Informal Competition and Productivity in Sub-Saharan Africa

Nesma ALI*

Boris NAJMAN**

May 2016

Abstract:

Despite the recognised contribution of competition to spurring productivity growth, competition stemming from informal firms has always been considered as a threat to formal firms. This paper investigates the significance of this default hypothesis. Using the World Bank's Enterprise Surveys, we update the two-step methodology of Guiso et al. (2004) to build a regional indicator of informal competition. We show that a higher intensity of regional informal competition can increase the labour productivity of formal firms. Furthermore, we show that informal competition can modify formal firms' investment structures in terms of their internal organisation and competences. This mechanism draws on the importance of formal firms' human and financial capital and highlights the weaknesses of the Sub-Saharan African business environment, which currently jeopardises any potential positive effects being gained from informal competition.

Keywords: Informal competition, labor productivity, formal firms, informal sector, obstacles.

JEL: O17, D22, L25.

*N. ALI, Université Paris-Est, ERUDITE (EA 437), F-94010, Créteil, France.
Email: nesmamagdi@gmail.com

**B.NAJMAN, Université Paris-Est, ERUDITE (EA 437), F-94010, Créteil, France., CASE.
Email: najman@u-pec.fr

This work was supported by CEPREMAP and UPEC. We would like to thank Asif Mohammed Islam from the World Bank Enterprise Survey Unit for his active collaboration. We would also like to thank Igor Bagayev (ERUDITE- UPEC), Racha Ramadan (Cairo University) and Emmanuelle Lavallée (Paris-Dauphine, LEDa and DIAL) for their useful comments and guidance. We thank Stéphanie Mahieu for her help. All errors remain ours.

1 Introduction

The 2005 economic catch-up in Sub-Saharan Africa has opened up questions about the informal sector's role in recent GDP trends (La Porta and Shleifer, 2008a). In Africa, productivity growth is coupled with a growing and persistent informal sector. We underline this controversy by investigating the informal sector's contribution to one of the main drivers of economic growth: 'market competition'. In other words, we test the effect of competition stemming from informal firms, hereafter referred to as 'informal competition', on the productivity of formal firms by taking into consideration regional and firms' characteristics.[1]

Our motivation arises out of investigating the informal sector controversy, whereby if the informal sector is considered as a threat to formal firms and regional economies, why is it growing considerably, not only in developing countries but also in developed ones? Why are the activities of the informal sector still ignored and discouraged by governments? Is it enough to say that the informal sector is expanding because it allows people involved in that sector to escape taxation, to avoid business regulation and thereby to gain a cost advantage over formal firms? In addition, what about the recent 'unexplained' African economic growth, described as a 'miracle' by Young (2012)? Is it appropriate to ascribe this entire economic catch-up by the 'big push theory'? This puzzle encourages us to reconsider the informal sector's role in Sub-Saharan Africa.

Launched in 1972 by the International Labour Organization (ILO) report, the concept of the 'informal sector' was initially presented with a very positive and optimistic view (ILO, 1972; Bangasser, 2000). However, the reports description of the informal sector's economic efficiency was not widely accepted by economic analysts at the time, and the most common interpretation of the informal sector was to characterise it as a temporary shelter for the poor that would

[1] In our sense, informal firms are those firms who fail to comply with economic regulations (such as registering and licensing) and who fail to meet their tax obligations (ILO, 2009). They also refer to micro-firms (with less than five employees) and the self-employed.

disappear with increasing economic development. The standard view of the informal sector as a threat to economic activity became a self-fulfilling prophecy that has persisted over time.

Consequently, given this prevailing view, most of the studies into the informal sector have tended to emphasise its negative impacts on the overall economy (De Soto, 1990, 2000; Gardes and Starzec, 2009; Djankov et *al.,* 2004; Galal, 2005; El-Hamidi, 2011). These studies commonly show that the informal sector activities are less productive than formal ones, and lack access to formal sources of finance, to government services, to proper documentation and to infrastructure. They tend to employ unskilled and less productive workers and their output is more labour-intensive. These aspects imply that everything related to the informal sector is – by default – harmful to the formal economy, including the competition stemming from informal firms, which is the focus of the present paper.

Although competition is well-known to be one of the key economic drivers of growth, papers in the literature considering informal competition have also treated it as harmful. In fact, only two papers have fully considered informal competition: González and Lamanna (2007) and Friesen and Wacker (2013). These papers focused exclusively on detecting the main characteristics of formal firms that allow them to avoid the negative effects of informal competition. They ignored the fact that competition can help create strong and efficient markets by keeping the most efficient producers and squeezing out inefficiencies and inefficient firms. To the best of our knowledge, no study has so far tested the significance of this default assumption. Our paper aims to fill this gap, by testing empirically the real effect of informal competition.

We chose to focus on Sub-Saharan Africa, as most of this region comprises developing countries with low-income levels and very large informal sectors. The region has the highest proportion of informal activity in percentage of official GDP according to Schneider et *al.* (2010). More precisely, Charmes (2012) carried out an analysis of employment in the informal sector in Sub-Saharan Africa that indicated that the peak of informal employment occurred between 1995 and 1999, with the informal sector accounting for 86.9 percent of non-agricultural employment. Then, between 2000

and 2005 the percentage dropped to its minimum level, with informal employment accounting for 63.3 percent of employment. However, the percentage has started to increase again and reached 69.5 percent between 2005 and 2010. As highlighted by the ILO report (ILO, 2012b), the informal employment rates in Sub-Saharan African countries are very large, and are beyond 60 percent in some countries, such as in the Côte d'Ivoire, Madagascar, Mali, Tanzania, Uganda, and Zambia.

These figures support the underlying debate on the informal sector. That is why we use 'informal competition' as a measure to reconsider the economic efficiency of this sector. Informal competition has been highlighted in the 2013 World Development Report (World Bank, 2013). and has been reported through the World Bank Enterprise Survey indicators. Here, it has been reported that in Sub-Saharan Africa, 67.7 percent of formal firms compete against informal firms and 38.8 percent of formal firms perceive the competition practices in the informal sector as a major constraint to their current operation. Moreover, informal competition has been ranked as the third most important obstacle to the development of formal firms. These numbers are based on the subjective view of formal firms' entrepreneurs towards the practices of competitors in the informal sector.[2] Two reasons can account for the underlying bad perception of the informal sector. First, informal competition is generated by the growing number of informal firms, which is initially considered a threat to formal firms and the wider economy. Second, it is perceived that informal firms have a cost advantage, due to not paying taxes, proper wages or following regulations, allowing them to undercut prices and therefore engaging in 'unfair competition'.

In this paper, we investigate to what extent the competition stemming from the growing number of informal firms affects the productivity of formal firms. Our analysis is based on a pooled sample of 14 437 formal private firms extracted from the standardised Enterprise Surveys collected by the

[2] These indicators are based on three questions: Does this establishment compete against unregistered firms? To what degree are the practices of competitors in the informal sector an obstacle to the current operation of this establishment? Which elements of the business environment included in the list, if any, currently represent the biggest obstacles faced by this establishment?

World Bank,[3] over the period 2006-2013 in 31 Sub-Saharan African and developing countries.[4] These countries have a similar economic development pattern in terms of the prevalence of poverty, informality, governance, and institutional quality. This similarity allows us to carry out a pertinent cross-country analysis. Moreover, a regional analysis of the prevalence of informal competition can be done thanks to the availability of regional data.

We assume the following hypothesis: that the number of informal firms is growing fast and constitutes the primary source of revenue for many of the poor. Informal firms compete against formal firms, especially those operating in the same market and serving the same type of consumer. The effects of informal competition are felt more locally than they are nationally or internationally. Weak governance and institutional quality in Sub-Saharan Africa prevents the realisation of an effective competitive process in the market. Finally, the informal sector could be considered as an economic resource rather than a threat.

Our benchmark specification assessing the effects of informal sector competition is to focus on the effect of informal competition on the productivity of formal firms. This specification reveals two econometrics issues. First, informal competition may have a direct effect on the productivity of formal firms and vice versa (reverse causality). Second, an omitted variable bias can affect our specification since both variables can be driven by the propensity of informal firms to cut their prices due to gain a cost advantage.

To solve these econometrics issues, we estimate our benchmark specification through a two-step process. The first step involves the construction of a regional indicator of informal competition using the updated two-step method of Guiso et *al.* (2004). Since the intensity of informal competition is reflected in our data set only through a perception variable,[5] the constructed regional indicator will prevent any bias linked to the direct inclusion of this perception variable in

[3] Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.
[4] See appendix 1 for a full list of countries included in the sample.
[5] *Do you think that the practices of competitors in the informal sector are an obstacle to the current operations of this establishment?* (see section 4.2 for the construction of the indicator)

our benchmark specification. This regional indicator allows us to implement interesting cross-country and cross-region analyses.

Through the second step, we estimate our benchmark specification using a simple ordinary least squares estimation. We involve in this estimation dummies for sectors, countries and years in order to reduce the number of variables on which we have to rely, as well as to reduce the range of possible alternative explanations. This two-step methodology allows us to be less vulnerable to criticism over omitted variable bias or model specification. We also present three robustness checks to test the validity of our results.

In performing our analysis, as we expected, our first step estimation showed that the probability of formal firms judging less severely the intensity of informal competition decreases when formal firms grow in size. This negative relationship also holds true even with a more stable business environment and when registration procedures are alleviated. Our findings also confirm our baseline hypothesis that the effect of informal competition must be analysed regionally rather than nationally. These results are in line with those of González and Lamanna (2007).

The main contribution of this paper arises from our second step, where we estimate the effects of the intensity of regional informal competition on the productivity of formal firms. We find that the higher the intensity of regional informal competition, the higher the labour productivity of formal firms. In other words, more intense competition stemming from informal firms drives formal firms to be more productive, which is a positive effect. Therefore, informal competition may be productive overall and the default hypothesis of assuming that informal competition is always a threat should be revisited. Moreover, our robustness checks confirm the validity of this positive effect.

This paper is laid out as follows. We start by presenting the relevant literature and channels of transmission in section two. Section three describes the data set, the variables employed in our regressions and the related stylised facts. We explain the methodology used and the construction

of our indicators in section four. The benchmark results and robustness checks are presented in section five. Finally, the last section summarises our conclusion and remarks.

2 Literature review

2.1 Theoretical and empirical background

Historically, the relationship between formal and informal firms has been analysed from the perspectives of different schools of thought, which underlines the controversy raised by this sector (see Lewis, 1954; Harris and Todaro, 1970; Hart, 1973; Rauch, 1991; De Soto, 1990, 2000). Beginning from this historical background, the ideas laid out in our paper and in our main hypothesis are based on the results of three more recent papers. These papers focus more in depth on the contribution of the informal sector to the economy and on the concept of informal competition.

The first paper is by La Porta and Shleifer (2008a), who searched for the relationship between the informal sector and economic development. Their analysis was based on three sets of the World Bank Enterprise Surveys (WBESs): the Enterprise survey, the Informal survey, and the Micro survey. Focusing on a number of African, Asian, and Latin American countries, they showed that the stylised facts of unofficial (that is, informal) firms tend to follows the dual economic view, whereby as the economy grows, unofficial firms would rather close than register, since their inefficiency prevents them from complying with government regulations. They further pointed out that productivity growth comes from formal firms, especially larger ones. However, they failed to find a clear conclusion on the contribution of the informal sector to overall economic development.

The two other papers are the only others in the literature that address the question of informal competition. Both papers used the firm-level WBESs.[6] The paper of González and Lamanna (2007) studies the characteristics of formal firms that make them more subject to the practices of competitors in the informal sector in 14 Latin American countries in 2006. Using a probit regression model, they proved that formal and informal firms compete with each other and are not in segmented or separated markets as suggested by the dual economic view. Their main result was to show that formal firms most resembling informal ones are the ones most adversely affected by informal competition. These formal firms are usually small, credit constrained firms that operate in industries with low entry costs and that serve the same type of consumers as informal firms. They also concluded that informal competition is a threat, especially in countries with low government capacity and high regulation.

The paper of Friesen and Wacker (2013) investigates the relationship between formal firms' access to finance and informal competition in 114 developing and transition countries over the period 2006 to 2011. They built their analysis upon the results of González and Lamanna (2007) by assuming that the existence of informal competition threatens the operations of formal firms. Using a nonlinear ordered response model, they showed that the more financially constrained formal firms are more subject to the practices of competitors in the informal sector. They concluded that the financial constraint is the first determinant of the severity of informal competition. This last point is also affected by other variables, such as corruption, labour regulation and firm size.

As already mentioned, there is a lack of literature tackling the effect of informal competition on firms' productivity. However, many studies emphasise the effects of 'normal' competition, where most of the studies conclude that the effect of competition on firms' productivity is positive

[6] To the best of our knowledge, this is the only survey that provides information about informal firms' practices in many countries.

(Nickell, 1996; Nickell et *al.* 1997; OECD, 2009; Ospina & Schiffbauer, 2010). Others argue that this positive effect holds true even when it is altered with endogenous and exogenous elements such as firms' access to finance (Ayyagari et *al.* 2008), access to a good business environment and access to infrastructure (Bastos & Nasir, 2004; Alby et *al.*, 2012).

Beck et *al.* (2005) opened the door for many researchers to study the key role of financial constraints. They showed to what extent development in the financial sector contributes to poverty reduction by supporting the growth of small and medium-sized enterprises (SMEs) in developing countries. Similarly, Cull and Xu (2005) and Beck and Demirguc-Kunt (2006) emphasised that financing obstacles are more growth-constraining for small firms and prevent all firms from reaching their optimal size. More recently, the World Development Report (2013) and Kuntchev et *al.* (2014) reported access to finance to be the most powerful constraint hindering firm growth in developing countries, and especially in Africa. They also found that the probability of a firm being credit constrained decreases with firm size, with higher productivity, and with higher proportion of private credits to GDP in the country. Other studies such as Friesen and Wacker (2013) have investigated the link between the business environment and financial constraints.

A large body of literature underlines the critical role of the characteristics of the business environment in determining the strength of the competition process in any market. A good business environment is one that ensures effective regulation and business law, the fluidity of the financial system and the availability of sound infrastructure. Such an environment helps the competition process to generate positive effects. However, these conditions do not hold in most Sub-Saharan African countries. As reported by the Doing business report (World Bank, 2015) and the CPIA Africa report (CPIA Africa, 2015), Sub-Saharan countries typically suffer from weak regulatory frameworks and poor law enforcement, the persistence of corruption, the poor provision of infrastructure and challenging access to external sources of finance. As shown by Eifert et *al.* (2005) and Ayagari et *al.* (2008), these issues have a direct effect on firms' productivity in Africa. In addition, Djankov et *al.* (2002) proved that tighter regulation increases the intensity

of corruption and the size of the informal sector in a wide range of income level countries (out of 85 countries in their study, 14 were African).

2.2 Main mechanisms

Our three-benchmark papers highlight the inefficiency of informal firms and the threats from informal competition. So, how does the intensity of the informal competition affect the productivity of formal firms? In fact, several channels might explain the relationship between these two aspects.

The first channel is related to the main causes of informality (Schneider et *al.,* 2010), whereby the growth of the informal sector results from the burden imposed by the tax system, social security schemes and severity of labour regulation. This burden can induce formal firms to participate in the informal sector by under-reporting revenues, labour and/or outputs. It can also encourage new entrepreneurs to start their businesses informally. The larger the size of the informal sector, the lower are the national tax revenues. This, in turn, causes a reduction in public service provision and/or an increase in tax rates. Therefore, the incentive to join the informal sector becomes stronger. This vicious cycle creates a reallocation of labour resources in the direction of the informal sector, which then allows informal enterprises to exert a competitive pressure on formal firms located within the sector in which they operate.

The second channel is related to the characteristics of informal firms. Competition from informal firms is mainly based on creativity, since efficiency is very challenging for them due to economy of scale issues. In their case, creativity typically does not relate to the development of new technologies, but it is rather in terms of adopting new managerial practices. As informal firms are small and usually managed by a single person, they have more simple communication strategies and more flexible production processes. They are able to quickly move in to markets where there is a demand and to serve that market with new services. They are also able to adapt more easily

their labour organisation and internal management to handle different market shocks (Saviotti and Pyka, 2008; Gülbiten and Taymaz, 2000; Duchêne and Rusin, 2002).

The third and last channel is based on the fact that informal firms typically have a cost advantage over formal ones, since they are less regulated, less taxed and do not comply with competition law. This cost advantage is considered as a positive force, allowing informal firms to operate more efficiently (Schneider & Enste, 2000). Although informal firms are less productive than formal ones and even though they use inefficient production techniques, the higher the cost differential between formal and informal firms, the greater the ability of informal firms to take market share from bigger, more productive firms (La Porta & Shleifer, 2008a).

According to these channels of transmission, informal firms can exert a competitive pressure on formal ones by three means: by the growth of the informal sector, through the managerial capacity of informal firms and through their cost advantage. In order to consider these channels in our econometrics technique, we incorporate the means that formal firms will use to respond to this competitive pressure. One such means is the capacity of formal firms to create economies of scale based on innovation and efficiency, which can limit the competitive pressure applied by informal firms. In addition, formal firms' ability to adopt new technologies and to accumulate human capital can overcome informal firms' managerial innovation capacity. Also, formal firms' access to external sources of finance allows them to create stronger financial capital that can overcome informal firms' cost advantage. Therefore, we include in our benchmark regressions variables that represent the size of formal firms, their human and financial capital and variables for the sectors in which they operate.

3 Data and stylised facts

This paper is based on the firm-level WBES that have been conducted by the World Bank and its partners in many developing and transition countries since 2002.[7] The surveys are administrated to a representative sample of firms in the non-agricultural formal private economy including small, medium and large-sized enterprises in the manufacturing sector, the service sector and in the transportation and construction sectors. The sample design of the WBES is based on stratified random sampling. Three levels of stratifications are used: the sector of activity, size and location. Enterprises with less than five employees or that are fully government-owned were excluded from the survey. This sampling methodology generated an appropriate sample size to benchmark the business environment of each economy from the perspective of the firm, using face-to-face interviews with the owner or the manager of the firm.

In this paper, we use the standardised WBES, which employs a uniform sampling methodology to minimise measurement errors and to yield data that are comparable across the world's economies. Our pooled sample period covers the period 2006 to 2013 and accounts for 14 437 formal private firms from 31 African and developing countries.[8] There were 13 sectors of activity and 116 regions corresponding to the 31 countries included in the analysis.[9] Among these countries, 15 were low-income countries, 11 were lower-middle-income countries and five were upper-middle-income countries.[10] Ten countries were surveyed twice during the time period and one country was surveyed three times. For these countries, we include all the surveys in our analysis to maximise the number of observations.[11]

[7] The data are available and downloadable through the World Bank portal: http://www.enterprisesurveys.org
[8] Surveys are conducted in each country at different points in time: 2006, 2007, 2009, 2010, 2011 and 2013.
[9] Non-responses are a common challenge that mainly occurs with sensitive questions. The questions addressing the perception of formal firms towards the practices of competitors in the informal sector was not answered in 363 observations. After examining these cases, we did not detect any distinctive features with respect to countries, sectors, location, size or ownership, and therefore ruled out any selection bias.
[10] World Bank Classification, July 2014
[11] Due to the absence of firms interviewed twice in the standardized WBES, we did not use a panel analysis.

The underlying characteristics make the standardised WBES ideal for the purpose of this study. First, its methodology generates optimised data for the type of cross-country comparison employed in our paper. Second, this survey provides unique information about the degree of informal competition, comparable across all regions included in the sample. Therefore, it allows us to implement a regional analysis based on the prevalence of informal competition by constructing a regional indicator of the intensity of informal competition. Third, the standardised WBES covers not only medium and large enterprises, it also covers small enterprises, which is crucial for investigating the incidence of informal competition on the productivity of formal firms.

3.1 Dependent variable

There are many different measures of firms' productivity, all of them with their own strengths and weaknesses. The choice between them depends on the purpose of the productivity measurement, and in many cases, on the availability of data. In our case, we used a single factor productivity measure – firms' level of labour productivity – since the data on capital were only available for a very limited number of firms in our sample. Therefore, we used total factor productivity measure as a form of robustness check.

In fact, labour productivity has been used as a common indicator in multiple studies tackling firm-level performance in developing countries, mostly due to the unavailability of a homogenous data source and to avoid measurement errors resulting from computation of the denominator (Isaksson et al., 2005; Isaksson, 2007; Kinda et al., 2011). According to the following equation (eq.1 below), for each firm *i,* the logarithm of annual labour productivity is the ratio of the last fiscal year's total sales revenues to the last fiscal year's total number of full-time permanent, temporary and seasonal workers (temporary and seasonal workers are weighted by their average length of employment during the year).

$$logprod_i = \log \frac{total\ sales\ revenue\ of\ last\ fiscal\ year_i}{total\ last\ fiscal\ year\ full\ time\ workers_i} \quad (1)$$

where,

$$Total\ last\ fiscal\ year\ full\ time\ workers_i = last\ fiscal\ year\ total\ full\ time\ permanent\ workers_i + last\ fiscal\ year\ total\ full\ time\ temporary\ and\ seasonal\ workers_i * average\ lenght\ of\ employment / 12$$

The amount of the last fiscal year's total sales revenues is converted into US dollars (USD) using the period's average official exchange rates and then deflated using the CPI (base year 2011).[12] In order to ensure we keep the most credible data, we excluded firms with very large sales (firms with sales in USD three standard deviations away from the mean value).[13] The remaining data can be trusted, especially given that in the WBES, the enumerators are asked to confirm the accuracy of this information.[14]

As highlighted in appendix 2, firms' average annual labour productivity was USD 133.47, corresponding to an average annual total full-time workforce of 29 workers and an average annual total sales revenues of USD 1944. The chemicals and pharmaceuticals industry shows the highest levels of average annual labour productivity, followed by the retail and wholesale industry and then the leather industry. The average annual labour productivity is indeed higher for older firms, which typically have managers with greater experience and which favour partnerships, which reflects a more secure human and financial capital for the firm.

3.2 Independent variables

As we have already mentioned, the purpose of this paper is to estimate the effect of competition stemming from informal or unregistered firms on the productivity of formal firms in multiple Sub-Saharan African developing countries. Therefore, the variable measuring informal competition intensity will be our independent variable of interest. The only way the standardised WBES presents this variable is through the following question:

[12] Made available through the World Development Indicators (World Bank and International Monetary Fund).
[13] In total, about 4 239 firms were identified as outliers.
[14] Information provided by the enumerators will be used to test the validity of our results (see appendix 3).

Do you think that the practices of competitors in the informal sector are No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?

We transformed this question into a dummy variable that indicates whether or not the owner of firm *i* perceives the practices of its competitors in the informal sector as a moderate, major or very severe constraint to the daily operation of their firm.[15] Although perception variables could be very insightful, their direct inclusion in the model may bias the results because of over-reporting or under-reporting behaviours.[16] That is why this perception variable was used to construct a regional indicator of informal competition intensity that varies across the regions of each country specified in the sample. The construction of the indicator is explained in the next section (4.2).

According to our sample (appendix 2, m-n), the practices of competitors in the informal sector are considered as the third most important binding constraint faced by formal firms, behind access to finance and electricity. Our data show that 54 percent of formal firms perceive the practices of competitors in the informal sector as a binding constraint. The competing firms are ultimately smaller with a sole proprietorship legal status. While the least affected are concentrated in the chemical and pharmaceutical industry, the most affected industry is the wood and furniture industry. They also perceive that access to finance and electricity and the severity of corruption and taxes are the major obstacles hindering them from operating in a good business environment.

[15] WBES measures the competition from informal firms as the establishment's perception that it may be competing with firms that may be smuggling, not abiding by copyrights or other intellectual property restrictions, avoiding the payment of taxes or duty, producing and/or selling counterfeit items and/or skirting regulations or other measures prescribed by law.

[16] Formal firms will be more motivated to over-report their answers in order to blame the poor business climate on the existence of informal firms.

Other explanatory variables were also employed in our model to control for the characteristics of the firm and its owner as well as for the main obstacles faced by the firm. The following paragraphs present in more detail the characteristics of these variables.

Firm *size* is calculated as the number of full-time temporary and permanent employees of the firm. It is also employed in our second step regression as a discrete variable that equals one if the firm is small (firms with 5–19 employees), two if the firm is medium-sized (firms with 20–99 employees) and three if it is large (firms with more than 100 employees). The importance of firm size has been highlighted in La Porta and Shleifer (2014), who concluded that informal firms are small and unproductive compared with even small formal firms. Moreover, González and Lamanna (2007) showed that small formal firms are the most affected by direct competition from informal firms.

The data cover all the 2-digit manufacturing industries according to the international standard industrial classifications (ISIC, revision 3.1), such as textiles, leather, garments, food, metals and machinery, and so forth. As reported in appendix 2, the data show that the majority of firms are small (70% of the sample) and operate in the retail and wholesale trade sector (26% of the sample). This mirrors the fact that the business environment in Africa is mainly composed of SMEs and displays fast growth of self-employment. About 61 percent of firms in the sample operate as sole proprietor firms, while only 16.7 percent of firms have a partnership or a limited partnership status.

However, the standardised WBES lacks data on managers' characteristics, such as their age, gender, educational level or marital status. We account for these characteristics through the *manager's experience in the sector*, which can be used as a proxy to account for their human capital. As the education system is very poor in Sub-Saharan Africa, it is much more relevant and efficient to account for a firm's human capital based on learning by doing rather than on conventional education. The average manager's experience is 12.6 years. The accumulation of human capital is the main driving force of observed earnings, albeit it rises at a diminishing rate throughout one's

life (Mincer, 1974). We find that older firms are bigger and are usually run by more experienced managers, but can still be as productive as younger and smaller firms.

The last set of explanatory variables controls for the different obstacles faced by firms, such as *access to finance, the severity of licensing procedures, taxes, corruption and crime*. The separate effect of each of these dummy variables has been the focus of a number of studies (Djankov et *al.*, 2002; Olken and Pande, 2012; Islam, 2014). Our data show that about half of our sample considers tax rates and corruption practices as moderate, major or very severe obstacles to the daily operation of their firms, while almost 40 percent of firms consider licensing procedures and crime risks as binding constraints. These barriers to entry are among the main reasons firms choose to operate informally without respecting the related regulations and rules. That is why self-employment and the informal sector has become the norm in developing countries.

In 2013, the World Development Report (World Bank, 2013) reported that *access to finance* was the most important binding constraint affecting the daily operation of firms in developing countries. We use two different dummy variables to describe this kind of obstacle. The first takes a value of one if the firm has a checking or saving account, and the second takes the value of one if the firm has credit or a loan. Similarly, our data show that although 83 percent of the firms have a checking or saving account, 64 percent of the firms perceive access to finance as a binding constraint, especially since only 15 percent of firms have a line of credit or a loan from a financial institution.

4 Methodology

This section presents the econometric specification used to estimate the effect of informal competition on formal firms' labour productivity through a two-step process. The first step involves the construction of a regional indicator of the intensity of informal competition using the updated two-step method of Guiso et *al.* (2004). Then, in our second step, we estimate our benchmark specification using a simple ordinary least squares estimation (OLS). We also introduce

nonlinear effects in order to examine the business environment associated with informal competition.

4.1 Benchmark specification

In order to estimate the effect of the intensity of regional informal practices on the labour productivity of formal firms, an OLS estimation was used. Our initial equation takes the following form:

$$lprod_i = \beta_0 + \beta_1 IRIC_k + \beta_2 Z_i + \alpha_t + \alpha_s + \alpha_j + \varepsilon_i \quad (2)$$

where $lprod_i$ is the logarithm of annual labour productivity of the formal firm *i* in deflated USD, $IRIC_k$ is the constructed indicator of regional informal competition intensity varying across regions *k* and Z_i is the set of control variables including the firm control variables, such as the size of the firm, its age, its legal status, the characteristics of the owner and the different obstacle faced by the firm. We also controlled for the unobserved year-specific (α_t), industry-specific (α_s) and country-specific (α_j) factors that might affect our dependent variable.

However, the OLS estimation was unable to solve the endogeneity problem. This last issue occurred because of the causal relationship existing between the intensity of regional informal competition perceived by each formal firm and their labour productivity. This issue might be partly eliminated by the use of our constructed local indicator of the intensity of informal competition that differs across the regions of each country but remains constant when comparing firms located in the same region. Thus, we can assume that the intensity of informal competition in region *k* does not directly affect the productivity of formal firms *i* located in region *k*. In addition, by taking the region, sector and country indicators, we reduce the number of variables on which we rely, as well as the range of possible alternative explanations. Therefore, these methods allow us to be less subject to criticism about omitted variable bias or model specification error.

4.2 Indicator construction

Our baseline hypothesis assumes that competition stemming from informal firms has a local effect rather than a national effect, because informal firms are less susceptible to operate, compete and to supply the market nationally, and much less so internationally. The intensity of informal competition is reported by the WBES through a subjective variable that depends on the perception of formal firms' managers towards the degree of informal competition. Creating a regional indicator of informal competition will avoid any bias linked to the direct usage of perception variables.

To do this, we updated the two-step method developed by Guiso et *al.* (2004),[17] who estimated a regional indicator of financial development in Italy. Based on their methodology, we created an indicator of Regional Informal Competition Intensity (IRIC). We did this using firm-level perception variables and a subjective assessment of the factors affecting the intensity of informal competition as perceived by formal firms in each region. In the standardised WBES, the intensity of informal competition is reflected through the question highlighted below:

> *Do you think that the practices of competitors in the informal sector are No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?*

As a first step, this question was employed in our specification as a dummy dependent variable that takes the value of one if the formal firm perceives the practices of its competitors in the informal sector as a moderate, major or very severe obstacle, and the value of zero if they perceive it as no obstacle or as a minor obstacle. Since our dependent variable is binary, use of a linear

[17] Guiso et *al.* (2004)'s paper studied the effects of local financial development by estimating a regional effect on the probability that a household is excluded from the credit market. This methodology was also used in Bagayev and Najman (2014) and Villegas-Sanchez (2009).

regression framework would be inappropriate and could lead to an incorrect conclusion. We therefore adopted a probit regression to estimate the following equations:

$$Perceive_i = \alpha_0 + \alpha_1 X_i + \delta\, Region_k + D_s + D_t + \epsilon_i \quad (3)$$

where $Perceive_i$ is a dummy variable that takes the value of one if the formal firm *i* perceives the practices of its competitors in the informal sector as a binding constraint and takes the value of zero otherwise; X_i is the vector of firm-specific attributes that might explain firms' responses and includes variables measuring the severity of tax rates, of licensing procedures, of corruption, and crime risks and $Region_k$ is the set of regional dummies that is used to construct our regional indicator of informal competition. Our reference region was Jinja in Uganda, which is a region showing the higher number of formal enterprises that perceive informal competition to be a binding constraint. We also include industry dummies (D_s) and year dummies (D_t) to control for any unobserved factors that could affect our dependent variable.

Our sample covered 116 regions of 31 Sub-Saharan African countries. The average number of enterprises per region was 124. Countries with less than two regions, as well as regions with less than 20 enterprises, were excluded from our econometric estimation to prevent any bias resulting from undersized countries or regions. On average in each region, around 65 formal firms perceive the practices of their competitors in the informal sector as a binding constraint.

As expected, the results of the first step probit estimation, as shown in Table 1, show that the probability that formal firms will perceive informal competition less severely increases when the formal firms grow in size and when the obstacles related to crime risks, tax rates, licensing procedures and corruption practices are alleviated. These first results confirm the findings of our benchmark papers. They also add to the wide literature covering the relationship between the business environment and informality.

Our variable of interest is $Region_k$. The measure of regional informal competition is provided by the coefficient δ_k in region *k*. If informal competition does not matter in a given region, then the coefficient associated with this region will not be significant. This is the case in seven regions where the probability of reporting informal competition as a binding constraint is not significantly different to that in our reference region.[18] All the other regions report negative and significant coefficients. Hence, compared to firms included in our reference region (where there is the highest intensity of informal competition), firms in all the other regions report a lower probability of informal competition intensity being a binding constraint.

Table 1: First step estimation of IRIC- Probit estimation

Independent variables	Dependent variable: Do you think that the practices of competitors in the informal sector is an obstacle to the operation of this firm?
Labor	-0.000679*** (0.00)
Firm's age	0.00104 (0.00)
Tax rates as a binding constraint	0.230*** (0.03)
Licensing procedures as a binding constraint	0.281*** (0.03)
Corruption as a binding constraint	0.266*** (0.03)
Crime as a binding constraint	0.426*** (0.03)
Region, country, year dummies	Yes
Constant	0.435** (0.18)
Observations	12,914
Pseudo R2	0.1295
Level of se clustering	Country- sector

Notes: the dependent variable is a dummy variable that takes one if formal firms perceive the practices of competitors in the informal sector as a binding constraint and zero otherwise. Labor is the number of full time permanent and temporary employees in the firm. Firm age is the difference between the date of the interview and the date the firm began operation (plus one). Tax rate, licensing, corruption and crime are dummy variables that take one if the firm perceives tax rates/licensing procedures/corruption practices/crime as binding constraints and zero otherwise. Region dummies are a set of dummies for each separate region included in the survey. The reference region is Jinja in Uganda. Year dummies are a set of dummies indicating the year in which the survey was conducted in each country. The reference year is 2007. Industry dummies are a set of dummies for each industry included in the survey. The reference industry is retail and wholesale trade. Non-parametric robust bootstrapped standard errors (2000 replications) are reported in brackets in all the columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

The second step of our method consists in providing measures of informal competition intensity by ranking the coefficients δ_k of the regional dummies included in our probit estimation, as

[18] For these regions, we choose to keep the measure for IRIC rather than dropping them, since it does not affect our results.

reported in column 3 of Table 2 in the next section. We then transform these measures to our indicator *IRIC* by normalising these coefficients by the following:

$$IRIC_k = 1 - \frac{\delta_k}{\min(\delta_k)} \quad (4)$$

where $IRICI_k$ is the regional indicator of firms perceiving informal competition as a binding constraint in region *k* and δ_k is the coefficients of the region dummy in region *k*. This normalised measure creates an indicator varying between zero and one: zero for the region less affected by informal competition intensity, and one for the region most affected by informal competition intensity.

5 Results

This section presents the results of our two-step econometric specification. The first step allows us to draw conclusions on the regional intensity of informal competition and to compare it between regions of the same country and between countries. The second step shows to what extent informal competition affects the labour productivity of formal firms. We then verify our results using three robustness checks.

5.1 Does regional informal competition matter?

Column 4 (Table 2) lists the indicators of regional informal competition intensity that will be used in the rest of our analysis. These indicators allow us to gain a global view of the disparity of informal competition intensity in each of the regions included in our sample.

According to the methodology used to construct IRIC, as explained in section 4.2, the Jinja region in Uganda is the reference region that displays the highest IRIC. Column 4 of panel B shows that the indicator is also at high levels in other regions of Uganda, such as in Mbarara, Mbale, Lira, and Kampala. Compared to the reference region, the Nimba region in Liberia emerges as the region

least affected by the practices of competitors in the informal sector (column 4 of panel A). This pattern also holds true in other regions of the same country, such as in Montserrado.

This result mirrors the fact that the size of the informal sector in both countries is large, but is relatively much larger in Uganda. The percentages of employment in the informal sector in Liberia and Uganda show that 60 percent vs 69.4 percent of people are in informal employment, 49.5 percent vs. 59.8 percent persons are employed in the informal sector and 10 percent vs. 13.7 percent persons are in informal employment outside the informal sector (ILO, 2012b). According to the WBES, 31 percent of enterprises located in Liberia perceive informal competition as a binding constraint, while 63 percent of enterprises located in Uganda perceive it as a binding constraint.

Informal firms are usually more concentrated in capital cities and in large cities, as these are where they typically find the highest level of demand and the largest number and variety of consumers. It is also where they can more easily hide from state regulation. That is why we remark that the intensity of informal competition is higher in capital cities, in cities surrounding the capital and in large cities. For example, in Uganda, the intensity of informal competition is higher in the Jinja region compared to Mbale and Mbarara, where Jinja is considered to be the third-largest economy in the East African Community. Similarly, in the Democratic Republic of Congo, the highest intensity of informal competition is concentrated in the capital city Kinshasa. This is the case also for the capital city Naouakchott in Mauritania, Dakar in Senegal, and Maputo in Mozambique.

We can also conclude from our results that the intensity of regional informal competition is high and persistent in the majority of the regions included in the sample. Indeed, out of 116 regions in our sample, 83 regions show an IRIC higher than 0.5. This result confirms our baseline hypothesis and the reality of most African and developing countries, where informality has become the norm.

The lowest level of IRIC is reported in regions located in Anglophone African countries, such as in Liberia, South Africa and Sierra Leone. This could be related to the fact that Anglophone

African countries are more economically dynamic than francophone African countries. They are usually ranked higher by the World Bank Doing Business indicators and by the UNDP Human Development Index.

Our results show that our regional analysis provides valuable insights on the prevalence of informal competition. It emphasises to what extent the effect of informal competition must be analysed regionally rather than nationally, as suggested by González and Lamanna (2007). In particular, as most of the initiatives targeting the upgrade of the informal sector are made locally with the help of the local community network and NGOs, this supports the importance of constructing a regional indicator of informal competition. In the next section, we examine the regional effects of informal competition on labour productivity of formal firms using the IRIC.

Table 2: Indicator of regional informal competition intensity (IRIC)

Panel A: Lowest 15 regions in regional informal competition intensity			
Region	Country	Coefficient	**IRIC**
(1)	(2)	(3)	(4)
Nimba	Liberia	-2.979***	0
Port Elizabeth	South Africa	-2.819***	0.053709
Montserrado	Liberia	-2.210***	0.25814
Kenema	Sierra Leone	-2.035***	0.316885
Free Town	Sierra Leone	-1.905***	0.360524
Mahajanga	Madagascar	-1.842***	0.381672
Abidjan	Ivory Coast	-1.774***	0.404498
Antananarivo	Madagascar	-1.740***	0.415911
Pointe-Noire	Congo	-1.719***	0.422961
Antsiranana	Madagascar	-1.712***	0.425311
Cape Town	South Africa	-1.656***	0.444109
Central Malawi	Malawi	-1.623***	0.455186
Santiago	Capeverde	-1.613***	0.458543
Libreville	Gabon	-1.595***	0.464585
Port-Gentil	Gabon	-1.594***	0.464921

Panel B: Highest 15 regions in regional informal competition intensity			
Central DRC	DRC	-0.565**	0.810339
Kampala	Uganda	-0.560***	0.812017
South DRC	DRC	-0.548***	0.816046
Maputo	Mozambique	-0.524***	0.824102
Pemba	Tanzania	-0.507**	0.829809
Lira	Uganda	-0.478**	0.839543
Nakuru	Kenya	-0.457***	0.846593
Dakar	Senegal	-0.453**	0.847936
Mbale	Uganda	-0.376*	0.873783
Mbarara	Uganda	-0.369*	0.876133
Abia	Nigeria	-0.359*	0.87949
Nouakchott	Mauritania	-0.347**	0.883518
Zanzibar	Tanzania	-0.309*	0.896274
Kinshasa	DRC	-0.280**	0.906009
Jinja	Uganda	0	1

Notes: The regional dummy coefficients are obtained from a probit estimation of the equation (3) using Standardized WBES over the period 2006-2013. The IRIC is the normalized measure of regional informal competition intensity computed as in equation 4. Panel A shows the 15 regions displaying the lowest levels of regional informal competition intensity. Whereas Panel B shows the 15 regions displaying the highest levels of regional informal competition intensity. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5.2 Is it necessary to fear informal competition?

Our benchmark specification (column 1, Table 3) shows that the higher the intensity of local informal competition, the higher the labour productivity of formal firms. Indeed, the IRIC coefficients are stable and positive in all specifications (columns 1 to 3).[19] This suggests that formal firms seem to have higher productivity levels when they face a higher intensity of local informal competition. A first possible interpretation of this seeming paradox is that formal firms facing little competition from the informal sector may be protected by regulations – for instance labour regulations or state interventions – and hence do not need to focus on improving their productivity. This is the case for formal large and very productive firms.

On the other hand, formal firms subject to more intense competition from informal firms may need to be more productive in order to prevent informal firms from benefiting from their typical

[19] Column 4 shows that the effect of the regional direct average is in line with our hypothesis. However, the coefficient is slightly overestimated and do not consider endogeneity issues.

cost advantage. This is the case for smaller formal firms. This interpretation is partly in line with the hypothesis of González and Lamanna (2007), who assumed that the formal firms that resemble informal firms the most are the ones who fear informal competition the most. In contrast to González and Lamanna (2007)'s interpretation, we show that those firms are positively affected by informal competition. Hence, we can say that those firms fear something that could actually benefit them, just because informality is considered as a threat.

Another possible interpretation is that formal firms do not distinguish between their sources of competition – whether it stems from informal firms or from other formal firms – because they are aware of the importance of the informal sector in their region and sector. Therefore, the behaviour of formal firms towards informal competition is the same as their behaviour towards competition stemming from other formal firms. In both cases, the firms try to be more efficient and productive in order to increase their own competitiveness. This interpretation is in line with the fact that the informal sector has become the norm in many developing countries. Thus in this situation, the difference between informal competition and formal (normal) competition melts away.

Actually, competing against informal firms is not so easy. Our channels of transmission show that informal firms have important characteristics that make them very strong competitors; for instance, as informal firms are usually small, they have a more flexible managerial innovation capacity in terms of easier communication strategies and more flexible production processes. They can thus more easily change their within-firm management and production in response to market shocks. In addition to their advantage in cost, they are also able to move where the demand is. Therefore, formal firms must be aware of these characteristics and find ways to boost their own productivity and competitiveness.

Our regressions consider some of the most important elements that enhance productivity. Column 1-3 show that the labour productivity of formal firms decreases with size; as smaller firms are more flexible. However, when firms get older, they can create sufficient economies of scale, become

more established, and create stronger human and financial capital. More experienced firms are able to introduce innovation in order to address competition from informal firms. Our results show that the stronger the experience of the manager, the highest the labour productivity of their firm. This effect is both due to a management quality effect and probably a managerial innovation capacity. In other words, firms with a more experienced manager may be better able to introduce internal organisational innovations (Brynjolfsson & Hitt, 2003; Duchêne & Russin, 2002).

Furthermore, while firms in developing countries mainly tend to be a 'one man show', individual proprietorship appears to have a negative effect on the labour productivity of formal firms compared to other legal forms (partnership, limited partnership, cooperative). These latter arrangements enable the firm to obtain more financial capital and collateral, which gives them easier access to different source of finance, and hence, greater finance to increase their productivity.

Considering the financial constraints, firms facing more severe obstacles in accessing sources of finance are usually less productive. More precisely, firms with less access to finance and banking services (access to credit, access to bank accounts) are less productive, while firms with bank accounts or a line of credit are more productive. In accordance with the results of Friesen and Wacker (2013), financially constrained formal firms are those who fear informal competition the most. Those firms are not easily able to overcome the cost advantage that informal firms have. Thus, access to different sources of finance is a necessary condition to obtain a positive effect from informal competition.

Columns 2 and 3 of Table 3, highlight the effects of acquiring an internationally recognised quality certification and foreign ownership. Quality certification does not just refer to ISO certification, it incorporates any internationally recognised quality certification. Foreign ownership refers to any firm that is more than 30 percent owned by foreign private individuals, companies or organisations. Both variables (quality certification and foreign ownership) can be used as a proxy for the capacity

of a firm to acquire new know-how and to innovate. Therefore, firms with quality certification and foreign ownership are expected to have stronger financial and human capital. We found that both variables have a significant positive effect on the labour productivity of formal firms. However, only 12 percent of formal firms in the sample reported having quality certification or being foreign owned.

As formal firms may suffer cost disadvantage comparing to informal one, they adapt their labour organisation in order to enhance labour productivity. Informal firms are supposed to be more flexible and able to react quickly to the demand. Formal firms, facing informal competition, invest in internal competences. Formal firms tend to keep their employees and to reward competences. Therefore, the capacity of formal firms' employees to use and develop their specific competences (tailored to the capital investment) contributes to productivity enhancement.

To summarise our results, we can state that the informal sector is not as harmful to productivity as González and Lamanna (2007), Friesen and Wacker (2013) and many other studies on the informal sector have considered. It is expected that formal firms fear informal competition. However, not all informal competition is a threat. Our empirical findings show that informal competition, analysed at a regional level, can positively and significantly affect the productivity of formal firms. Many elements allow formal firms to benefit more effectively from a positive effect from informal competition. Formal firms can become more productive and competitive by creating economies of scale, by acquiring stronger human and financial capital and by enhancing the expertise of the firm and its managerial capacity.

Table 3: productivity regression

	Dependent variable : formal firms' log annual labor productivity (USD/employee)			
Independent variables	Benchmark specification	Quality certification	Foreign ownership	Regional direct average
	(1)	(2)	(3)	(4)
IRIC	0.492***	0.435**	0.432**	
	(0.19)	(0.19)	(0.19)	
Regional direct average				0.658***
				(0.20)
Firm size: small	1.123***	1.148***	1.184***	1.133***
	(0.07)	(0.07)	(0.07)	(0.11)
Firm size: medium	0.806***	0.817***	0.846***	0.822***
	(0.07)	(0.07)	(0.07)	(0.09)
Firm's age	0.00483***	0.00427***	0.00445***	0.00482*
	(0.00)	(0.00)	(0.00)	(0.00)
Manager's year of experience	0.00283*	0.00282*	0.00263*	0.00318**
	(0.00)	(0.00)	(0.00)	(0.00)
Sole proprietorship	-0.314***	-0.293***	-0.251***	-0.312***
	(0.03)	(0.03)	(0.03)	(0.03)
Access to finance as an obstacle	-0.132***	-0.124***	-0.112***	-0.136***
	(0.03)	(0.03)	(0.03)	(0.02)
Firm has a line of credit	0.180***	0.184***	0.194***	0.179***
	(0.03)	(0.03)	(0.03)	(0.04)
Firm has a checking or saving account	0.416***	0.398***	0.392***	0.414***
	(0.04)	(0.04)	(0.04)	(0.04)
Quality certification		0.285***	0.256***	
		(0.04)	(0.04)	
Foreign ownership			0.294***	
			(0.04)	
Country, year, industry dummies	yes	yes	yes	yes
Constant	-1.866***	-1.848***	-1.910***	7.120***
	(0.28)	(0.29)	(0.27)	(0.22)
Observations	10,040	9,854	9,854	10,316
R-squared	0.517	0.523	0.526	0.517

Notes: The dependent variables is the log of annual labor productivity of formal firms in deflated USD. IRIC is the indicator of regional informal competition intensity, our explanatory variable of interest, showing the intensity of informal competition in each region included in the sample. Dummies for firms' size are included taking large firms as reference. Firm age is the difference between the date of the interview and the date the firm began operation (plus one). Manager years of experience is a continuous variable showing the number of years the firm's manager has in the sector. Sole proprietorship is a dummy variable taking one if firms' status is sole proprietorship and zero otherwise. Access to finance is a dummy variables taking one if firms perceive access to finance as binding constraint and zero otherwise. Firm has a saving or checking account/line of credit are dummy variables taking one if firms have a saving or checking account/line of credit and zero otherwise. Quality certification is a dummy variable taking one if firms have an internationally-recognized quality certification and zero otherwise. Foreign ownership is a dummy variable taking one if foreign ownership of the firm exceed 30% and zero otherwise. Industry dummies are a set of dummies for each industry included in the survey. The reference industry is retail and wholesale trade. Year dummies are a set of dummies indicating the year in which the survey was conducted in each country. The reference year is 2007. Country dummies are a set of dummies for each country included in the sample. The reference country is Nigeria. Column (4) considers the regional average of the perception of formal firms toward informal competition. Non-parametric robust bootstrapped standard errors (2000 replications) are reported in brackets in all the columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5.3 Institutional quality associated with informal competition

Our benchmark regression proved empirically that regional informal competition could significantly and positively affect the labour productivity of formal firms. In this section, we investigate to what extent institutional quality affects informal competition.

Using the World Bank worldwide governance indicators (WGI), we include four different characteristics:[20] control of corruption (*COR*), rule of law (*RULE*), governance effectiveness (*GOV*) and regulatory quality (*REG*).[21]

These indicators typically have a scale of -2.5 to 2.5. To allow an easier interpretation of the results, we normalise these in order to create indicators that range between 0 and 1, where a value of zero corresponds to lower ranks and a value of one corresponds to higher ranks. Then we regress these indicators with our dependent variable *IRIC*, as shown by the following equation:

$$lprod_i = \alpha_0 + \alpha_1 IRIC_k * WGI_j + \alpha_2 Z_i + \theta_t + \theta_s + \theta_j + \varepsilon_i$$

where $lprod_i$ is the logarithm of annual labour productivity of the formal firm *i* in deflated USD; $IRIC_k$, is the constructed indicator of Regional Informal Competition in each region *k*; WGI_j are the four governance indicators that we introduced alternatively in the regression and Z_i, is the set of firm control variables as before. We also control for unobserved year-specific (θ_t), industry-specific (θ_s) and country-specific (θ_j) factors that might affect our dependent variable.

The results of these regressions are reported in Table 4. We can first remark that the effect of regional informal competition remains positive and highly significant at the one percent level. Compared to our benchmark specification, all the other variables keep the same sign and significance levels. This confirms again the validity of our main results and interpretations.

[20] The definition of each indicator is taken from the WGI's website: http://info.worldbank.org/governance/wgi/index.aspx#home

[21] See appendix 4 for the definition of each indicator.

Of the four measures of the business regulatory environment, we find that control of corruption and rule of law insignificantly affect the labour productivity of formal firms. However, government effectiveness and regulatory quality are significant and affect negatively the labour productivity of formal firms. This result is puzzling because a better control of corruption and more effective governance, rule of law and regulatory quality would be expected to have a significant positive impact on firms' productivity.

Considering the interaction effects, we observe that the four interactions of IRIC with WGI have a negative sign and are highly significant. This result means that the IRIC has a positive effect on the labour productivity of formal firms, but this positive effect is reduced by the introduction of new policies that target the enhancement of the institutional quality. As already mentioned, the informal sector is considered by default by most firms to be a threat. All the policies undertaken to enhance the business environment of formal firms tend to be repressive. Therefore, these policies can jeopardise any positive effects linked to the informal sector, even if overall they are applied ineffectively.

Table 4: IRIC and institutional quality

Variables	Dependent variable : formal firms' log annual labor productivity (USD/employee)				
	Benchmark specification	Interactions with IRIC			
		COR	RULE	GOV	REG
	(1)	(5)	(6)	(7)	(8)
IRIC	0.492***	0.934**	1.484***	1.087***	1.741***
	(0.19)	(0,39)	(0,47)	(0,41)	-0,511
Firm size: small	1.123***	1.124***	1.129***	1.112***	1.113***
	(0.07)	(0,07)	(0,07)	(0,07)	(0,07)
Firm size: medium	0.806***	0.807***	0.811***	0.797***	0.803***
	(0.07)	(0,07)	(0,07)	(0,07)	(0,07)
Firm's age	0.00483***	0.00486***	0.00494***	0.00472***	0.00473***
	(0.00)	(0,00)	(0,00)	(0,00)	(0,00)
Manager's year of experience	0.00283*	0.00285*	0.00279*	0.00303**	0.00261*
	(0.00)	(0,00)	(0,00)	(0,00)	(0,00)
Sole proprietorship	-0.314***	-0.315***	-0.314***	-0.323***	-0.323***
	(0.03)	(0,03)	(0,03)	(0,03)	(0,03)
Access to finance as an obstacle	-0.132***	-0.133***	-0.132***	-0.138***	-0.131***
	(0.03)	(0,03)	(0,03)	(0,03)	(0,03)
Firm has a line of credit	0.180***	0.180***	0.181***	0.179***	0.180***
	(0.03)	(0,03)	(0,03)	(0,03)	(0,03)
Firm has a checking or saving account	0.416***	0.418***	0.417***	0.418***	0.412***
	(0.04)	(0,04)	(0,04)	(0,03)	(0,04)
COR		0,711			

		(0,79)			
IRIC# COR		-1.339* (0,79)			
RULE			1,445 (1,06)		
IRIC# RULE			-2.077*** (0,80)		
GOV				-2.047** (0,82)	
IRIC#GOV				-1.332** (0,61)	
REG					-3.650*** (1,41)
IRIC# REG					-2.129*** (0,70)
Country, year, industry dummies	yes	yes	yes	yes	yes
Constant	-1.866*** (0.28)	-2.212*** (0,35)	-2.562*** (0,43)	-2.293*** (0,38)	-3.495*** -0,473
Observations	10,040	10 040	10 040	10 040	10 040
R-squared	0.517	0,518	0,518	0,519	0,52

Notes: this table recall the benchmark specification (see notes table 3). columns 5-8 include Worldwide governance indicators. Non-parametric robust bootstrapped standard errors (2000 replications) are reported in brackets in all the columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

5.4 Robustness checks: Total factor productivity measure

Data required to measure total factor productivity – such as cost of capital and labour – were available for only a very limited number of firms in our sample. Therefore, in this section, we use a subset of firms to compute the total factor productivity (TFP) measure in order to verify the validity of our results.

As Bloom et al. (2010) have done,[22] we consider the following Cobb Douglas firm-level production function:

$$y_i = \propto_l l_i + \propto_e e_i + \propto_q q_i + \beta . IRIC_k + \gamma' Z_i + u_i$$

where y_i is the last fiscal year total annual sales in USD; l_i is the total labour costs in the last fiscal year in USD, including wages, salaries and bonuses; $e_i$is the total annual cost of electricity in the last fiscal year in USD and q_i is the total annual expenditure for the purchase of equipment in the

[22] In Bloom et *al.* (2010)'s paper, they use a similar equation to test the effects of modern management practices on manufacturing firms productivity in the UK.

last fiscal year in USD. All the monetary values are converted into USD and deflated using the CPI (base year: 2011). The lower case letters denote natural logarithms. The vector Z_i consists of a number of control variables that affect productivity, such as a firms' age, the manager's years of experience, the firms' legal status, financial constraints and a set of country, industry and year dummies.

Our coefficient of interest is the coefficient β, which verifies the effect of the indicator of regional informal competition *IRIC* using the TFP measure instead of labour productivity. Column 9 of Table 5 shows that IRIC remains positive and highly significant at 1 percent. Therefore, our result is still valid, even with the small subset of firms for which we can measure TFP (almost 5800 firms).

Table 5: robustness checks: total factor productivity and informal competition:

Variables	Benchmark specification	Dependent variable: log total annual sales in USD (last fiscal year)
	(1)	(9)
log(labor cost)		0.737***
		(0,01)
log(electricity cost)		0.0550***
		(0,01)
log(Equipment cost)		0.00439***
		(0,00)
IRIC	0.492***	0.377***
	(0.19)	(0,14)
Firm's age	0.00483***	0.00378***
	(0.00)	(0,00)
Manager's year of experience	0.00283*	-0,0013
	(0.00)	(0,00)
Sole proprietorship	-0.314***	-0.169***
	(0.03)	(0,03)
Access to finance as an obstacle	-0.132***	-0.102***
	(0.03)	(0,02)
Firm has a line of credit	0.180***	0,0438
	(0.03)	(0,03)
Firm has a checking or saving account	0.416***	0.216***
	(0.04)	(0,03)
Firm size: small	1.123***	
	(0.07)	
Firm size: medium	0.806***	
	(0.07)	
Country, year, industry dummies	yes	yes
Constant	-1.866***	2.543***
	(0.28)	(0,14)

Observations	10,040	6 352
R-squared	0.517	0,717

Notes: this table recall the benchmark specification (see notes table 3). Column (9): the dependent variables is the log of last fiscal year total annual sales in USD. All costs are reported in USD and deflated. Non-parametric robust bootstrapped standard errors (2000 replications) are reported in brackets in all the columns. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

6 Conclusion

This paper investigates the effect of competition stemming from informal firms on the labour productivity of formal firms in 31 Sub-Saharan African countries. We update the two-step methodology of Guiso et *al.* (2004) to construct a regional indicator of informal competition intensity using a pooled sample of 14 437 formal firms extracted from the standardised World Bank Enterprise Survey over the period 2006-2013. We then estimated the effect of our constructed indicator on the labour productivity of the formal firms included in our sample.

The standardised Enterprise Surveys (WBESs) provide unique information comparable across the world's economies. However, endogeneity might occur because of the causal relationship between the intensity of informal competition as perceived by each formal firm and their own labour productivity. We try partly to eliminate the endogeneity issue by using our constructed local indicator of the intensity of informal competition, which differs across the regions of each country but remains constant when comparing firms located in the same region. We also included industries, countries and years dummies to prevent any omitted variable bias or model specification error. Multiple checks were implemented to verify our main results.

As expected, we find that the intensity of regional informal competition is high and persistent in the majority of the regions included in the sample, and that it widely differs across regions of the same country as well as across countries. These results show to what extent regional informal competition matters and confirm our baseline hypothesis assuming that the effect of informal competition must be analysed regionally rather than nationally.

Unlike the majority of studies focusing on the informal sector, we conclude that the presence of informal firms is not always as harmful as is usually considered. Our results show that more intense competition stemming from informal firms can drive formal firms to become more productive. The typical cost advantage of informal firms pushes formal firms to become more productive and more competitive. Indeed, many elements allow formal firms to benefit more effectively from the positive effect of informal competition. Formal firms, for instance, can become more productive and competitive by acquiring stronger human and financial capital and by enhancing the expertise of the firm and its managerial capacity. We also confirm that policies undertaken to enhance institutional quality tend to be repressive policies. Therefore, these policies may jeopardise any positive effects linked to the informal sector, even if the policies are applied ineffectively.

Our results allow us to draw some interesting policy implications. The findings of this paper suggest that these countries should recognise the importance of informal firms and integrate them into their policies in order to improve their role. To do so, they must ensure the creation of a secure business environment, not only for formal firms, but also for informal ones that, like it or not, remain a very important part of the production system in developing counties. Formalising the informal sector depends on the institutional willingness of governments to implement it and not just on the willingness of informal firms, who may prefer to remain informal.

Our paper contributes to the existing literature in several different ways. First, we provide, for the first time, empirical estimates on the effect of informal competition on the productivity of formal firms by introducing a regional indicator of the intensity of informal competition. We then extend our estimation to a large sample of Sub-Saharan African countries. Second, we emphasise a new type of competition that should be considered more often, because of the growing number of informal firms in the developing world. Third, we adopt existing econometrics techniques to introduce nonlinear effects that could explain more extensively the business environment associated with informal competition. Fourth, our results add to the literature on African economic

growth by indicating the mechanisms through which the informal sector can be considered as an economic resource rather than a threat.

Reference:

Alby, P., Dethier, J. J., & Straub, S. (2012). Firms operating under electricity constraints in developing countries. *The World Bank Economic Review*, lhs018.

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2008). How important are financing constraints? The role of finance in the business environment. *The World Bank Economic Review*, *22*(3), 483-516.

Bagayev, I., & Najman, B. (2014). Money to fill the gap? Local financial development and energy intensity in Europe and Central Asia. *ERUDITE Working Paper No.2*.

Bangasser, P. E. (2000). *The ILO and the informal sector: an institutional history*. Geneva, Switzerland: International Labour Organization.

Bastos, F., & Nasir, J. (2004). Productivity and the investment climate: what matters most?. *World Bank Policy Research Working Paper*, (3335).

Beck T, Demirgu¨c¸ -Kunt A, Laeven L, Levine R. (2005). Finance, firm size and growth. *World Bank Policy Research Working Paper, (3485).*

Beck, T., & Demirgüç -Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance*, *30*(11), 2931–2943.

Bloom, N., Genakos, C., Martin, R., & Sadun, R. (2010). Modern Management: Good for the Environment or Just Hot Air?*. *The Economic Journal*, *120*(544), 551-572.

Brynjolfsson, E., & Hitt, L. M. (2003). Computing productivity: Firm-level evidence. *Review of economics and statistics*, *85*(4), 793-808.

Charmes, J. (2012). The informal economy worldwide: trends and characteristics. *Margin: The Journal of Applied Economic Research*, *6*(2), 103-132.

CPIA Africa (2015). *Assessing Africa's policies and institutions.* World Bank, Washington, DC.

Cull, R., & Xu, L. C. (2005). Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms. *Journal of Financial Economics*, *77*(1), 117-146.

De Soto, H. (1990). *The other path: The invisible revolution in the third world.* Harper and Row, New York.

De Soto, H. (2000). *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. Basic books.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). The regulation of entry. *Quarterly*

Journal of Economics, 1–37.

Djankov, S., Miguel, E., Qian, Y., Roland, G., & Zhuravskaya, E. (2004). Who are Russia's entrepreneurs? *Journal of the European Economic Association*, *3*(2-3), 587–597.

Doing Business indicators (http://www.doingbusiness.org/), The World Bank.

Duchêne, G., & Rusin, P. (2002). *Micro-entreprises, croissance et mutations de l'emploi dans les pays en transition* (Vol. 53, No. 3, pp. 637-646). Presses de Sciences Po.

Eifert, B., Gelb, A., & Ramachandran, V. (2005). Business environment and comparative advantage in Africa: Evidence from the investment climate data. *Center for Global Development Working Paper*, (56).

El-Hamidi, F. (2011). How do women entrepreneurs perform? Empirical evidence from Egypt. In *Economic Research Forum (ERF) Working Paper*.

Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

Friesen, J., & Wacker, K. (2013). Do Financially Constrained Firms Suffer from More Intense Competition by the Informal Sector? Firm-Level Evidence from the World Bank Enterprise Surveys. *Courant Research Centre. Discussion Paper No. 139*.

Galal, A. (2005). The economics of formalization: Potential winners and losers from formalization in Egypt. *Investment Climate, Growth, and Poverty. ECES Working Paper No. 95*, 39.

Gardes, F., & Starzec, C. (2009). Polish households' behavior in the regular and informal economies. *Revue économique*, *60*(5), 1181-1210.

González, A. S., & Lamanna, F. (2007). Who fears competition from informal firms? Evidence from Latin America. *The World Bank Financial and Private Sector Development Enterprise Analysis Unit*.

Gülbiten, Ö., & Taymaz, E. (2000). Are Small Firms Inefficient? A Schumpeterian Analysis of Productivity Differentials. *Department of Economics, Middle East Technological University, Ankara*.

Guiso, L., Sapienza, P., & Zingales, L. (2004). Does local financial development matter? *The Quarterly Journal of Economics*, *119*(3), 929–969.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *The American economic review*, 126-142.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The journal of modern*

African studies, 11(01), 61-89.

Human Development Index (http://hdr.undp.org/en/content/human-development-index-hdi). UNDP.

International Labor Office. (1972). *Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya*. International Labor Office. Geneva: Switzerland.

International Labor Office. (2009). *The informal economy in Africa: Promoting transition to formality: Challenges and strategies*. International Labor Office. Geneva: Switzerland

International Labor Office.(2012a). *African newsletter on Occupational Health and Safety: Small-scale enterprises and informal sector*. International Labor Office. Geneva: Switzerland

International Labor Office. (2012b). *Statistical update on employment in the informal economy*. International Labor Office. Geneva: Switzerland

Isaksson, A. (2007). Determinants of total factor productivity: A literature review. *Research and Statistics Branch, UNIDO*.

Isaksson, A., Ng, T. H., & Robyn, G. (2005). *Productivity in developing countries: trends and policies*. UNIDO.

Islam, A. (2014). Economic growth and crime against small and medium sized enterprises in developing economies. *Small Business Economics*, 1–19.

Kinda, T., Plane, P., & Véganzonès-Varoudakis, M.-A. (2011). Firm productivity and investment climate in developing countries: how does Middle East and North Africa manufacturing perform? *The Developing Economies*, *49*(4), 429–462.

Kuntchev, V., Ramalho, R., Rodríguez-Meza, J., & Yang, J. S. (2014). What have we learned from the enterprise surveys regarding access to credit by SMEs? *Working Paper, Enterprise Analysis Unit, World Bank, Washington, DC*.

La Porta, R. L., & Shleifer, A. (2008a). *The unofficial economy and economic development*. National Bureau of Economic Research.

La Porta, R., & Shleifer, A. (2014). Informality and Development. *Journal of Economic Perspectives*, *28*(3), 109–126.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The manchester school*, *22*(2), 139-191.

Mincer, J. (1974). Schooling, Experience, and Earnings. Human Behavior & Social Institutions No. 2.

Nickell, S. J. (1996). Competition and corporate performance. *Journal of political economy*, 724-746.

Nickell, S., Nicolitsas, D., & Dryden, N. (1997). What makes firms perform well?. *European Economic Review*, *41*(3), 783-796.

OECD. (2009). *Competition Policy and the Informal Economy.* OECD, Paris.

Olken, B. A., & Pande, R. (2012). Corruption in developing countries. *Annual Review of Economics*, *4*, 479–509.

Ospina, S., & Schiffbauer, M. (2010). Competition and firm productivity: Evidence from firm-level data. *IMF Working Paper*.

Rauch, J. E. (1991). Modelling the informal sector formally. *Journal of development Economics*, *35*(1), 33-47.

Saviotti, P. P., & Pyka, A. (2008). Product variety, competition and economic growth. *Journal of Evolutionary Economics*, 18(3-4), 323-347

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). Shadow Economies all over the World: New Estimates for 162 Countries from 1999 to 2007. *World Bank Policy Research Working Paper Series, Vol.*

Schneider, F., & Enste, D. (2000). Shadow economies around the world-size, Causes, and Consequences. International Monetary Fund, Working Paper No. 00/26.

Villegas-Sanchez, C. (2009). FDI spillovers and the role of local financial markets: evidence from Mexico. *Manuscript, University of Houston*.

World Bank. (2013). *World Development Reports: Jobs*. World Bank, Washington, DC.

World Bank (2015). *Doing Business report: Going beyond efficiency.* The World Bank, Washington DC.

World Development Indicators, The World Bank

Worldwide Governance indicators (http://info.worldbank.org/governance/wgi/index.aspx#home), The World Bank.

Young, A. (2012). *The African growth miracle* (No. w18490). National Bureau of Economic Research.

Appendices:

Appendix 1: List of countries

	Country	#Enterprises per country	% Enterprises per country	#Regions per country	Survey Year	World Bank income classification-July 2014
1	Angola	627	4.34	3	2006-2010	UM
2	Botswana	406	2.81	2	2006-2010	UM
3	Burkina-Faso	269	1.86	2	2009	L
4	Cameroun	261	1.81	3	2009	LM
5	Cape Verde	92	0.64	3	2009	LM
6	Congo	86	0.6	2	2009	LM
7	Cote d'Ivoire	311	2.15	2	2009	LM
8	DRC	1,031	7.14	8	2006-2010-2013	L
9	Ethiopia	492	3.41	4	2011	L
10	Gabon	93	0.64	2	2009	UM
11	Gambia	160	1.11	2	2006	L
12	Ghana	618	4.28	4	2007-2013	LM
13	Guinea	217	1.5	2	2006	L
14	Kenya	891	6.17	6	2007-2013	LM
15	Liberia	101	0.7	2	2009	L
16	Madagascar	790	5.47	11	2009-2013	L
17	Malawi	81	0.56	2	2009	L
18	Mali	736	5.1	4	2007-2010	L
19	Mauritania	215	1.49	2	2006	LM
20	Mozambique	418	2.9	4	2007	L
21	Namibia	254	1.76	2	2006	UM
22	Nigeria	1,795	12.43	11	2007	LM
23	Rwanda	353	2.45	2	2006-2011	L
24	Senegal	458	3.17	4	2007	LM
25	Sierra Leone	134	0.93	2	2009	L
26	South Africa	493	3.41	4	2007	UM
27	Swaziland	259	1.79	3	2006	LM
28	Tanzania	1,010	7	6	2006-2013	L
29	Uganda	1,141	7.9	6	2006-2013	L
30	Zambia	63	0.44	2	2007-2013	LM
31	Zimbabwe	582	4.03	4	2011	L
	Total	14437	100	116		

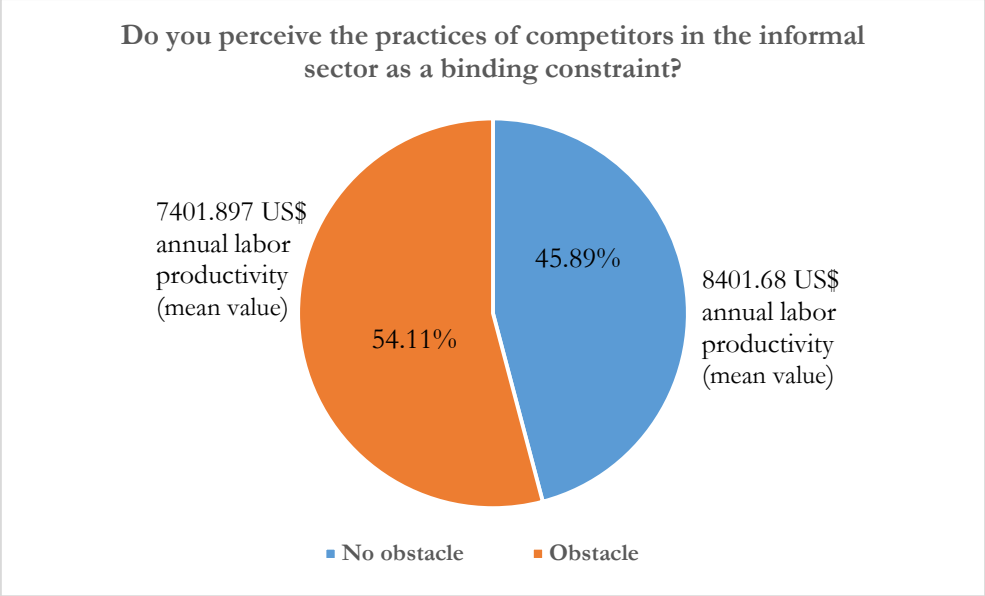
Source: World Bank Enterprise Survey, standardized dataset. http://www.enterprisesurveys.org

Appendix 2: Summary statistics of main variables

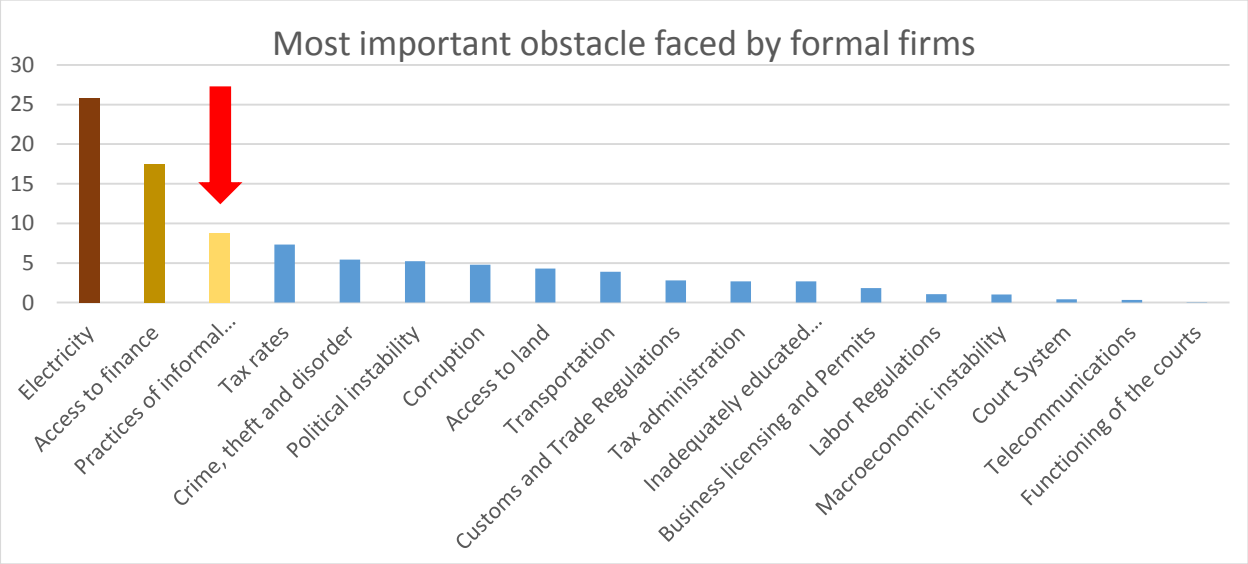
Variable	Obs.	Mean	Std. Dev.	Min	Max
a) Annual labor productivity in USD (deflated, CPI base year 2011)	12723	133.4727	210.5299	.0024572	2622.458
b) Annual sales revenue in USD (deflated, CPI base year 2011)	12807	1944.003	2740.61	.0165859	20714.73
c) Total full time workers (labor=permanent, temporary and seasonal workers)	14247	29.0301	95.80393	5	3669
d) Firm age	14169	13.05496	12.40526	0.01	172.01
e) Manager's years of experience in the sector	14131	12.62991	9.062227	0.01	90.01
f) Labor costs (deflated, CPI base year 2011)	12547	906.7577	37099.76	3.68e-08	3930860
g) Electricity costs (deflated, CPI base year 2011)	12353	84.16166	1364.542	2.71e-08	99274.27
h) Equipment costs (deflated, CPI base year 2011)	8303	2395.66	128497.4	2.71e-08	1.09e+07

	Freq.	Percent	Average annual labor productivity
i) Size of the firm			
Small(<20)	10,118	70.08	7843.774
Medium(20-99)	3,611	25.01	8393.617
Large(100 and over)	708	4.9	2788.703
Total	14437	100	
j) Sector of activity			
Textiles	289	2	6083.828
Leather	136	0.94	9286.42
Garments	1,156	8.01	5240.471
Food	1,750	12.12	8048.518
Metals and machinery	767	5.31	7193.002
Chemicals and pharmaceuticals	256	1.77	9618.454
Wood and furniture	458	3.17	5229.007
Non-metallic and plastic materials	307	2.13	8137.184
Other manufacturing	1,810	12.54	8360.354
Retail and wholesale trade	3,777	26.16	9496.247
Hotels and restaurants	1,384	9.59	6321.171
Other services	1,700	11.78	6954.059
Other: Construction, Transportation, et	647	4.48	8428.211
Total	14437	100	
k) Firms with sole proprietorship	8,828	61.15	6803.432
l) Firms with partnership legal status	2425	16.79	8685.827

m) Formal firms' perceptions towards the practices of competitors in the informal sector:



n) Most important constraints faced by formal firms in their operation:



Note: all figures are computed by the authors.
Source: World Bank Enterprise Survey, standardized dataset. http://www.enterprisesurveys.org

Appendix 3: Robustness check: Truthful and reliable information:

Despite the importance of micro-level data in drawing useful policy implication, the credibility of collected data is usually criticized. Most of the data provided by micro-level surveys rely on subjective perceptions and opinions of the respondent. In the WBES, question on perception regarding business environment are administered to the managing director or the direct representative of the firm. While, question on production costs, investment flows and statistics can be administrated to the managing director, the accounting department, the bookkeeper and/or the human resource manager. Provided figures can be taken directly from the firms' record (if any) or estimated with precision. In addition, efforts are made by enumerators to assure respondents of the confidentiality of their information.

However, some respondent can be reluctant in providing such sensitive information. That is why enumerators are asked to confirm the credibility of provided information by answering 2 questions:

- It is my perception that the questions regarding opinions and perceptions: 1.truthful, 2.somewhat truthful, 3.not truthful
- The questions regarding figures (productivity and employment numbers): 1.are taken directly from establishment records, 2.are estimates computed with some precision, 3.are arbitrary and unreliable numbers

Columns 3-5 of the table below report the results of our benchmark regression after dropping alternatively untruthful opinions and perception (answer no.3), untruthful and somewhat truthful opinion and perception (answer no.2 and 3), then arbitrary & unreliable numbers (answer no.3 of each question). We can see that our regional indicator of informal competition remain positive and highly significant, expect in column 4 where the significance is reduced to 10%. All other explanatory variables keep the same sign and significance as in the benchmark specification.

Variables	Dependent variable : formal firms' log annual labor productivity (USD/employee)			
	Benchmark specification	Truthful and somewhat truthful Opinion and perceptions	Only truthful Opinion and perceptions	Reliable figures
	(1)	(3)	(4)	(5)
IRIC	0.492***	0.512***	0.394*	0.531***
	(0.19)	(0.19)	(0.21)	(0.18)
Firm size: small	1.123***	1.125***	0.944***	1.132***
	(0.07)	(0.07)	(0.08)	(0.07)
Firm size: medium	0.806***	0.810***	0.644***	0.817***
	(0.07)	(0.07)	(0.08)	(0.07)
Firm's age	0.00483***	0.00470***	0.00544***	0.00462***
	(0.00)	(0.00)	(0.00)	(0.00)
Manager's year of experience	0.00283*	0.00287*	0.00191	0.00274*
	(0.00)	(0.00)	(0.00)	(0.00)
Sole proprietorship	-0.314***	-0.313***	-0.343***	-0.311***
	(0.03)	(0.03)	(0.03)	(0.03)
Access to finance as an obstacle	-0.132***	-0.131***	-0.138***	-0.135***
	(0.03)	(0.03)	(0.03)	(0.03)
Firm has a line of credit	0.180***	0.177***	0.150***	0.181***

	(0.03)	(0.03)	(0.04)	(0.03)
Firm has a checking or saving account	0.416*** (0.04)	0.418*** (0.04)	0.389*** (0.04)	0.425*** (0.04)
Country, year, industry dummies	yes	yes	yes	yes
Constant	-1.866*** (0.28)	-1.897*** (0.29)	-2.065*** (0.32)	-1.959*** (0.28)
Observations	10,040	9,984	6,505	9,750
R-squared	0.517	0.518	0.572	0.523

Note: this table recalls the benchmark specification (see notes table 4). Column (3): truthful and somewhat truthful opinions and perceptions are considered. Column (4): only truthful opinions and perceptions are considered. Column (5): only reliable figures (taken directly from firms' records, estimated with precision) are considered. *** Significant at 1 %, ** Significant at 5%, * Significant at 10%.

Appendix 4: Definition of Institutional quality's indicators as reported by the WGI's website (http://info.worldbank.org/governance/wgi/index.aspx#home)

- Control of corruption (COR): *captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.*
- Rule of law (RULE): *captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.*
- Governance effectiveness (GOV): *captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.*
- Regulatory quality (REG): *captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development*