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Productivity in the Non-Oil Sector in Nigeria

Firm-Level Evidence

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Abstract

This paper examines the determinants of the productivity of Nigerian firms, using three waves of Enterprise Surveys from 2007, 2009, and 2014 and 7,670 firms. The paper uses three alternative measures of productivity, which are found to be highly correlated: labor productivity, value added per worker, and total factor productivity. The more notable trends in the data show: a rise in productivity, with the output of exporting firms decreasing; increasing concentration of production, reflected in the rise of the Herfindahl-Hirschman index by a factor of three; increasing costs of crime, power outages, lack of security, and bribery; significant heterogeneity of these costs along several dimensions, such as firm size, age, location, and the exporting or domestic nature of the market it serves. These costs are inversely related with investment. Regardless of the measure of productivity, its main determinants are the education of the worker, size of the firm, availability of credit, and business climate variables. When labor productivity is used, the stock of capital is also a major determinant of productivity. Within the investment climate variables, power outages and the corruption index are the more significant ones. Power outages are negatively associated with productivity. Bribery is positively related, supporting the "greasing the wheels" hypothesis of bribery as a factor that reduces transaction costs. The impact is nonlinear, as it decreases with firm size. The results also show a positive association between productivity and exporting, but the causality is reversed when the analysis controls for endogeneity: productivity is a weak determinant of the likelihood of a firm becoming an exporter.

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Produced by the Research Support Team

Productivity in the Non-Oil Sector in Nigeria: Firm-Level Evidence

Santiago Herrera and Wilfried Kouamé

Key words: Labor productivity, total factor productivity, investment climate, corruption, Nigeria.

JEL codes: D24, K42, O12, O43

I. Introduction

International evidence shows that total factor productivity growth accounts for most of the income and growth differences across countries. Research shows that both physical and human capital accumulation are persistent processes, while growth is volatile and varies widely across countries (Easterly and Levine, 2001). Hence, identifying the determinants of productivity is essential to understanding growth.

Most of the productivity analysis in Nigeria is based on aggregate macroeconomic data and points to four main findings: 1) total factor productivity increased in the period 2000-2014; 2) growth in Nigeria is negative in periods of fast capital accumulation (Sala-i-Martin, et. al. 2012; Lennon, 2016: World Bank, 2017); 3) periods of faster positive productivity growth can be associated with episodes of market-oriented reform and development of more inclusive political institutions (World Bank, 2017); the 4) the most important determinants of labor productivity growth are investment and education of the labor force (Lennon, 2016).

Yet, aggregate macroeconomic figures do not capture heterogeneity of productivity across sectors or firms. Despite the importance and need of disaggregating the analysis of productivity, firm-level productivity has been an under-researched topic in Nigeria. However, the World Bank's Enterprise Survey (ES) is a useful source of both quantitative and qualitative information of firms in Nigeria. Between 2007 and 2014, the Bank performed three ES for the manufacturing and services sectors. The ES contains quantitative and qualitative information of over 7,500 firms. The survey contains balance sheet information as well as production details on output (sales) and factor utilization. It also collects information on variables related to how infrastructure affects the firm, on the firms' relationship with government officials, finance and corporate governance, labor skills, and other topics. However, evidence on the productivity of Nigerian firms is sparse and limited to a descriptive analysis of the investment climate (McKinsey Global Institute 2014; World Bank 2008, 2011, 2015, 2016).

The objective of this paper is to examine the impact of the investment climate and other factors on Nigerian enterprise productivity. We consider four main dimensions of investment climate that are insecurity, bribe or informal payment to get things done, the amount of time that management spends dealing with government regulation, and the costs of power outage. Besides the investment climate, other factors that can determine firm productivity are its size, the quality of the workforce, the availability of credit, and the sector of operation.

The remainder of the paper is structured as follows. Section II describes the data and main stylized facts of the production, productivity, resource utilization, and investment climate in Nigeria. Section III presents the empirical strategy and shows econometric results. Section IV concludes.

II. Literature review and stylized facts of output, input, productivity, and business climate in Nigerian firms 2007-2014

A. Literature review

The business environment or investment climate refers to a set of factors, policies and institutions that shape the opportunities and incentives for firms to invest productively, create jobs and expand (Aterido et al. 2011; World Bank., 2005). The literature reveals a consensus that good business environment fosters firms' growth, productivity and development, while adverse business environment increases firms' transaction costs and constraints on their development.[1] As highlighted by Dollar et al (2005), the investment climate matters for the level of productivity, wages, profit rate and the growth of output, employment, and capital stock at the firm level. A poor business environment reduces the opportunities and incentives for firms to invest productively, create jobs and expand. We focus in this paper on three specific dimensions of the investment climate: access to infrastructure, access to finance, and regulatory environment.

Well-developed infrastructure is essential to promote economic growth by reducing transaction cost for firms as well as for households. Indeed, infrastructure services like transport, energy, water and sanitation are used by firms in their production processes and delivery of goods and services (Bah and Fang, 2015). Moreover, well-developed infrastructure is an asset for the competitiveness of firms both at the national and international levels. In this vein, Bah and Fang (2015) argue that poor infrastructure in Africa increases transaction cost and makes African firms less competitive than their international counterparts. In Africa, as in the other developing countries, the costs of transportation, logistics, telecommunication, water, electricity, security and bribes are high, and firms suffer great losses due to transportation problems, power and water outages and crime (Eifert et al, 2005). Poor infrastructure creates barriers to opportunities and increases costs and risks for small firms as well as multinationals (World Bank, 2005) by limiting market access, shrinking the size of the available market and reducing productivity. Eifert et al (2005) show for instance that a substantial portion of the variance in measured productivity between China and several African countries can be attributed to infrastructure and logistics-related losses rather than their intrinsic capabilities. Good infrastructure connects firms to their customers and suppliers and helps them take advantage of modern production techniques (World Bank, 2005). In Nigeria, as in other African countries, poor quality of infrastructure characterized mostly by frequent power outages, insecurity, and bribery negatively impacts firms' performance and reduces the incentive to invest productively.

A branch of the literature focuses on the effects of credit and liquidity constraints on firms' performance. Rajan and Zingales (1998), one of the first to analyze this relationship, highlight that industries which require more external financing grow faster in more financially developed countries. Financial inclusion encourages investment by reducing liquidity constraints and therefore affects firm size, competition, and industrial structure (Beck et al. 2005). Moreover, Beck et al (2005) find that the effect of financial underdevelopment on a firm's growth depends on the firm's size. The latter highlight that the smallest firms are consistently the most adversely affected by negative investment climate in general but especially by financial underdevelopment. Finally, heavy regulatory environment negatively affects firms' performance. Djankov et al (2002) show that heavy regulation related to the starting of businesses increases the size of the unofficial economy. Moreover, Botero (2004) finds that heavy regulation of labor is associated with a larger unofficial economy, lower labor force participation, and higher unemployment. Klapper et al (2006) show that entry regulations hamper establishment entry and that the value added per employee grows more slowly in countries with high entry barriers (Klapper et al., 2006) and small firms may be more dissuaded from entering than large firms.

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[1] World Bank (2005); Dollar et al., (2006) and Atérido et al (2011) for more extensive discussion.

Related to the investment climate and productivity, the impact of corruption and firm productivity is examined in detail by De Rosa et.al. (2013) in their analysis of Eastern and Central European economies. They examine the impacts of the "bribe tax", which is the small payments to reduce transaction costs of the day-to-day operation and the "time-tax", which is the time devoted by managers to deal with red tape. The authors note that the impact of the bribe tax can be either positive or negative, though they find a negative association between both variables. They find insignificant the impact of the time tax.

B. Descriptive statistics and Stylized facts of Nigerian Firms' Output, Factors, and Business Climate

This paper uses the World Bank's Enterprise Surveys in Nigeria including more than 7,000 firms for the three years 2007, 2009 and 2014. The 2007 survey included 2,387 firms in 26 states, the 2009 survey 3,157 firms in 11 states and the 2014 survey included 2,676 firms in 19 states. We combined the first two surveys to ensure statistical representativeness at the national level. The surveys did not cover the agricultural or mining sectors. Tables 1 and 2 summarize the sample composition by size and sector, for the total sample.

Table 1. Sample composition

	All firms		
	2008	2014	Total
	Panel A. Sample composition by size		
Small (0-19)	3,811	1,806	5,617
Medium (20-99)	1,110	665	1,775
Large (100 and above)	126	145	239
	Panel B. Sample composition by sector		
Manufacturing	2,621	1,427	3,837
Services	2,426	1,196	3,419
Total	5,047	2,623	7,670

Source: Enterprise Surveys.

Output

We associate firm output with sales, as the surveys have no information on inventory management. Hence, we use the terms sales and output interchangeably. Total sales increased between both periods, but the behavior was different between exporting firms and those that produce for the domestic market (Figure 1). Sales go up between 2008 and 2014 driven by the increase in domestic markets while sales of exporting firms decreased in the same period. The fall in the exporter firm sales may be explained by the resource curse of the oil boom registered during the period of analysis; these micro-level data coincide with falling non-oil and gas exports registered at the macro level.[2] Sales increased across all the regions except in the East regions (North East and South East) where sales go down between 2008 and 2014.

Production became more concentrated at the sector level between 2008 and 2014, as implied by the Herfindahl_Hirschman Index (HHI): the increase in concentration is more notable in the services sector (Figure 2), which as will be shown in the next section, is the one with highest productivity. The concentration of production at the sector level may give rise to economies of scale, which in turn explains productivity growth vis a vis other drivers of productivity growth such as resource reallocation towards more productive sectors (World Bank, 2017).

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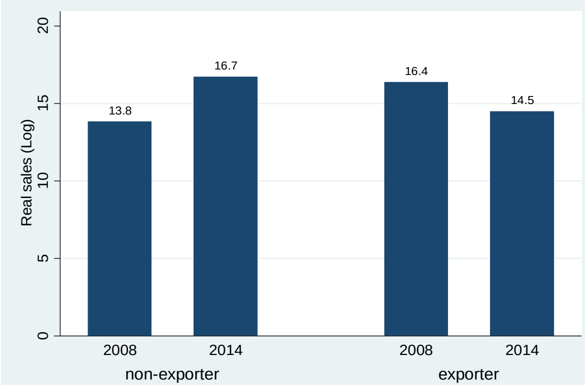
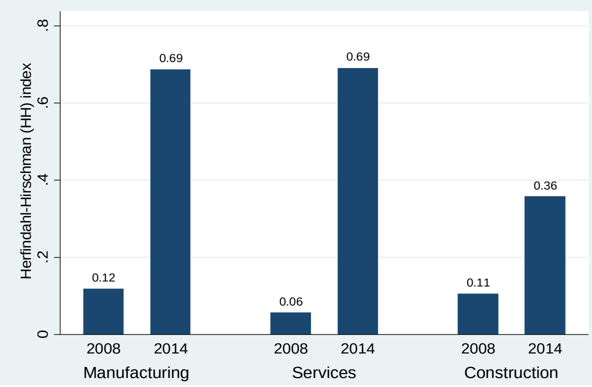
[2] See the CID-Harvard Atlas data for Nigeria exports at the product level in 2008 and 2014.

Figure 1. Real Sales, Exporting and Non-Exporting Firms, 2008-2014



Source: Authors' calculations based on panel data from the World Bank Enterprise Surveys

Figure 2. Production Concentration by Sector, Herfindahl-Hirschman Index, 2008-2014

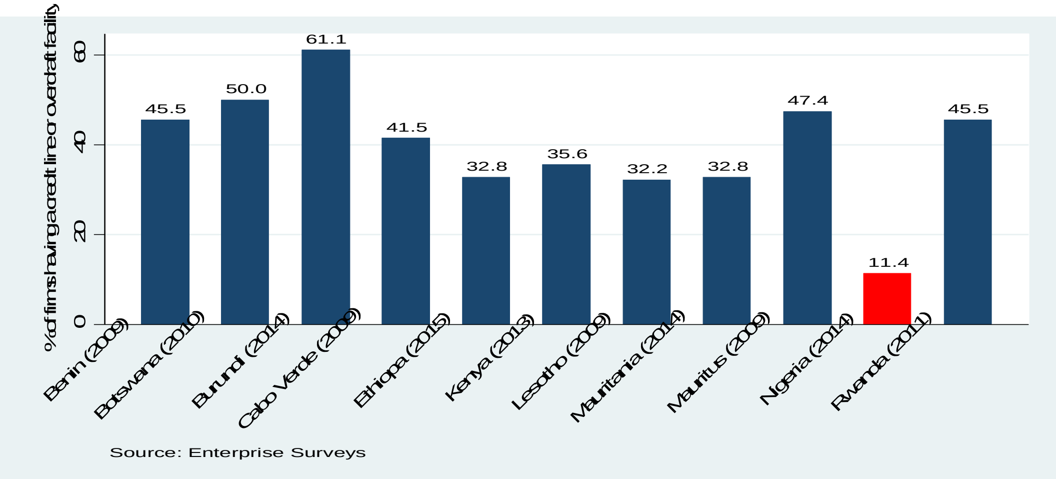


Source: Authors' calculations based on panel data from the World Bank Enterprise Surveys

Access to finance

The proportion of working capital financed by banks and the proportion of firms having a loan increased between 2008 and 2014. However, there is large heterogeneity across firms in the use of bank financing: while 7 percent of small firms reported having a line of credit or a loan facility, the proportion rose to 15 percent in medium sized firms, and further to 34 percent in large firms (Appendix 2). In total, only 12 percent of the firms had a loan or an overdraft facility in 2014, which is extremely low compared with regional peers where the proportion is more than 30 percent (Figure 3). Also, in 2014 less than 10 percent of Nigerian firms applied for a loan [3] (Appendix 2). Among firms that did not apply for a loan, 51 percent report that they do not need a loan, whereas the others quote respectively complexity in application procedure, unfavorable interest rate, high collateral requirements, insufficiency of size and maturity, and did not think it would be approved as the main reasons for not applying.

Figure 3. Proportion of firms having a loan – comparison



Source: Enterprise Surveys

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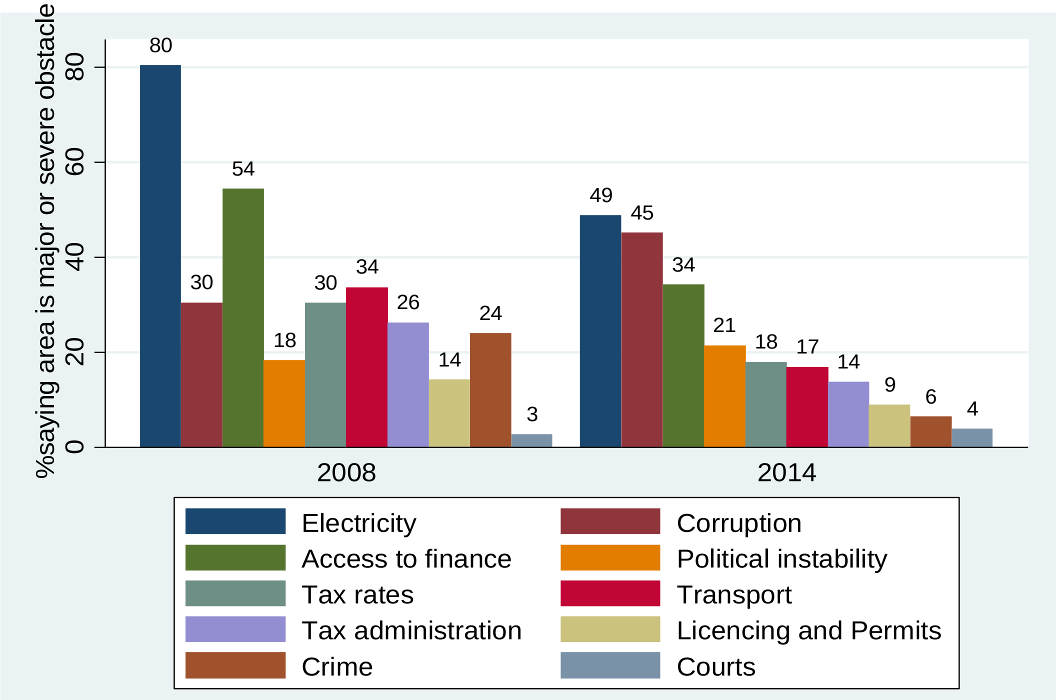
[3] The acceptance rate was 83 percent for all firms, but only 49 percent in the panel sample.

Obstacles to doing business

Firms reported electricity, corruption, access to finance, and political instability as the four major or very severe obstacles to their operations in 2014 (Figure 4). The firms' perception of the major obstacles shows a relative improvement, as the percentage of firms that ranked these factors as major obstacles declined over time, except corruption; while 30 percent of firms ranked corruption as a major obstacle, that fraction rose to 45 percent in 2014.

Figure 4. Top constraints to doing business in Nigeria



Source: Authors' calculation based on data from Enterprise Surveys

There is a large heterogeneity in the firms' perceptions of obstacles to doing business across regions. Electricity is perceived as the biggest obstacle to doing business in all the regions except in the North West, where corruption is reported as the major obstacle by a small margin (Table 2). Political instability appears within the top 3 major or very severe obstacles to doing business in the Northern regions (NC, NE, and NW), while it is ranked in the bottom three obstacles in the Southern regions (except the SE region, Table 2).

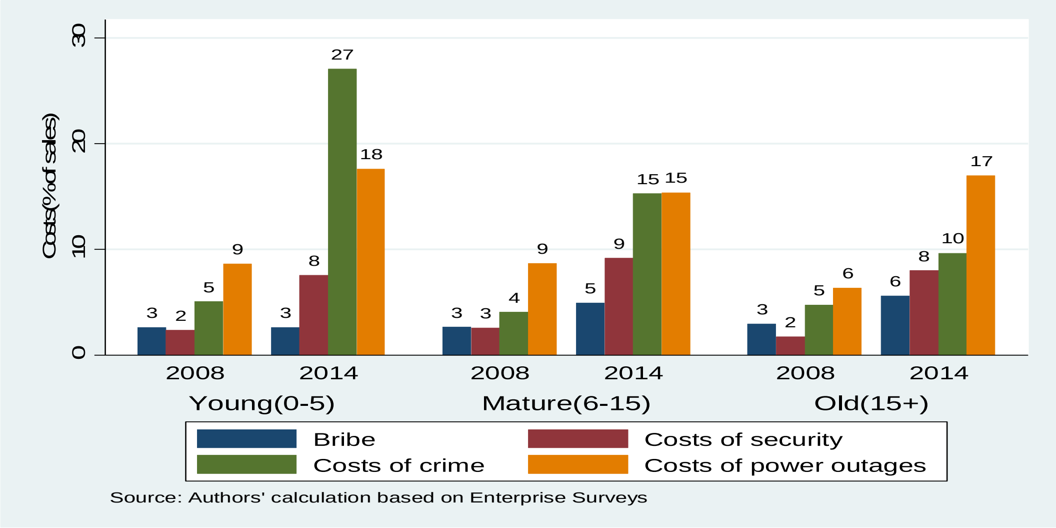
Table 2. Ten top constraints to doing business, by region – 2014*
(percentage of firms ranking each factor as a major obstacle)

	Regions					
	NC	**NE**	**NW**	**SE**	**SS**	**SW**
Electricity	56	59	45	52	50	51
Corruption	48	51	46	46	29	46
Access to finance	25	25	21	39	23	49
Political instability	28	52	28	35	5	12
Tax rate	17	52	12	29	28	19
Tax administration	17	53	8	24	15	14
Transport	18	27	14	17	7	20
Crime	9	16	7	18	13	2
Licensing and Permits	10	8	10	19	5	6
Courts	2	10	6	11	7	1

Source: Authors' calculation based on Enterprise Surveys Nigeria 2014.
Notes. This table reports the percentage of firms that Rank each factor as a major or severe obstacle to doing business. Note: NC=North Central; NE=North East; NW=North West; SE=South East; SS=South South; SW=South West.

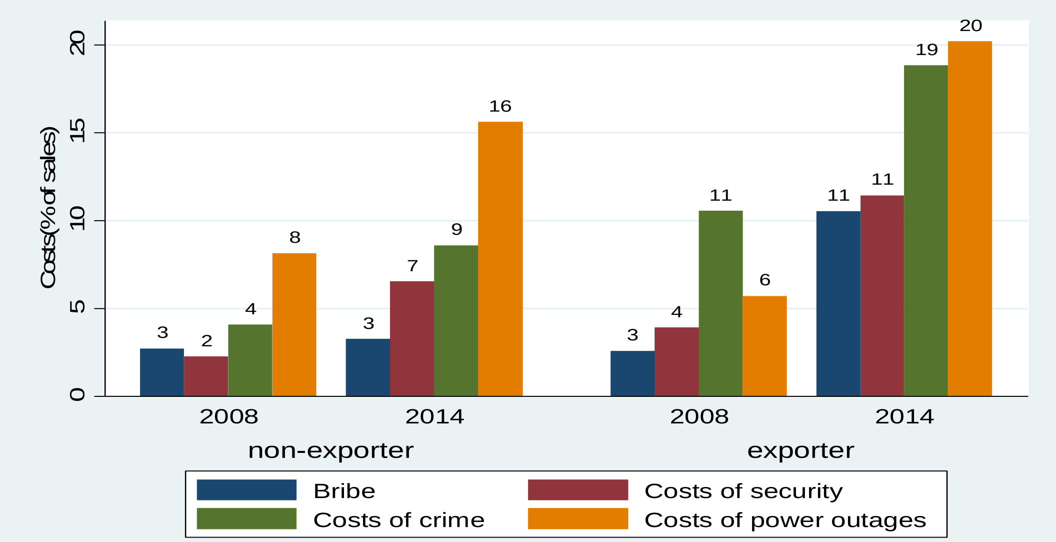
While the perceptions described above indicate an apparent improvement in the business climate over time, the percentage of sales lost due to each of the factors, specifically bribes, security, crime, and power outages increases over the same period. In 2014 Nigerian firms reported an average total cost due to these four factors equivalent to 40 percent of sales. These costs are larger for young, exporting, and manufacturing firms (Figures 5 to 7) and can be interpreted as fixed costs arising from the business climate.

Figure 5. Costs of crime, power outage, security, and bribe, by age category



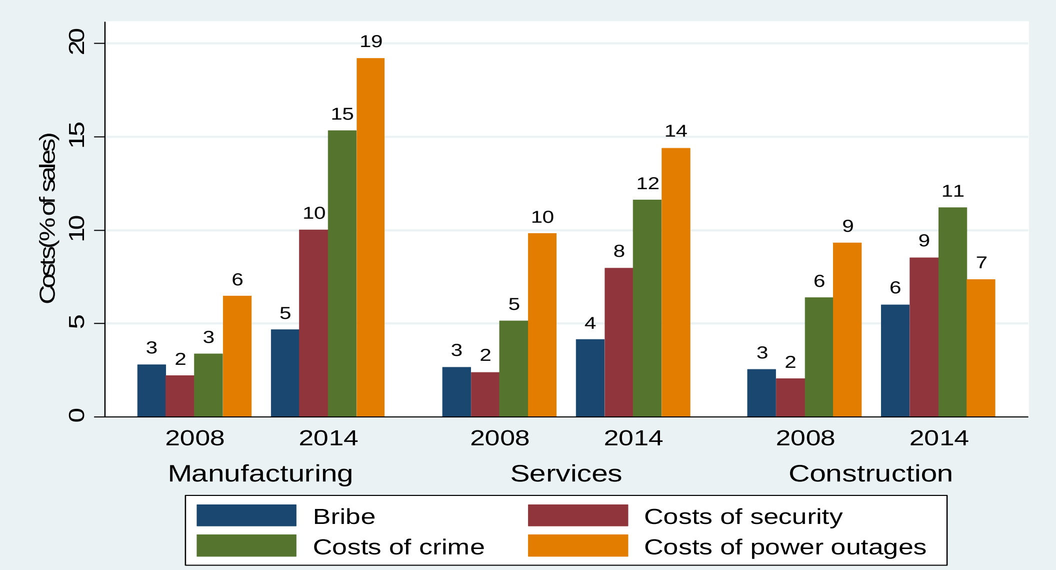
Source: Authors' calculation based on Enterprise Surveys

Figure 6. Costs of crime, power outage, security, and bribe, exporting or non-exporting status



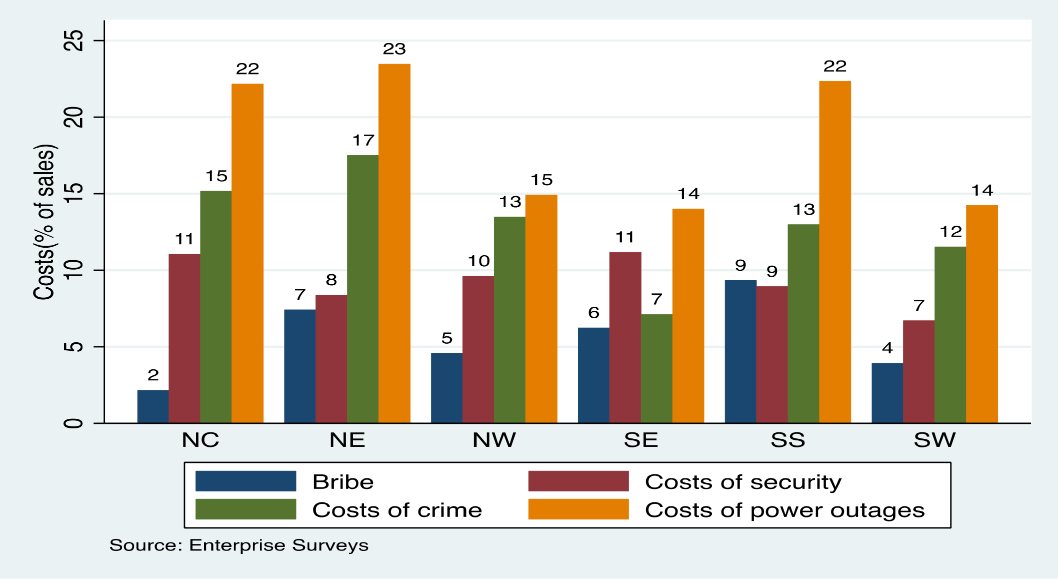
Source: Authors' calculation based on Enterprise Surveys

Figure 7. Costs of crime, power outage, security, and bribe, by sector of operation



Source: Authors' calculation based on Enterprise Surveys

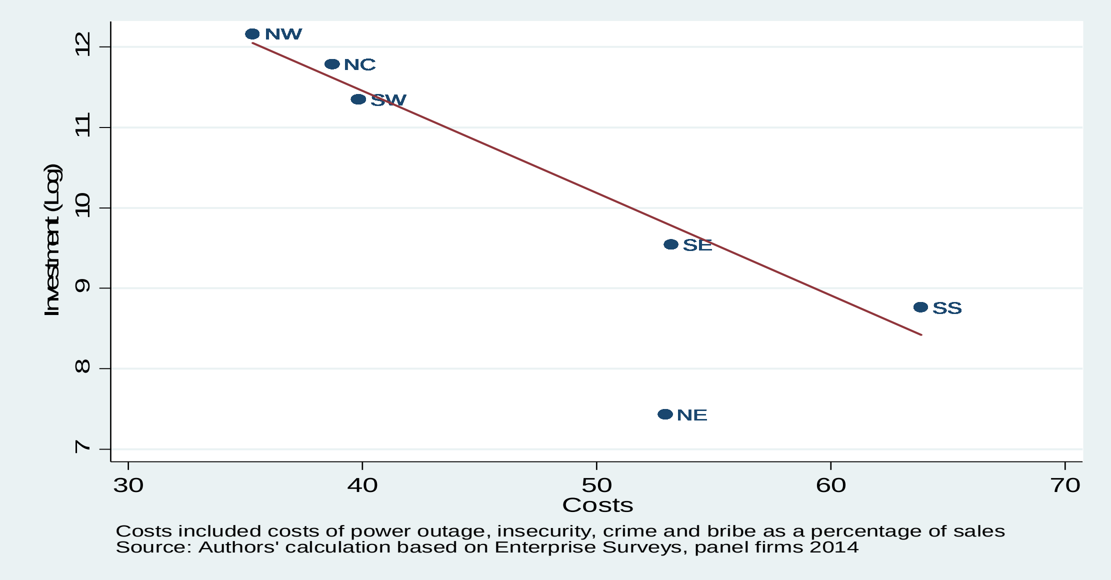
Figure 8. Costs of crime, power outage, security, and bribe by regions



Source: Enterprise Surveys

The costs of power outage, security, crime, and bribes do not affect homogeneously firms across Nigeria and are negatively associated with investments (Figure 9). These costs are higher for firms in the East and South South regions where the weighted average investment is lower. A regression for determinants of investment estimated for a panel of firms verifies the negative impact of investment climate variables, as well as the positive association of investment and firm size and availability of credit. More importantly, the regional fixed effects reveal the significant differences, with the northeast and the southeast having the largest negative effect.

Figure 9. Investment levels and the costs of an adverse business climate by region*



Costs included costs of power outage, insecurity, crime and bribe as a percentage of sales
Source: Authors' calculation based on Enterprise Surveys, panel firms 2014

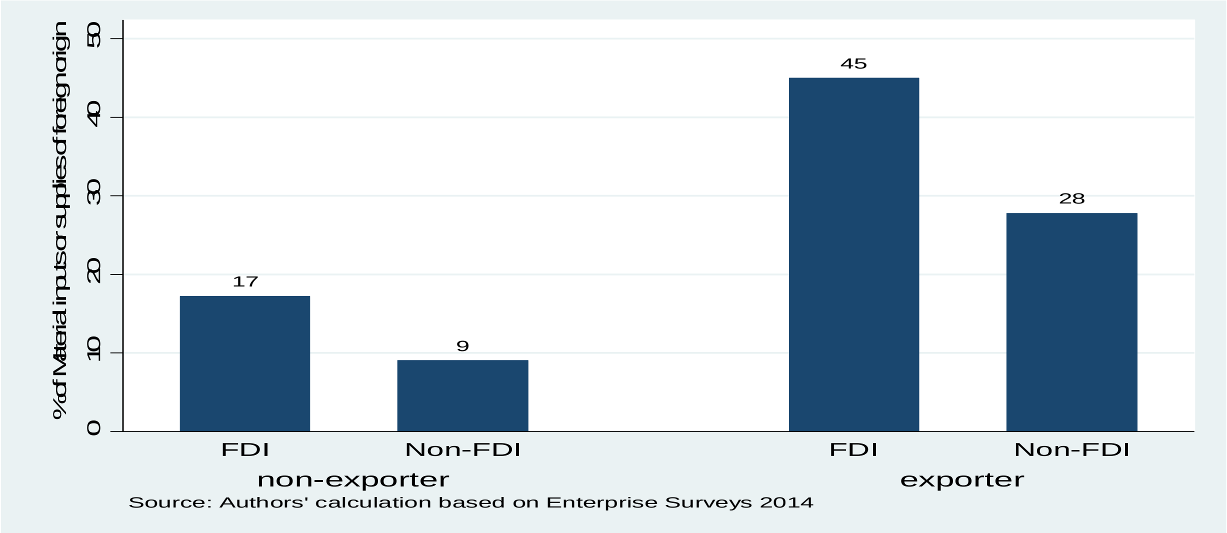
Source: Authors' calculations based on panel data from the 2014 World Bank Enterprise Surveys.
Note: "Costs" include losses due to power outages, insecurity, crime, and bribery as a percentage of firm sales.
NC=North Central; NE=North East; NW=North West; SE=South East; SS=South South; SW=South West.

Outward orientation

Exporting firms import more relative to the non-exporting ones, especially when they have foreign ownership participation. For instance, exporting firms with foreign ownership imported 45 percent of their inputs, while non-exporting firms with foreign ownership imported only 17 percent of the inputs. Both figures are lower for firms without foreign ownership, but still exporting firms import more than non-exporters (Figure 10).

Nigerian exporting firms are more productive than the non-exporting ones (Figure 11.)[4] The positive association between the exporting nature of firms and productivity cannot be used as a causality statement. In the empirical section, we deal with potential endogeneity issues.

Figure 10. Exporter status and foreign participation in ownership



Source: Authors' calculation based on Enterprise Surveys 2014

Figure 11. Exporter status and total factor productivity

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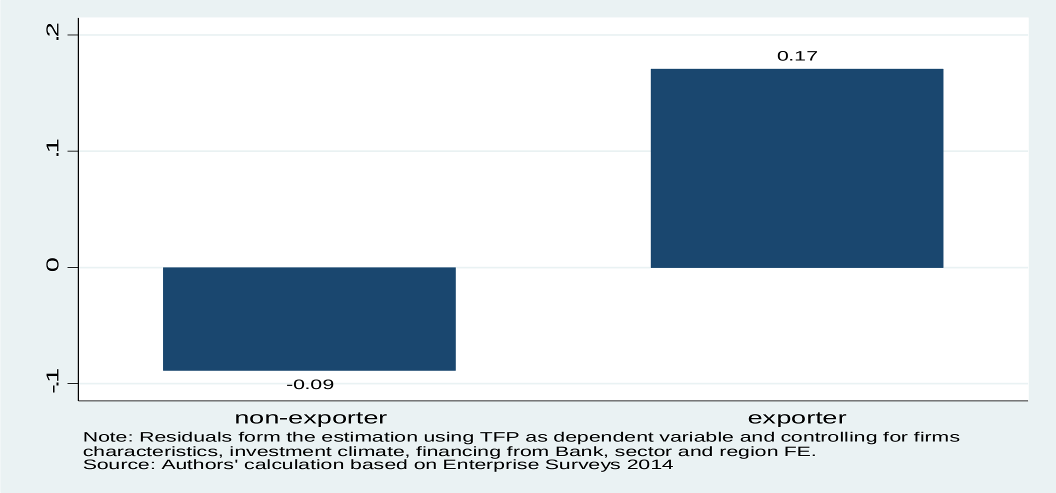
[4] Figure 11 uses the total factor productivity (TFP) measure of productivity, which is a residual of a regression described in the text. Hence it can be either positive or negative.

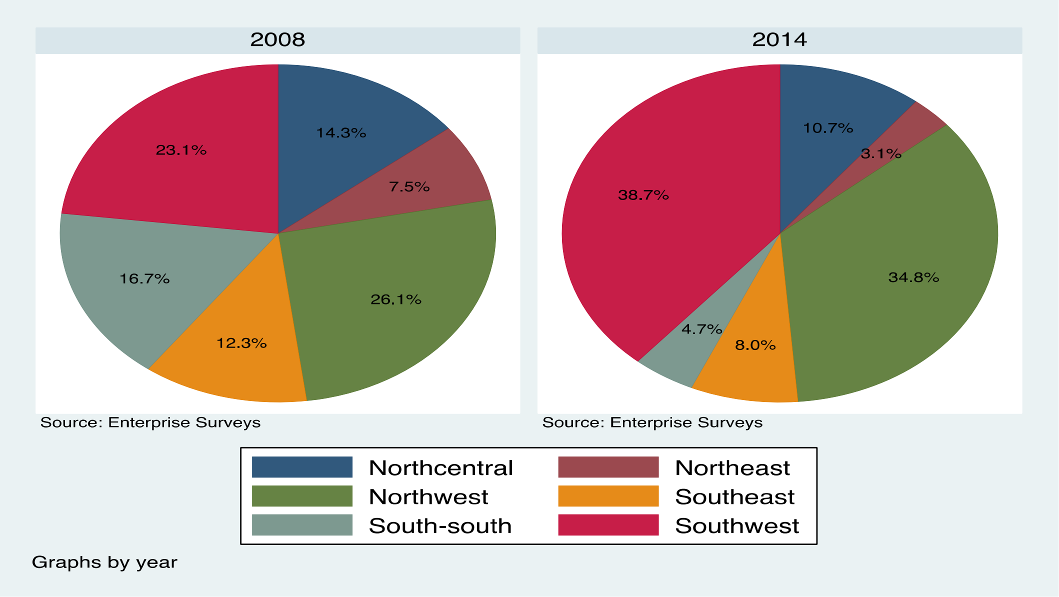


Note: Residuals form the estimation using TFP as dependent variable and controlling for firms characteristics, investment climate, financing from Bank, sector and region FE.
Source: Authors' calculation based on Enterprise Surveys 2014

Firm location and duality of the economy

The location of firms reveals striking differences that can influence firm performance. While small firms are more evenly distributed across the country, there is a process of concentration in the northwest and southwest (Figure 12). Large firms are extremely concentrated in the Southwest region, where 73 percent of the large firms are located (Figure 13). Recall that the costs associated with bribes, crime, insecurity, and power outage are lower in the Southwest relative to the other regions (Figure 9).

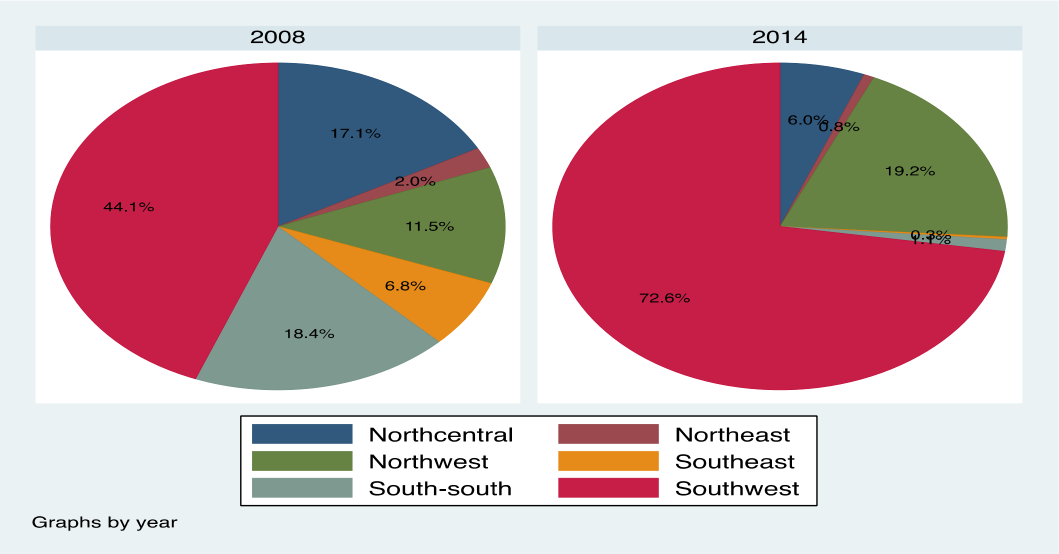
Figure 12. Distribution of small firms by regions



Source: Enterprise Surveys

Source: Enterprise Surveys

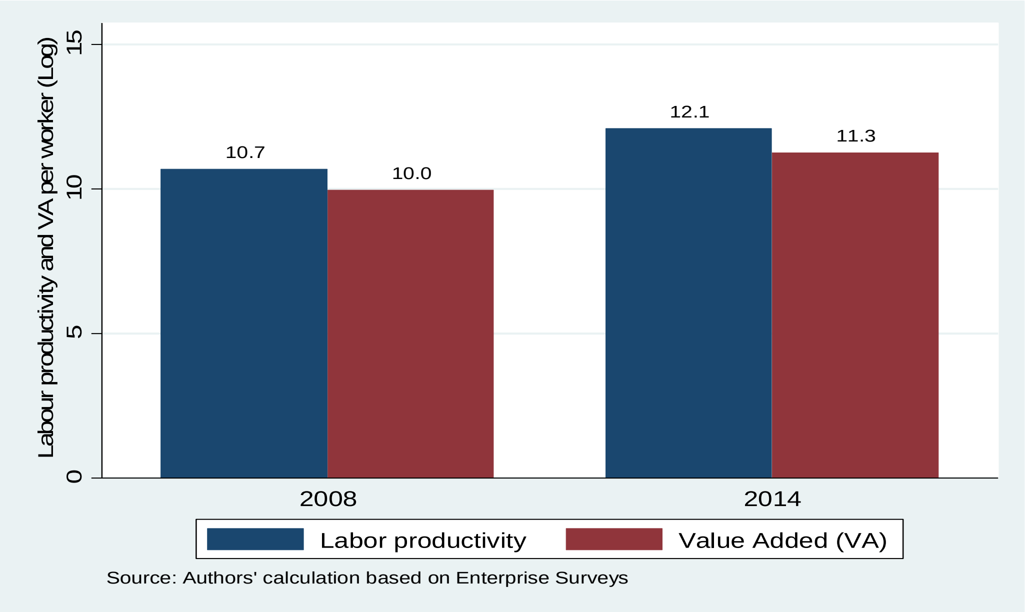
Figure 13. Distribution of large firms by regions



Firm performance

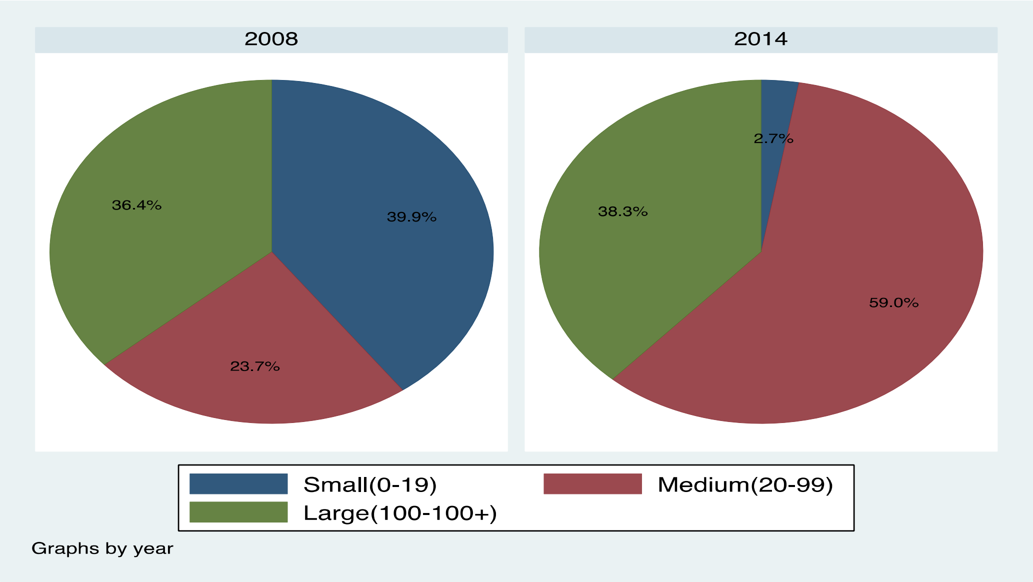
Labor productivity and value added per worker increased in the period 2008-2014 (Figure 14). Contribution to value added per worker became increasingly concentrated in the medium and large firms (Figure 15).

Figure 14. Labor productivity and value added per worker



Source: Authors' calculation based on Enterprise Surveys

Figure 15. Contribution to value added by size

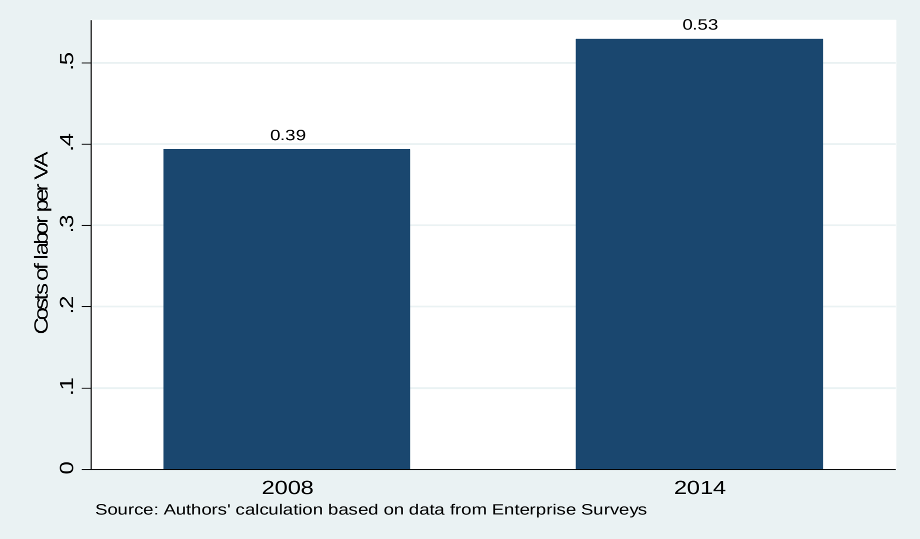


Source: Authors' calculation based on Enterprise Surveys

Similarly, the costs of labor per unit of value added increased over the same period on average (Figure 16). All else being equal, this increase in the average costs of labor per unit of value added can be interpreted as a factor for loss of competitiveness of Nigerian firms.

However, there is significant heterogeneity in the indicator by firm size, as it decreased for large firms, while it rose in small and medium firms. This would imply that larger firms were more productive between 2008 and 2014, while small and medium firms face a lost competitiveness over the same period. This striking difference in this key indicator points at the need of analyzing productivity behavior controlling for numerous factors, including size of the firm, location, and sector of operation to be able to explain which are the main determinants of productivity of Nigerian firms.

Figure 16. Labor Costs per unit value added



Source: Authors' calculation based on data from Enterprise Surveys

III. Determinants of firms' productivity

This section explores the determinants of productivity of Nigerian firms with data from three waves of Nigeria Enterprise Surveys (ES) as described in the previous section. The analysis uses three different measures of productivity: labor productivity per worker, value added per worker, and total factor productivity (TFP). Labor productivity is measured as the real annual sales divided by the number of fulltime equivalent workers by considering the temporary workers.[5] Value added is obtained by excluding the costs of raw materials and energy from the annual sales. Value added per worker is obtained by dividing the difference by the number of fulltime equivalent workers.

Finally, we use the TFP concept as an alternative measure of productivity at the firm level. TFP has the advantage to account for the technology of production and the level of capital. We derive the TFP from a Cobb-Douglas production function with the following technology $Y_{ijct} = K_{ijct}^{\alpha} L_{ijct}^{\beta}$. Y_{ijct} refers to the gross output of firm i in sector j in country c during the previous fiscal year with K and L denoting capital and labor, respectively. Using the natural logarithm, the production could be specified as follows: $y_{ijct} = \theta + \alpha k_{ijct} + \beta l_{ijct} + q_{ijct} + \varepsilon_{ijct}$. y_{ijct} is the natural logarithm of output at the end of the previous fiscal year; k_{ijc} and l_{ijc} represent the natural logarithm of the net book value of capital and the total permanent full-time employees (labor) at the end of the previous fiscal year. q_{ijct} captures unobservable productivity shocks; and ε_{ijct} is an independent and identically distributed shock, which does not affect firm decision. Estimating the TFP at the firm level is challenging because of the potential correlation between productivity shocks and inputs. Firms facing a positive productivity shock could respond by using higher levels of inputs. Following Levinshon and Petrin (2003) and Saliola and Seker (2012), we address this potentially endogenous issue by using the cost of energy as a proxy of unobservable productivity shock. The TFP is estimated as the residual from the production function based on the following equation:

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[5] We are grateful to Josual Wimpey from the Enterprise Surveys for the suggestion and help in the construction of full time equivalent workers.

$$TFP_{ijct} \cong y_{ijct} - \hat{\alpha}k_{ijct} - \hat{\beta}l_{ijct} - \hat{\gamma}q_{ijct};$$

where $\hat{\alpha}$, $\hat{\beta}$, and $\hat{\gamma}$ are the estimated coefficients from the previous equation.

Using different measures of productivity helps us ensure the robustness of our findings. Fortunately, the correlation across the different measures is high (Table 3), indicating that despite the empirical difficulty of estimating TFP, our preferred measure of productivity, results will not depend on the choice of the specific measure.[6]

Table 3. Correlation between productivity measures

	LP	**VA**	**TFP**
LP	**1.00**		
VA	**0.97**	**1.00**	
TFP	**0.78**	**0.81**	**1.00**

Note: Correlations are statistically significant at the 1% level.
LP=labor productivity; VA= value added per worker.

Factors affecting productivity

When the measure of productivity is labor productivity, we include the stock of capital measured by the gross book value of capital reported by firms. Two factors that capture features of the labor input are the proportion of temporary workers and the average educational attainment of a typical worker. To capture the availability of financing we included a dummy variable that takes the value 1 if the firm has a line of credit or an overdraft facility. The impact of the investment climate can be captured by including several variables: the percentage of the top manager's time spent in dealing with the government regulations ("time tax"), the costs of bribing, the costs of power outages, and the costs of security, all expressed in terms relative to the volume of sales and reported in the ES.[7] We included a dummy to capture whether the firm was an exporter taking the value 1 if a firm has a positive share of its sales directly or indirectly exported.

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[6] The high correlation between labor productivity and TFP could be interpreted as evidence in favor of a simple neo-classical growth model for Nigeria, in which TFP is the main driver of labor productivity. New growth models in which labor productivity depends on the amount of resources devoted to the production of capital may not be applicable due to the low investment levels or the low elasticity of output with respect to capital, or because the economy is so oil-dependent that new capital goods are not produced and irrelevant in this undiversified economy. A dynamic growth model is needed for a complete interpretation of these correlations (see Sargent and Rodriguez, 2000; McGgrattan and Prescortt, 2012; or Romer, 1987).

[7] We do not include the losses due to theft, robbery, vandalism or arson in the estimations because of missing observations. We lost more than 80 percent of the sample by including this variable.

We control size, age, sector, region, and time effects. The size is proxied by the market share of the firm, measured by the ratio of the firm sales over the total sales by sector-region-year. The age is proxied by age category dummy variables: Young for firms aged between 0 and 5 years; mature between 6 and 15 years; and old more than 15 years (old is used as a reference). Sector, region and year dummies are included to control for some potentially important omitted variables, the differences in demand conditions and survey differences. The estimated equation could be written as follows:

$$Productivity_{ijst} = \alpha + \beta\ Investment\ Climate_{ijst} + \delta\ X_{ijst} + \eta_s + \eta_j + \eta_t + \varepsilon_{ijst}$$

where, $Productivity_{ijst}$ is the measure of productivity of firm i in sector j, state s at time t, $Investment\ Climate_{ijst}$, the investment climate variables described above, X_{ijst} firm individual characteristics, η_s, η_j, η_t states, sector and year fixed effects respectively, and ε_{ijst} the error term. All estimates deal with potential multivariate outliers using the methodology proposed by Weber (2010), a refinement of the procedure described by Hadi (1992, 1994).

Identification strategy

The estimation is done in two steps. First, all variables are assumed to be exogenous, and in a second step the estimation accounts for the potential endogeneity of exporting nature[8] and bribery costs by using an instrumental variables methodology. Exports we instrumented with the proportion of material inputs and supplies of foreign origin. The intuition is that firms connected to the international market through imports are more likely to export, as shown in the stylized facts section. Bribery was instrumented by average bribe by location-sector-size cluster "to get things done". The underlying intuition of this instruments is based on the literature on the social conformity effect (Fortin et al., 2007; Myles and Naylor, 1996; Gordon, 1989). If paying a bribe "to get thing done" is a social norm for a group of firms, an establishment belonging to this group will be more likely to be involved in corruption activities. As argued by Alm et al (2016) the culture of bribery reduces the stigma and social costs involved with all forms of bribery.[9]

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[8] See Melitz (2003) and Melitz and Ottaviano (2008) for more extensive discussion on the relationship between exports and productivity.

[9] The way the average is calculated and matched to firms is particularly important to address properly the endogeneity problem (Aterido et al., 2011). Indeed, the average must be calculated so that it considers the fact that firms may change size over the period for which we have data, i.e., at t-3 and t. To do so, we follow a two-step approach like Aterido et al (2011). First, we compute the average size of each firm. Based on average size, we calculate for each location-sector-size cluster the average amount of bribe paid "to get things done". Given that the bribery environment may be different for firms that have changed size over time relative to what is typical for firms of a given size category for a while, we match the average based on their initial size. Indeed, matching based on the current size may leave endogeneity untackled as other characteristics of the current cluster may affect a specific firm productivity through

Fixed effects are used to control for omitted variable bias, namely other effects this norm of bribes might have on institutional variables at the state level and on a firm-specific level of productivity. Given that we have two instruments for two endogenous variables, we are not able to test for over-identifying restrictions. The first step estimations are reported in Table A2 in Appendix 4.

Results

Tables 4 to 6 summarize the estimates of the determinants of productivity, for the three measures of productivity. When labor productivity is used (Table 4), the stock of capital is a strong determinant of the firms' labor productivity. A 10 percent increase in the stock of capital raises the labor productivity between 1.5 percent and 1.8 percent. The effect is statistically significant at the 1 percent level.

The average educational attainment of a typical worker increases firms' productivity with all measures of productivity. A 1-year increase in the average educational attainment of a typical worker increases productivity between 8.9 percent and 20.9 percent. The proportion of temporary workers has a positive effect on labor productivity and value added per worker. However, the coefficient is barely significant at the 10 percent level in only two regressions.

Firm size is also positively associated with productivity, regardless of the measure. The firm's age is insignificant. Having a credit line or an overdraft facility increases productivity from 17.9 percent to 50 percent relative to firms that do not have a credit line or an overdraft facility. The effect is strongly significant at the 1 percent level whatever the measure of productivity. This result is puzzling given that only 12 percent[10] of Nigerian firms have a line of credit or an overdraft facility in 2014.

Among the investment climate variables, the cost of power outages is a consistently negative and significant determinant of firm productivity. A 10 percent increase in the cost of power outage reduces productivity between 4.9 percent and 15 percent. Bribery appears positively related to productivity (Tables 4-6), but the impact decreases with firm size (Table 7). This finding highlights that the unfriendly business climate imposes disproportionately on small firms the burden of corruption as a means to raise their productivity. Weak identification test confirms that our instruments are valid. The statistic of the test ranged between 13.9 and 16.7.

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other channels than just its own amount of bribe paid. We therefore match the average based on initial size, arguing that the owner/manager of a firm carries part of this norm of bribes from its earlier situation into its current situation. We assume however that the norm of bribes and costs of insecurity remain constant over time in a location-sector-size cluster and this allows using the information on conditions faced small firms at t to measure conditions faced by small firms at t-3.

[10] This is extremely low compared with regional peers where the fractions oscillate between 30 percent and 50 percent.

The positive association between the exporting nature of firms and productivity (Column 4, Tables 4-6) vanishes when the 2SLS method is used (Column 5, Tables 4-6). Weak identification tests confirm that our instruments are valid. The statistic from the weak identification test ranges between 14.6 and 15.2. To clarify the relationship between productivity and being an exporter, we examine the impact of productivity on the likelihood of being an exporting firm by estimating a Probit model. Results reported in Table A2, Columns 5-7, show that, regardless of the measure of productivity, the more productive firms are more likely to be exporters. Similar to the results of Melitz (2003), and Melitz and Ottaviano (2008), the level of productivity increases the likelihood of being an exporter.

We performed a series of robustness checks, such as using different methods of dealing with outliers and estimating the models without the weights, and none of the results change (Appendix 4).

Table 4. Determinants of labor productivity per worker

	(1)	(2)	(3)	(4)	(5)
VARIABLES	LP	LP	LP	LP	LP-2SLS
Capital					
Log. Stock of capital	0.181***	0.173***	0.172**	0.167**	0.176***
	(0.0287)	(0.0246)	(0.0442)	(0.0423)	(0.0290)
Labor					
Proportion of	0.363	0.349	0.613*	0.559*	0.487**
temporary worker	(0.307)	(0.291)	(0.280)	(0.257)	(0.186)
Avg. Education of	0.0618	0.0555	0.124**	0.127**	0.213***
Workers	(0.0374)	(0.0384)	(0.0425)	(0.0422)	(0.0458)
Size and Age					
Market share	11.04**	10.76**	8.281*	7.995*	23.38***
	(3.997)	(3.767)	(3.650)	(3.381)	(4.107)
Young	-0.0500	-0.0638	0.108	0.124	0.0934
	(0.0606)	(0.0557)	(0.113)	(0.118)	(0.126)
Mature	0.0481	0.0483	0.162	0.169	0.0958**
	(0.104)	(0.104)	(0.0870)	(0.0944)	(0.0403)
Access to finance					
Credit line or overdraft		0.338**	0.336**	0.252*	0.211*
Facility		(0.0849)	(0.119)	(0.123)	(0.110)
Investment Climate (%)					
Cost of insecurity			0.0134	0.00604	0.0063
			(0.0163)	(0.0154)	(0.0179)
Cost power outage			-0.00795**	-0.00670**	-0.00718***
			(0.00221)	(0.00259)	(0.0023)
Bribe			0.0249**	0.0239**	0.0718**
			(0.00743)	(0.00800)	(0.0316)
Management time			0.00429	0.000547	-0.00329
			(0.00392)	(0.00515)	(0.0091)
Outward-orientation					
Exporter				0.572***	0.320
				(0.100)	(0.591)
Sector					
Manufacturing	-0.530	-0.470	-0.537**	-0.317	1.323
	(0.558)	(0.489)	(0.197)	(0.237)	(1.102)
Observations	2,716	2,711	1,405	1,405	1,277
R-squared	0.493	0.502	0.586	0.596	0.577
Weak identification test					14.59
States FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Source: Authors' estimations based on the data from the Enterprise Surveys 2007/2009 and 2014.

Note: LP=labor productivity per worker. Robust standard errors clustered at the States level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the estimates use the weights from the survey.

Table 5. Determinants of value added per worker

	(1)	(2)	(3)	(4)	(5)
VARIABLES	VA	VA	VA	VA	VA-2SLS
Labor					
Proportion of	0.304	0.292	0.465	0.386	0.510*
temporary worker	(0.388)	(0.361)	(0.354)	(0.304)	(0.309)
Avg. Education of	0.112	0.100	0.161*	0.165**	0.187*
Workers	(0.0737)	(0.0748)	(0.0706)	(0.0634)	(0.114)
Size and Age					
Market share	17.35*	16.56*	11.63*	11.11*	33.78***
	(7.408)	(6.749)	(5.508)	(5.007)	(5.100)
Young	-0.288	-0.295	-0.130	-0.115	-0.226
	(0.198)	(0.177)	(0.192)	(0.195)	(0.264)
Mature	-0.0396	-0.0353	0.0630	0.0634	-0.0067
	(0.0679)	(0.0641)	(0.0808)	(0.0830)	(0.0457)
Access to finance					
Credit line or overdraft		0.494**	0.451**	0.337**	0.282***
Facility		(0.149)	(0.117)	(0.0838)	(0.0898)
Investment Climate (%)					
Cost of insecurity			0.0228	0.0151	0.0143
			(0.0236)	(0.0214)	(0.0157)
Cost power outage			-0.0150**	-0.0137**	-0.0142***
			(0.00515)	(0.00491)	(0.00420)
Bribe			0.0182*	0.0170*	0.011
			(0.00784)	(0.00806)	(0.0384)
Time Tax			0.00595	0.00121	-0.0002
			(0.00671)	(0.00839)	(0.0075)
Outward-orientation					
Exporter				0.752***	0.843**
				(0.177)	(0.377)
Sector					
Manufacturing	-0.809	-0.697*	-1.216***	-0.924***	-0.877
	(0.415)	(0.292)	(0.178)	(0.187)	(0.972)
Observations	2,811	2,807	1,430	1,430	1,302
R-squared	0.345	0.361	0.463	0.481	0.521
Weak identification test					14.56
Region FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Source: Authors' estimations based on the data from the Enterprise Surveys 2007/2009 and 2014.

Note: VA=value added per worker. Robust standard errors clustered at the States level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All the estimates use the weights from the survey.

Table 6. Determinants of TFP

	(1)	(2)	(3)	(4)	(5)
VARIABLES	TFP	TFP	TFP	TFP	TFP-2SLS
Labor					
Proportion of	0.400	0.391	0.766	0.731	0.768**
temporary worker	(0.307)	(0.292)	(0.395)	(0.369)	(0.306)
Avg. Education of	0.0440	0.0365	0.0890**	0.0906**	0.132**
Workers	(0.0282)	(0.0300)	(0.0312)	(0.0291)	(0.0553)
Size and Age					
Market share	6.899**	6.553**	4.706*	4.393*	12.71***
	(2.636)	(2.432)	(2.010)	(1.720)	(2.258)
Young	-0.0117	-0.0265	0.0918	0.108	0.149
	(0.0376)	(0.0302)	(0.116)	(0.122)	(0.133)
Mature	0.0744	0.0734	0.0838	0.0887	0.0258
	(0.0728)	(0.0698)	(0.0692)	(0.0719)	(0.0390)
Access to finance					
Credit line or overdraft		0.266***	0.267**	0.200**	0.165***
Facility		(0.0649)	(0.0812)	(0.0703)	(0.0517)
Investment Climate (%)					
Cost of insecurity			0.0198	0.0142	0.0157*
			(0.0107)	(0.00949)	(0.009)
Cost power outage			-0.00646***	-0.00529**	-0.00490***
			(0.00142)	(0.00184)	(0.00235)
Bribe			0.0239***	0.0232**	0.0405*
			(0.00525)	(0.00593)	(0.0217)
Time Tax			0.00168	-0.00113	-0.00187
			(0.00547)	(0.00723)	(0.00748)
Outward-orientation					
Exporter				0.434*	0.379
				(0.180)	(0.487)
Sector					
Manufacturing	-0.599	-0.541	-0.374	-0.206	0.420
	(0.667)	(0.633)	(0.447)	(0.558)	(0.504)
Observations	2,708	2,705	1,402	1,402	1,275
R-squared	0.073	0.086	0.351	0.365	0.397
Weak identification test					15.24
Region FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Source: Authors based on the data from the Enterprise Surveys 2007/2009 and 2014.

Note: TFP are obtained using Levinshon and Petrin (2003)'s approach. Robust standard errors clustered at the States level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the estimates use the weights from the survey.

Table 7. Determinants of productivity – Non Linear Effect of Bribery

	(1)	(2)	(3)
VARIABLES	LP	VA	TFP
Capital			
Log. Stock of capital	0.173***		
	(0.0329)		
Labor			
Proportion of	0.412**	0.427	0.717***
temporary worker	(0.178)	(0.260)	(0.275)
Avg. Education of	0.240***	0.211**	0.149***
Workers	(0.0339)	(0.102)	(0.0463)
Size and Age			
Market share	76.20***	98.53***	48.20***
	(16.24)	(26.18)	(8.965)
Young	0.135	-0.150	0.180
	(0.146)	(0.295)	(0.146)
Mature	0.132***	0.0466	0.0509
	(0.0440)	(0.0480)	(0.0410)
Access to finance			
Credit line or overdraft	0.181	0.251***	0.142***
Facility	(0.133)	(0.0626)	(0.0456)
Investment Climate (%)	0.00675	0.0131	0.0160*
Cost of insecurity	(0.0193)	(0.0181)	(0.00894)
Cost power outage	-0.00585*	-0.0124**	-0.00397
	(0.00322)	(0.00487)	(0.00255)
Bribe	0.103***	0.0451	0.0614***
	(0.0312)	(0.0362)	(0.0180)
Bribe*Market share	-7.583**	-9.624**	-5.126***
	(2.952)	(4.770)	(1.688)
Time Tax	-0.00263	0.000759	-0.00158
	(0.00930)	(0.00788)	(0.00748)
Outward-orientation			
Exporter	0.172	0.637	0.290
	(0.663)	(0.532)	(0.573)
Sector			
Manufacturing	1.973	-0.151	0.881**
	(1.302)	(0.995)	(0.398)
Observations	1,277	1,302	1,275
R-squared	0.508	0.508	0.352
Weak identification test	8.559	9.184	8.896
Region FE	YES	YES	YES
Year FE	YES	YES	YES

Source: Authors based on the data from the Enterprise Surveys 2007/2009 and 2014.

Note: LP=labor productivity per worker; VA=Value added per worker; TFP are obtained using Levinshon and Petrin (2003)'s approach. Robust standard errors clustered at the States level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the estimates use the weights from the survey.

Table 8. First step estimations and likelihood of firm being an exporter

	First step estimations				Likelihood of firm being an exporter		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Bribe	Bribe	Exporter	Exporter	Exporter	Exporter	Exporter
Log. Stock of capital	-0.254		0.00727		-0.0520		
	(0.296)		(0.00445)		(0.0406)		
Proportion of temporary worker	3.007*	5.411**	0.0952**	0.138***	-0.148*	-0.0413	-0.131**
	(1.191)	(1.620)	(0.0244)	(0.0211)	(0.0854)	(0.0726)	(0.0589)
Avg. Education of Workers	-1.046***	-1.459***	-0.0180*	-0.0264	0.0194	-0.0195	0.0167
	(0.0954)	(0.348)	(0.00800)	(0.0144)	(0.0546)	(0.0341)	(0.0374)
Market share	35.28	-19.36	2.840**	3.111**	0.0842	0.197	0.677
	(33.22)	(14.69)	(1.035)	(1.066)	(1.785)	(1.248)	(1.363)
Young	-0.316	-3.001	-0.0310*	-0.0467**	-0.466**	-0.138	-0.527***
	(0.562)	(1.806)	(0.0142)	(0.0116)	(0.233)	(0.140)	(0.110)
Mature	-0.196	-1.206	-0.0140	-0.00943	0.0883	0.260	0.101
	(0.708)	(1.186)	(0.0253)	(0.0253)	(0.176)	(0.206)	(0.181)
Credit line or overdraft Facility	1.256	0.415	0.140*	0.128	0.845***	0.781**	0.845**
	(0.631)	(0.604)	(0.0662)	(0.0684)	(0.288)	(0.309)	(0.338)
Cost power outage	-0.0294	0.0489	-0.00236**	-0.000995			
	(0.0294)	(0.0247)	(0.000753)	(0.000963)			
Time Tax	0.0444	0.0154	0.00682**	0.00613***			
	(0.0352)	(0.0283)	(0.00189)	(0.00152)			
Cost of insecurity	0.186	0.595*	0.0108**	0.0145***			
	(0.155)	(0.254)	(0.00310)	(0.00359)			
Bribe							
Average bribe by Location-sector-size cluster	0.590**	0.876***	-0.00228	0.00401			
	(0.199)	(0.139)	(0.0123)	(0.0137)			
Inputs of foreign origin	-0.0173	0.0480*	0.00406***	0.00526***	0.0156***	0.0153***	0.0155***
	(0.0199)	(0.0221)	(0.000780)	(0.00103)	(0.00227)	(0.00263)	(0.00219)
Foreign Contribution					0.893***	1.040***	0.859***
					(0.302)	(0.292)	(0.301)
Manufacturing	-26.50	-18.69	-0.387***	-0.334**	-0.493	-0.610	-0.525*
	(15.37)	(16.62)	(0.0800)	(0.0860)	(0.319)	(0.416)	(0.303)
LP per worker					0.170**		
					(0.0717)		
VA per worker						0.109*	
						(0.0649)	
TFP							0.126*
							(0.0747)
Observations	1277	1327	1277	1327	2699	2789	2693
R-squared	0.287	0.419	0.402	0.481			
Region FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

Source: Authors based on the data from the Enterprise Surveys 2007/2009 and 2014.

Note: LP=labor productivity per worker; VA=Value added per worker; TFP are obtained using Levinshon and Petrin (2003)'s approach. Robust standard errors clustered at the States level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the estimates use the weights from the survey.

IV. Concluding remarks

Government policies influence the investment climate and productivity through their impacts on costs, risks and barriers to competition. Key factors affecting the investment climate through their impact on costs are: factor markets (labor, intermediate materials and capital), infrastructure, taxes, the regulatory burden, corruption, corporate governance and red tape in general, technological and innovation support, and the availability and cost of finance. A significant component of country competitiveness is having a good investment climate or business environment.

The paper found that the costs of a bad investment climate, proxied by the costs of power outages, corruption, insecurity and crime, and the time that managers have to spend dealing with government regulation ("time tax") are fixed costs that affect more the small, young, exporting firms. These costs are also negatively associated with investment, and partially explain why investment is low in some regions.

This paper examined the evolution and determinants of productivity of Nigerian firms. The paper used three alternative measures of productivity: labor productivity, value added per worker, and total factor productivity (TFP) which were found to be highly correlated. The more notable trends in the data show: a rise in productivity, with output of exporting firms decreasing; increasing concentration of production, reflected by the Herfindahl-Hirschman index rise by a factor of three; increasing costs of crime, power outages, lack of security, and bribery, measured as foregone sales due to these factors; and significant heterogeneity of these costs along several dimensions, such as size, age, location, and exporting or domestic nature of the markets. These costs are inversely related with investment.

Regardless of the measure of productivity utilized, the main determinants of firm productivity are the education of the worker, the size of the firm, the availability of credit, the amount of time that management spends dealing with government regulation ("time tax"), and the cost of power outages.

When labor productivity is used, the stock of capital is also a major determinant of productivity. Firms in the services sector are the more productive ones. There is a positive association between productivity and exporting nature, but when the endogeneity and reverse causality are controlled for, we find that productivity is a weak determinant of the likelihood of a firm exporting, while as well as the credit availability, the foreign participation in ownership, and the integration to foreign markets via imported inputs are robust determinants of this likelihood.

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Appendices

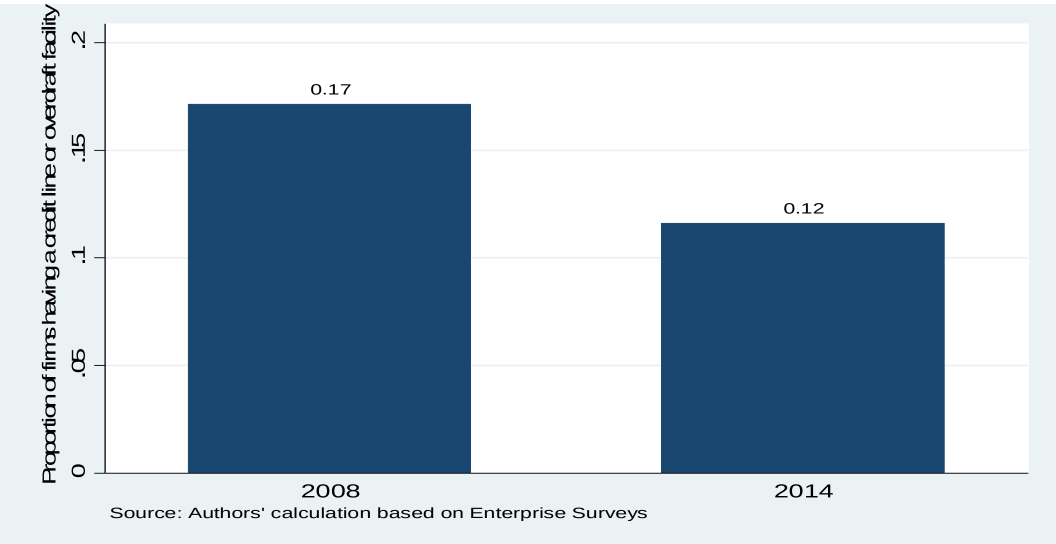
Appendix1 - Sample by States

Table A1. Survey coverage by States

	Panel			All firms		
	2008	**2014**	**Total**	**2008**	**2014**	**Total**
Abia	42	41	83	197	123	320
Abuja	24	25	49	164	151	315
Adamawa				121	0	121
Akwa Ibom	0	105	105	119	149	268
Anambra	106	0	106	189	0	189
Bauchi				134	0	134
Bayelsa				124	0	124
Benue				119	0	119
Borno				121	0	121
Cross river	52	52	104	220	134	354
Delta				137	0	137
Ebonyi				122	0	122
Edo				96	0	96
Ekiti				120	0	120
Enugu	42	42	84	222	124	262
Gombe	33	33	66	120	126	180
Imo				120	0	120
Jigawa	29	29	58	121	123	246
Kaduna	61	62	123	235	138	373
Kano	60	61	121	260	200	460
Katsina	30	30	60	121	125	246
Kebbi	38	38	76	123	133	180
Kogi				119	0	119
Kwara	28	28	56	129	124	253
Lagos	30	31	61	403	282	685
Nasarawa	28	28	56	119	130	249
Niger	34	34	68	124	124	248
Ogun	36	35	71	257	130	316
Ondo				123	0	123
Osun				121	0	121
Oyo	57	57	114	158	119	277
Plateau				120	0	120
Rivers				128	0	128
Sokoto	20	19	39	106	115	221
Taraba				89	0	89
Yobe				120	0	120
Zamfara	33	33	66	121	123	244
Total	**783**	**783**	**1566**	**5544**	**2673**	**8217**

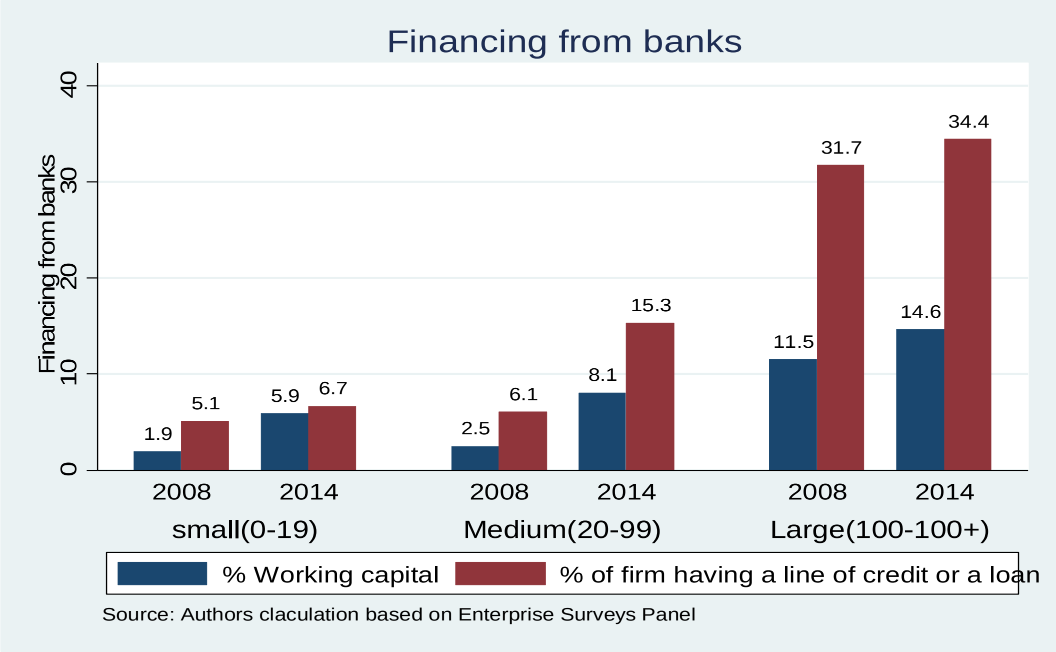
Appendix 2: Financing

Figure A1: Proportion of firms having a loan or an overdraft facility



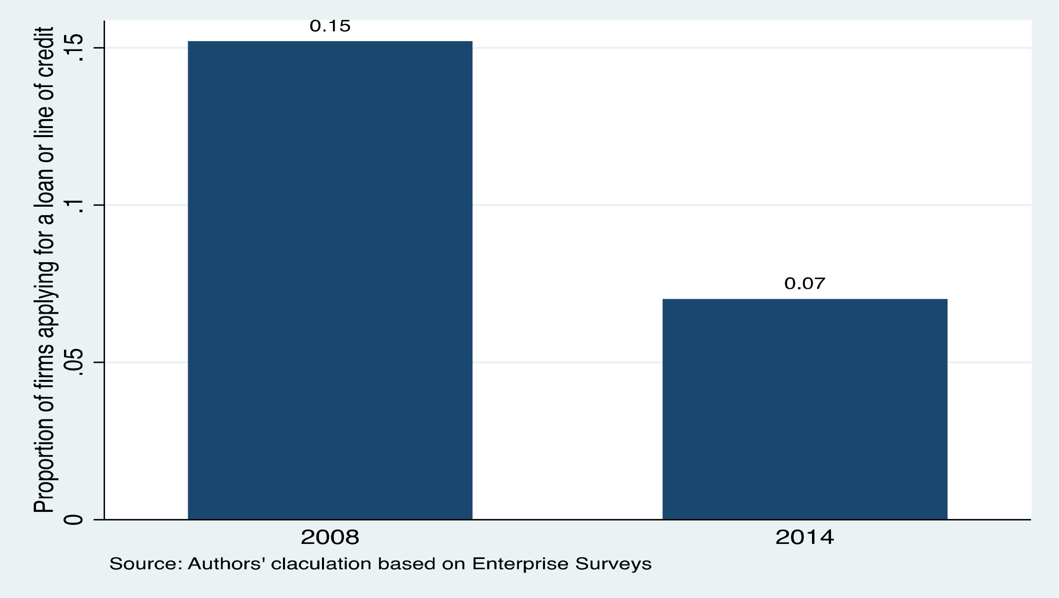
Source: Authors' calculation based on Enterprise Surveys

Figure A2. Financing from Banks – Panel data



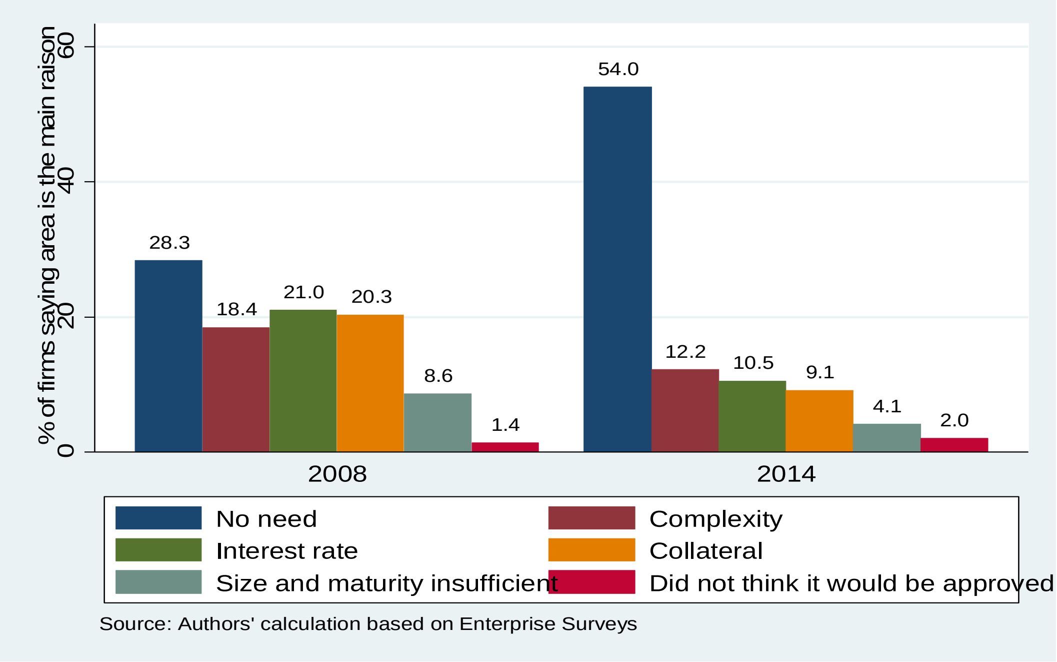
Source: Authors claculation based on Enterprise Surveys Panel

Figure A3: Proportion of firms applying for a loan



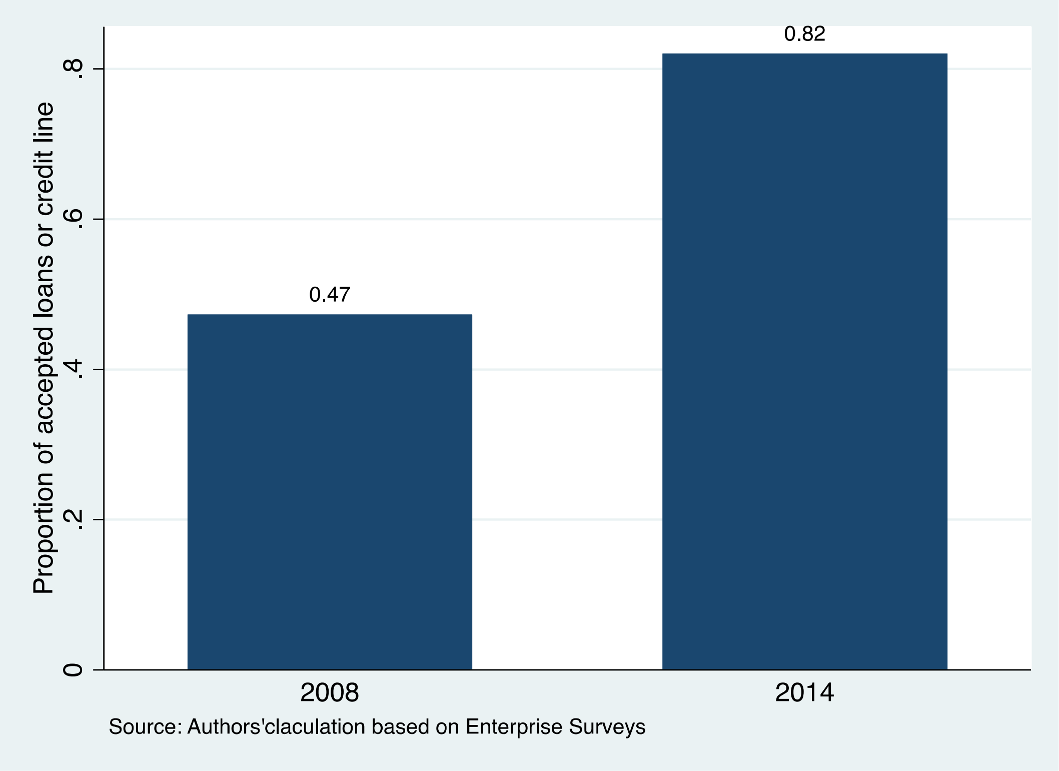
Source: Authors' claculation based on Enterprise Surveys

Figure A4. Reasons why firms did not apply for a loan.



Source: Authors' calculation based on Enterprise Surveys

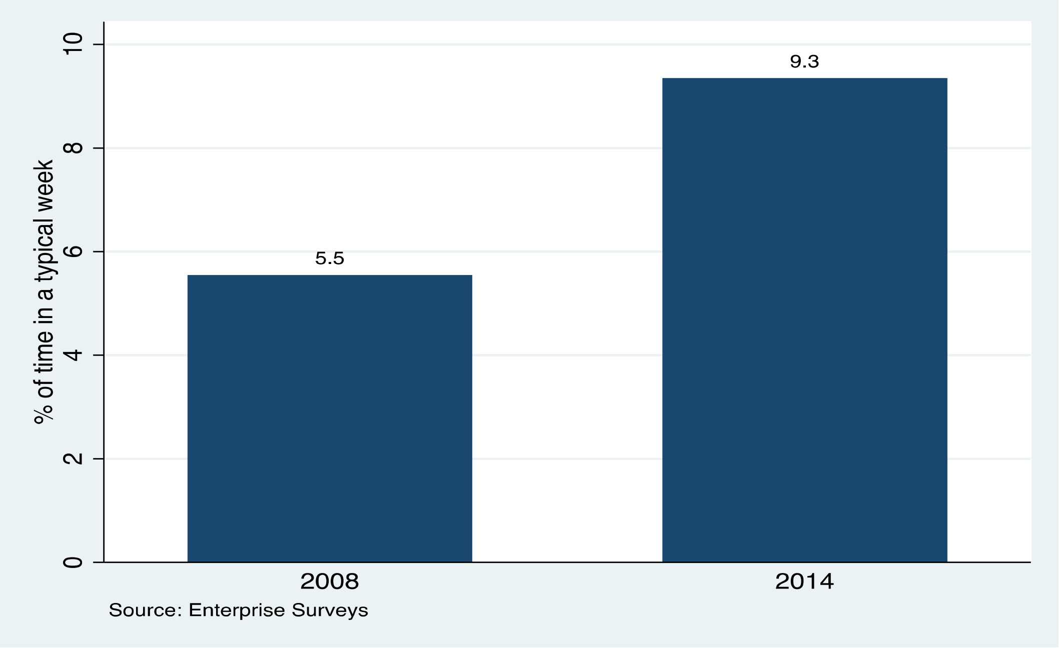
Figure A5. Acceptance rate for firms applying for a loan



Source: Authors'claculation based on Enterprise Surveys

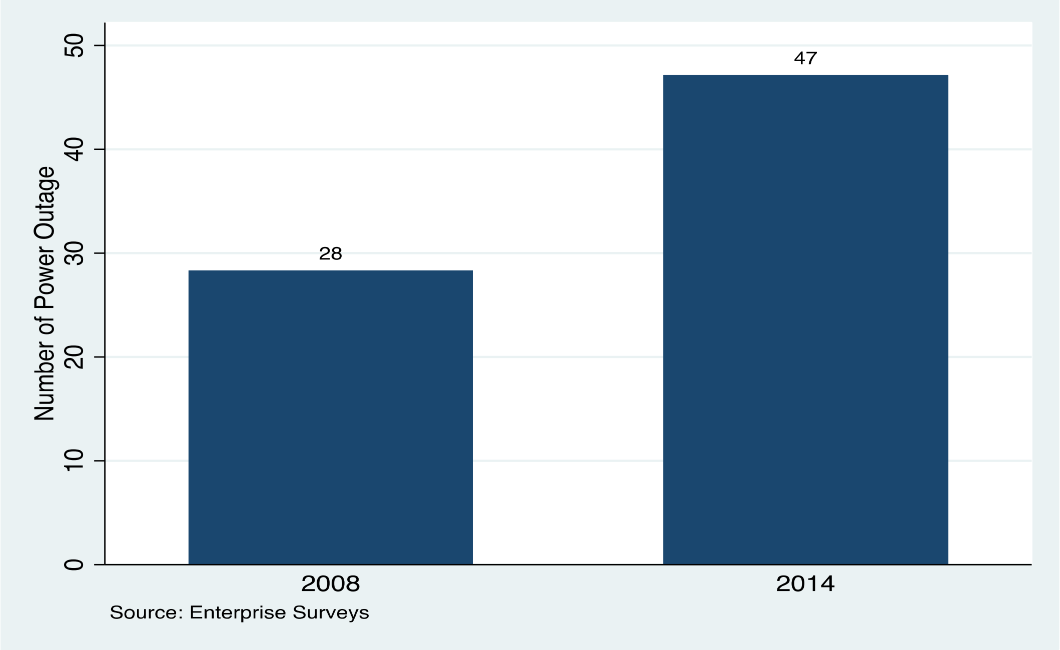
Business environment

Figure A6. Time spent in dealing with government regulation



Source: Enterprise Surveys

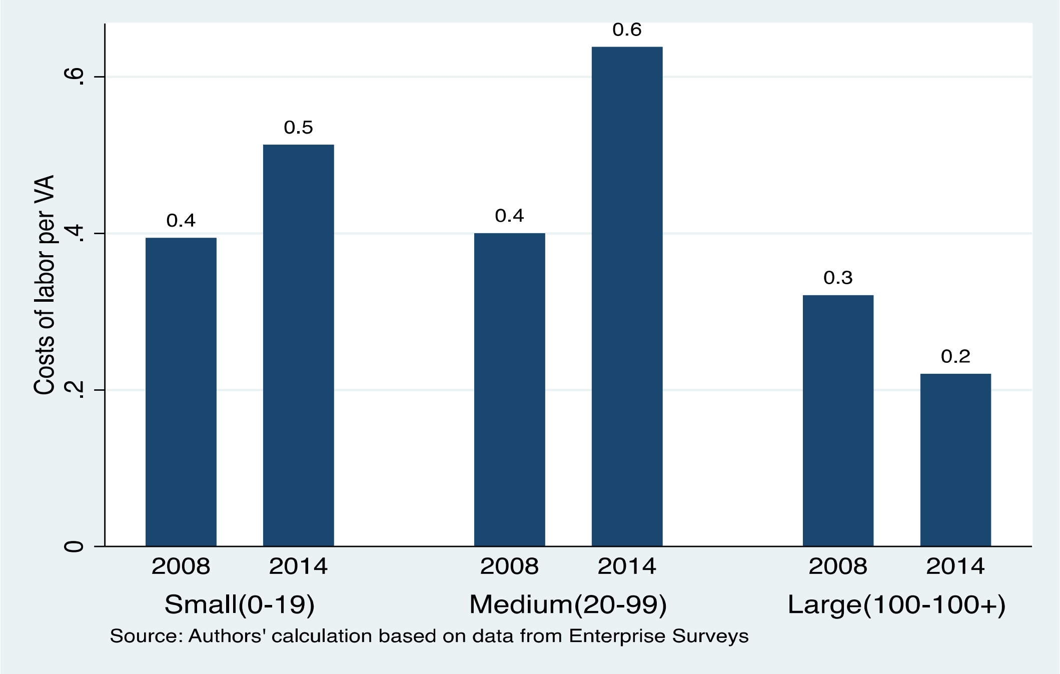
Figure A7. Number of power outage in a typical month



Source: Enterprise Surveys

Firms' performance

Figure A8. Costs of labor per VA

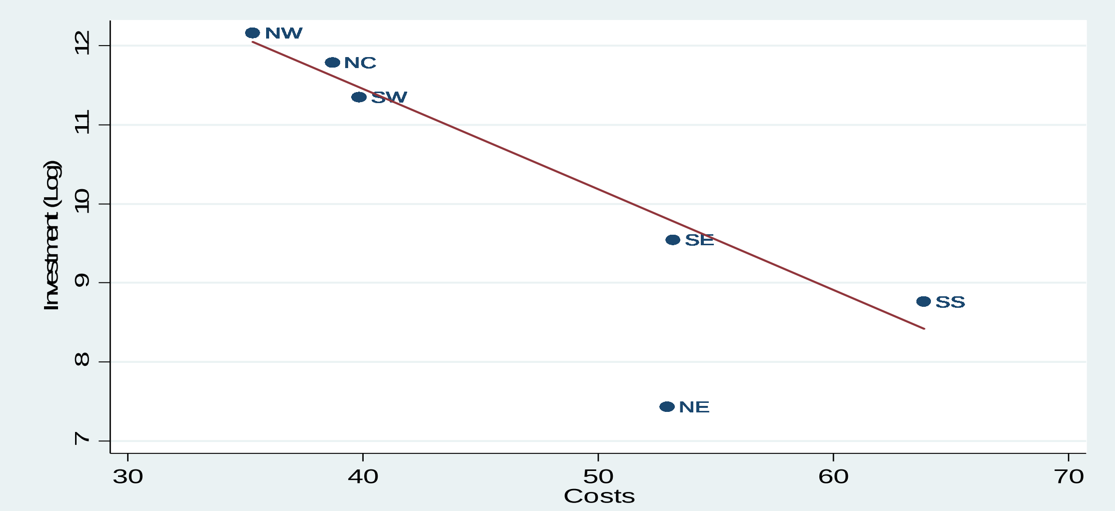


Source: Authors' calculation based on data from Enterprise Surveys

Appendix 3- Investment and costs from the business environment

One of the interesting stylized facts in Nigeria is the relationship between firm's investment and the fixed costs generated by the investment climate. Indeed, regions with higher fixed costs (bribe, costs of power outage, crime, and security as percentage of sales) have a lower level of investment.

Figure A9. Investments and fixed costs



Costs included costs of power outage, insecurity, crime and bribe as a percentage of sales
Source: Authors' calculation based on Enterprise Surveys 2014

We assess the magnitude of the relationship between firms' investment and investment climate by analyzing the potential determinants of firms' investment. We include the same financing, size and age variables, as in the previous estimations. As fixed costs generated by investment climate, we include separately bribe, costs of security and power outage, and the percentage of time in a typical week the top manager spends in dealing with the regulations imposed by the government. We do not include the costs of crime in the regression because this variable makes us lose an important number of observations. Also, to take into account the panel dimension, we focus only on the panel data.

The results reported in the Table A2 show that having a credit line or an overdraft facility, and the size increase firms' investment. However, all the investment climate variables, except the cost of power outage, decrease the firms' investment. A 10 percent increase in the time the top manager spends in dealing with the regulations imposed by the government decreases investment by 18 percent. Similarly, a 10 percent increase in the firms' payment in bribes and security as percentage of sales decreases firms' investment between 84 percent and 87 percent for bribes and 59 percent and 70 percent for cost of security.

Table A2. Firms' investment and business environment – Panel

VARIABLES	(1) Log(investment)	(2) Log(investment)
Size and Age		
Market share	6.668***	6.603***
	(1.301)	(1.459)
Young	-0.391	-0.469
	(0.410)	(0.551)
Mature	-0.491	-0.572*
	(0.302)	(0.324)
Real sales growth		-0.000
		(0.000)
Credit		
Credit line or overdraft facility	0.779** (0.309)	0.715** (0.333)
Investment Climate		
Management time (%)	-0.0181*	-0.00348
	(0.0103)	(0.0120)
Costs power outage (%)	0.00106	0.000612
	(0.00917)	(0.0102)
Bribe (%)	-0.0872***	-0.0842***
	(0.0163)	(0.0182)
Cost security (%)	-0.0585**	-0.0679**
	(0.0252)	(0.0273)
Real sales growth		-0.000
		(0.000)
Region fixed effects		
North Central	-1.195***	-1.145**
	(0.462)	(0.527)
South East	-2.713***	-2.487***
	(0.616)	(0.676)
North East	-1.750***	-1.701***
	(0.599)	(0.636)
South South	-1.728***	-1.204
	(0.646)	(0.788)
North West	-1.257***	-1.286***
	(0.383)	(0.425)
Observations	285	245
Sector FE	YES	YES
Survey FE	YES	YES

Source: Authors based on the panel data from the Enterprise Surveys.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix 4- Robustness checks

To assess the sensitivity of our findings, we perform two robustness checks in addition to using three different measures of productivity. First, we examine whether our results hold without using the weights. Indeed, the literature is not unanimous on the use of weights in regression and there is not strong econometric argument in favor of using weighted estimation. As highlighted in the implementation report of the Nigeria 2014 Enterprise Surveys data set,[11] both OLS and weighted OLS can be inconsistent under regular conditions, even if the weighted OLS has the advantage to provide an estimate that is independent of the simple design. Columns (1) to (3) of Table A3 report estimates of unweighted 2SLS for all measures of productivity. Second, we examine whether our results are sensitive using an alternative criterion to deal with outliers. We use Hadi's (1992, 1994) methodology for multivariate outliers. This methodology uses the covariance matrix to identify a set of outliers over more than one variable. Columns (4) to (6) of Table A3 below present results from estimation excluding the set of outliers identified by Hadi's (1992) approach. The results remain quantitatively and significantly the same. As it can be seen, our findings remain quantitatively and significantly the same.

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[11] http://www.enterprisesurveys.org/documents/Implementation_note.pdf

Table A3. Determinants of productivity – Robustness checks

	Unweighted estimations			Hadi (1992) Multivariate outliers		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	LP	VA	TFP	LP	VA	TFP
Capital						
Log. Stock of capital	0.184***			0.116***		
	(0.0269)			(0.0423)		
Labor						
Proportion of	0.279***	0.170	0.294	0.395***	0.422	0.755*
temporary worker	(0.0902)	(0.199)	(0.183)	(0.124)	(0.392)	(0.386)
Avg. Education of	0.0792***	0.143*	0.0506***	0.205***	0.162	0.127
Workers	(0.0267)	(0.0769)	(0.0154)	(0.0700)	(0.124)	(0.0821)
Size and Age						
Market share	19.84***	28.49***	11.24***	143.5**	77.70**	68.53***
	(5.072)	(6.374)	(2.494)	(58.84)	(38.95)	(26.46)
Young	-0.0239	-0.214	0.00642	0.126	-0.132	0.184
	(0.151)	(0.151)	(0.121)	(0.160)	(0.226)	(0.150)
Mature	-0.0251	-0.165	-0.0293	0.0827	0.0178	0.00727
	(0.0639)	(0.108)	(0.0672)	(0.0967)	(0.0859)	(0.0752)
Access to finance						
Credit line or overdraft	0.156***	0.306***	0.134***	0.139	0.284***	0.175*
Facility	(0.0471)	(0.0658)	(0.0275)	(0.101)	(0.105)	(0.0950)
Investment Climate (%)						
Costs of insecurity	0.0360	0.0740	0.0263	0.0565	0.0581	0.0320
	(0.0275)	(0.0548)	(0.0269)	(0.0443)	(0.0617)	(0.0294)
Cost power outage	-0.00842***	-0.0148***	-0.00475***	-0.00789***	-0.0120***	-0.00416**
	(0.00194)	(0.00378)	(0.00162)	(0.00164)	(0.00294)	(0.00194)
Bribe	0.0286	-0.0344	0.00670	0.0825**	0.0292	0.0369
	(0.0227)	(0.0289)	(0.0149)	(0.0385)	(0.0612)	(0.0384)
Management time	-0.00244	0.00349	0.000784	-4.35e-05	-0.00184	-0.00309
	(0.00338)	(0.00403)	(0.00354)	(0.00464)	(0.00691)	(0.00742)
Outward-orientation						
Exporter	0.217	0.379***	0.254	0.234	0.771*	0.545
	(0.187)	(0.111)	(0.156)	(0.398)	(0.451)	(0.472)
Sector						
Manufacturing	0.315	-0.579	-0.216	1.605	-0.328	0.500
	(0.468)	(0.519)	(0.356)	(1.433)	(1.810)	(0.915)
Observations	1,186	1,211	1,184	1,050	1,070	1,049
R-squared	0.514	0.279	0.217	0.494	0.525	0.416
Weak identification test	18.37	20.07	19.43	7.39	9.44	7.13
Region FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Source: Authors' estimations based on the data from the Enterprise Surveys 2007/2009 and 2014.

Note: LP=labor productivity per worker; VA=value added per worker; TFP are obtained using Levinshon and Petrin (2003)'s approach. Robust standard errors clustered at the States level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All the estimates use the weights from the survey.