019	0.015	0.180	0.830**	0.193**	0.247***	0.011	0.047
	(0.189)	(0.279)	(0.066)	(0.069)	(0.039)	(0.040)	(0.248)	(0.345)	(0.092)	(0.092)	(0.043)	(0.038)
Infrastructure												
Telecom	0.485***	0.777***	0.131***	0.117***	0.034**	0.013	0.555***	0.842***	0.162***	0.155***	0.047***	0.043**
	(0.086)	(0.105)	(0.039)	(0.041)	(0.016)	(0.018)	(0.087)	(0.122)	(0.043)	(0.045)	(0.016)	(0.018)
Poli/inst. factors												
Ln(party years)	-0.148	-0.154	-0.090**	-0.074*	-0.005	0.002	-0.105	-0.288	-0.110**	-0.106*	-0.006	-0.016
	(0.094)	(0.138)	(0.039)	(0.042)	(0.011)	(0.012)	(0.139)	(0.202)	(0.053)	(0.054)	(0.012)	(0.010)
Ethnic frac.	0.350*	0.838***	0.189**	0.155	-0.047	-0.041	0.734*	1.205**	0.174	0.049	-0.016	0.057
	(0.204)	(0.301)	(0.085)	(0.103)	(0.039)	(0.041)	(0.421)	(0.580)	(0.140)	(0.146)	(0.052)	(0.047)
Busi. Environ.												
Bribe	-1.796	-1.445	-0.759	-1.233**	-0.117	-0.091	-1.884	-1.531	-0.730	-0.876	-0.026	-0.266
	(1.481)	(1.879)	(0.607)	(0.624)	(0.266)	(0.305)	(1.525)	(1.900)	(0.665)	(0.721)	(0.219)	(0.286)
Firing diff.	0.814***	0.877**	-0.093	-0.269***	-0.014	-0.005	0.902**	1.082*	-0.189	-0.427***	-0.019	0.039
	(0.277)	(0.389)	(0.096)	(0.103)	(0.035)	(0.042)	(0.455)	(0.594)	(0.154)	(0.153)	(0.033)	(0.030)
Competition_ind	-2.431***	-0.876**	-0.255***	-0.106	0.036	0.159***	-2.481***	-0.921**	-0.165	-0.028	0.035	0.117**
	(0.371)	(0.354)	(0.090)	(0.090)	(0.044)	(0.055)	(0.468)	(0.369)	(0.114)	(0.128)	(0.038)	(0.056)
Foreign	0.336***	0.719***	0.184***	0.173***	0.204***	-0.004	0.421***	0.765***	0.215***	0.209***	0.203***	-0.024**
	(0.082)	(0.074)	(0.027)	(0.030)	(0.030)	(0.010)	(0.104)	(0.104)	(0.033)	(0.035)	(0.042)	(0.011)
Finance												
Bank	0.557***	0.587***	0.110	0.083	-0.072**	-0.032	0.265	0.431	0.137	0.196**	-0.031	-0.004
	(0.173)	(0.218)	(0.070)	(0.084)	(0.032)	(0.044)	(0.232)	(0.300)	(0.085)	(0.095)	(0.030)	(0.042)
Trade credit	0.158	0.898**	0.260***	0.188*	0.163***	0.076	0.062	0.876*	0.271**	0.158	0.140***	0.032
	(0.261)	(0.390)	(0.094)	(0.102)	(0.039)	(0.048)	(0.340)	(0.512)	(0.112)	(0.114)	(0.037)	(0.047)
Firm and other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
others controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	9,770	12,764	10,482	10,729	13,818	10,002	5,784	7,846	6,390	6,552	8,584	5,854
r2_a	0.127	0.338	0.243	0.135	0.162	0.024	0.135	0.367	0.258	0.158	0.201	0.025

Notes: *, **, and *** represent statistical significance at the 10, 5 and 1 percent levels. Intercept not reported. White standard errors are clustered at the country level. Only countries within the same range of informality index as Africa are included in the regressions. Industry dummies also controlled for. Omitted firm controls include those for ln(firm age), state ownership, ownership largest, and lagged levels for the growth equations. Other controls include: ln(population), landlock, any conflicts in 10 years, obstacle_crime, tariff, country-industry average of foreign. The coefficients for omitted other controls tend to have similar results with or without restricting the sample.

Table 11. Accounting for performance differences between the Poor African countries and the top half performers of the similar-income sample

	TFP	Ln Labor Productivity	Labor Productivity Growth	Sales Growth	Export Growth	Investment / Value Added
Difference between Africa and the top half performers of the similar-income sample	-0.662	-0.855	-0.119	-0.034	-0.135	-0.096
<u>Infrastructure</u>	<u>114.4%</u>	<u>141.9%</u>	<u>171.5%</u>	<u>535.2%</u>	<u>39.8%</u>	
Telecom	114.4	141.9	171.5	535.2	39.8	
<u>Finance</u>	<u>10.9%</u>	<u>50.5%</u>	<u>59.2%</u>	<u>116.0%</u>	<u>26.2</u>	
Bank	10.9	8.9			-6.9	
Trade credit		41.6	59.2	116.0	33.1	
<u>Political and inst. factors</u>	<u>-19.7%</u>	<u>-36.6%</u>	<u>-12.8%</u>	<u>134.3%</u>		
<u>Of which:</u>						
Ln(party years)			46.2	134.3		
Any conflicts in 10 years						
Ethnic Fractionalization	-19.7	-36.6	-59.0			
<u>Geography</u>					<u>-33.0%</u>	<u>-8.0%</u>
<u>Of which</u>						
Ln(population)					-33.0	
Landlock dummy						-8.0
<u>Business environment</u>	<u>-12.4%</u>		<u>-2.6%</u>	<u>55.2%</u>	<u>-6.9%</u>	<u>10.8%</u>
<u>Of which:</u>						
foreign			-6.7	-22.2	-6.6	
Country-ind average of foreign					-7.3	5.2
Firing difficulty				12.9		
Bribe				64.5		
Tariff						
Competition_Ind	-12.4		-7.2			5.6
Obstacle_crime					7.0	

Note. We do not report the effects for some variables (e.g., industry dummies, Africa, and firm characteristics). When a cell is empty, it means that the coefficient is statistically insignificant from zero or the magnitude is too small (less than 4 percent).

The number of the first row is the absolute difference between the Africa sample (excluding the four richest countries) and the better comparison group sample. The rest of the numbers represent the percentage of contribution that a specific variable or category contributes in explaining the African disadvantage.

Appendix. The list of countries for each sample
(The numbers in the table are GDP per capita in 2005 U.S. dollars)

Africa					
Angola2006	767.4	Guinea2006	141.6	Niger2009	170.5
Benin2009	353.8	GuineaBissau2006	396.5	Rwanda2006	250.2
Burundi2006	109.2	Ivory Coast2009	530.1	Senegal2007	522.3
Cameroon2009	692.0	Lesotho2009	501.5	Sierra Leone2009	254.1
CapeVerde2009	1553.8	Liberia2009	144.4	Swaziland2006	1463.2
Chad2009	285.2	Madagascar2009	260.2	Tanzania2006	316.3
Congo2009	1156.4	Malawi2009	148.4	Togo2009	248.5
DRC2006	85.8	Mauritania2006	429.5	Uganda	283.1
Eritrea2009	151.0	Mozambique2007	307.8		
Gambia2006	332.7	Namibia2006	2460.2		
The average comparison group (i.e., with GDP per capita < 3000 USD)					
Albania2007	1541.0	Georgia2008	1079.9	Romania2009	2595.5
Armenia2009	1425.2	Guatemala2006	1749.2	Russia2009	2866.3
Azerbaijan2009	1945.6	Honduras2006	1244.9	Samoa2009	1800.0
Belarus2008	2067.6	Kazakhstan2009	2332.2	Tajikistan2008	217.2
Bolivia2006	1039.3	Kyrgyz Rep.2009	352.1	Timor Leste2009	299.7
Bosnia and Herzegovina200	2041.4	LaoPDR2009	450.0	Tonga2009	1659.7
Bulgaria2009	2412.6	Mongolia2009	683.1	Ukraine2008	1037.3
Colombia2006	2955.2	Nepal2009	245.1	Vanuatu2009	1288.0
Ecuador2006	1515.7	Nicaragua2006	818.4	Vietnam2009	617.1
ElSalvador2006	2359.4	Paraguay2006	1346.5	Yemen2010	561.3
Fiji2009	2190.4	Peru2006	2228.3	Uzbekistan2008	725.4
Fyr Macedonia2009	2075.8	Philippines2009	1201.7		
The better comparison group (i.e., with GDP per capita < 3000 USD, and top half in firm performance)					
Albania2007	1541.0	Georgia2008	1079.9	Tajikistan2008	217.2
Armenia2009	1425.2	Peru2006	2228.3	Ukraine2008	1037.3
Bosnia & Herz.200	2041.4	Philippines2009	1201.7	Vietnam2009	617.1
Bulgaria2009	2412.6	Romania2009	2595.5		
Fyr Macedonia2009	2075.8	Russia2009	2866.3		

Note. The “Africa” in the table excludes South Africa, Botswana, Mauritius, and Namibia. We also excluded Ghana due to potential data errors (with extremely high labor productivity, due perhaps to wrong uses of currency units during a currency rebasing period).