

## **Can informal firms hurt registered SMEs' access to credit?**

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### Abstract

We examine whether competitors from the informal sector affect the credit constraints of registered SMEs in 86 countries. We also investigate how the quality of institutional environment alters such effect. Our findings show that formal SMEs facing competition from informal firms are more likely to be credit-constrained than their counterparts and that such adverse impact manifests only in countries with weak rule of law and control of corruption. Moreover, registered micro and small firms are more negatively affected by the presence of informal firms competing against them than medium-sized firms because the benefits related to formality increase with firm size.

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## 1. INTRODUCTION

Strong institutions and inclusive growth are crucial in increasing the economic opportunities of economic agents across all economies. By increasing employment, by contributing to social stability and by enhancing entrepreneurship, small and medium enterprise (SME) development is vital in driving inclusive growth. SMEs, however, face obstacles, which constrain their growth potential. Consistently ranked first among these obstacles according to the results of the World Bank Enterprise Surveys (WBES) is lack of access to financing. But while the credit access problem of SMEs has received much attention from academicians worldwide in recent years (Demirgüç-Kunt and Maksimovic (1998); Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006); Beck, Demirgüç-Kunt and Maksimovic (2008)), the second most serious constraint faced by SMEs, the practices of the informal sector (WBES Surveys 2009, 2010, 2011, 2012) has been relatively overlooked particularly in the SME literature. Aside from reducing overall productivity (Amaral and Quintin (2006); Galiani and Weinschelbaum (2007); Perry, Maloney, Arias, Fajnzylber, Mason and Saavedra- Chanduvi (2007); Albrecht, Navarro and Vroman (2009)) and hence economic growth, informal firms may have an undesirable impact particularly on the operations of registered<sup>1</sup> SMEs. This is further exacerbated by the limited amount of law enforcement particularly in less developed economies. Moreover, government officials take caution in terms of regulating the informal sector as more than half of the world's working population, on average, is employed in the informal economy (OECD, 2009) and at least 33% of the GDP of low-income countries come from the informal sector (La Porta and Shleifer, 2008).

Informality may be either a consequence of poor quality of institutions and weak governance (De Soto, 1989) or a choice that firms make when establishing their operations. The proponents of the former argue that should the government facilitate entry to the formal sector and compliance with tax rules, entrepreneurs will decide to register their businesses. The other view, however, suggests that owners of start-up firms may opt to remain in the informal sector in response to an entrepreneurial opportunity. Because registration and compliance with product regulations account for a significant proportion of their initial investments (Rand and Torm, 2012), owners may decide to stay under government radar and thus limit their risk taking especially if future conditions in the industry are hard to predict (Siquiera, Webb and Bruton, 2014). Moreover, McKenzie and Sakho (2010) suggest that

entrepreneurs decide whether to formalize their business or not depending on which option increases their profitability.

Previous studies in the literature tackling informality mainly focus on the nature of informality, the effects of informality from a macroeconomic point of view and its determinants (Loayza, 1996; Maloney, 2004; Schneider, 2005; Chaudhuri, Schneider and Chattopadhyay, 2006). Only a few, if not non-existent, however, have empirically examined the impact of informality on the business operations of formal firms from a micro-level perspective. In this paper, we examine the impact of the practices of informal firms, which are direct competitors to registered SMEs, on the latter's access to credit. To our knowledge, this is the first study that tackles this issue. This research hence takes into account inter-linkages between the formal and informal sectors where both operate and compete within same product markets and thus, cater to an overlapping customer base (Sethuraman, 1997; Böhme and Thiele, 2014). We purport that formal SMEs may or may not be affected by the practices of informal firms competing against them depending on which view, the parasite or the dual view, dominates over the other. While the parasite view considers informal firms as unfair competitors to registered SMEs because they evade taxes and regulations (Farrell, 2004; Levy, 2008); the dual view sees both types of firms as fundamentally different (Rauch, 1991; La Porta and Shleifer, 2014). This latter view thus implies that formal and informal firms have different customer bases and qualities of products and services offered in the market. Moreover, it also purports that formal firm owners are more educated and productive; and because the scale of operations of informal firms are assumed to be smaller, informal firms should not pose a threat to the operations of formal firms. Proponents of the entrepreneurial perspective of informality (Siquiera et al., 2014), however, suggest that informal entrepreneurs are not necessarily less educated and unproductive. McKenzie and Sakho (2010) find that owners of large informal firms have higher entrepreneurial ability than formal firm owners. The entrepreneurial perspective of informality hence suggests that informal firms are capable of competing against registered firms.

Moreover, we contribute to the literature not only by examining the consequences of competition from informal firms on formal SMEs' access to credit but also on how the quality of institutional environment alters such impact. To our knowledge, this is the first study that investigates the role played by the quality of the institutional environment when tackling the potential adverse effects of informal firms on formal businesses' operations. We argue that the quality of the institutional environment affects the size of the informal sector, the costs

and benefits of formality and informality, the government capacity to enforce the law, and the individual perceptions and social norms regarding informality that affect the substitutability between formal and informal goods. Weak contract enforcement results in a large informal sector (Quintin, 2008), which may lock households and small firms to a limited set of opportunities, adversely affecting firms' expected income streams and profitability. Consequently, this could negatively impact their loan and line of credit applications from formal financial institutions. Moreover, when a large proportion of firms does not conform to imposed regulations, informality can become a social norm, eventually creating a 'culture of informality' (Perry et al., 2007). A strong rule of law, however, raises the likelihood of informal activity detection; hence informal firms have to keep their operations small or to cease their activities completely, weakening their capability of adversely affecting formal SMEs' ventures. Moreover, complicated tax rules, and high level of corruption and bureaucracy constrain firms from entering or staying in the formal sector as they both lower the benefits and increase the costs associated with formality. High tax rates may also dissuade formal firms to innovate and to invest leading them to lose their competitive edge against informal firms.

Working on a sample of 23084 SMEs in 86 countries, our results indicate that formal SMEs facing competition from informal firms are more credit-constrained than their counterparts. This finding holds even after taking into account the endogeneity issue between having informal competitors and being credit-constrained. Moreover, we stress that the adverse impact of competition from informal firms manifests only when the quality of institutional environment is weak. When rule of law, and control of corruption are strong, the probability of detecting and penalizing informal firms is high; hence informal firms cannot hurt the profit opportunities of formal SMEs. Further, we find registered micro and small firms to be more affected by informal firms than medium-sized firms because benefits attributed to formality are relatively low when firm size is small.

This paper is organized as follows. Section 2 discusses the research framework for our empirical investigation. Section 3 meanwhile presents the data and variables used in this study and a discussion of the descriptive evidence. Section 4 tackles the methodology used in our paper, while Section 5 reports the results of our econometric investigation. We address further issues and check the robustness of our results in Section 6. We conclude in the last section.

## 2. RESEARCH FRAMEWORK

As highlighted in the *OECD Policy Roundtables on Competition Policy and the Informal Economy* in 2009, there are serious concerns regarding the adverse impact of the presence of informal firms competing against formal firms on the latter's business operations. In this paper, we particularly investigate whether or not competition from informal firms affects formal firms' access to credit. We also examine how different qualities of institutional environment alleviate or intensify the effects of informal firm presence on registered SMEs' access to credit.

### *2.1 Informal firm presence and formal firms' credit constraints*

Informal firms may or may not affect formal firms' credit constraints depending on the nature of the informal firms. La Porta and Shleifer (2008) present three views of the informal firms' role in economic development- the romantic view, the parasite view, and the dual view.

Deriving from the work of De Soto (1989, 2000), according to the romantic view, informal firms are fundamentally similar to formal firms. They are potentially productive but are held back by institutional constraints such as government taxes, regulations, and lack of access to finance. This view thus highlights informal firms' potential should they have been made 'official'. It suggests that entrepreneurs would register their business if the barriers to official status were reduced or removed. This, however, does not prejudice whether informal firms could or could not affect formal firms' business operations.

In contrast with this relatively optimistic view, the parasite and the dual views consider informal firms as unproductive businesses. Their differences, however, lie on their standpoint about the strength of the inter-linkage between the formal and the informal sectors. The parasite view treats informal firms as direct competitors of formal businesses. Although this perspective acknowledges informal firms as inefficient businesses because they have to remain small to remain undetected by the government, it purports that the unfair cost advantage they generate by staying illegal more than compensates their low productivity (Farrell, 2004). By being informal, they avoid taxation and compliance with labor and goods regulations. This enables them to undercut prices and eventually take away market share from formal firms. Moreover, Perry et al. (2007) suggest that the unfair competition from informal firms slows down the creative destruction process where efficient firms should prevail over the inefficient ones. This in turn may have negative consequences on the incentives of formal

businesses to invest in new ventures and to innovate, limiting their capacity to gain competitive edge vis-à-vis informal firms.

Meanwhile, the dual view purports that informal firms are very different from the formal firms in various aspects not affected by government policies such as entrepreneurial characteristics (La Porta and Shleifer, 2008). In contrast with the parasite view, this perspective conjectures that the presence of informal firms should not pose serious threats to the business operations of registered firms. Informal firms are hence not regarded as their outright competitors. Because informal businesses are associated with higher inefficiency attributed to the employment of relatively less capable and less educated workers, this view casts doubt on the capability of informal firms to undercut prices for the same type of product or service offered in the market. Instead, the dual view suggests that informality intensifies market segmentation where formal and informal businesses cater to different groups of customers due to their different growth prospects and levels of productivity. The presence of unregistered enterprises hence should not affect formal firms' profitability under this view.

In the WBES, lack of access to finance is considered by formal SMEs to be their most serious growth obstacle followed by the practices of the informal sector. We can suspect that both obstacles may be linked. Informal firms competing against formal firms may affect the latter's access to credit. More precisely, following the parasite view, informal firms may take away market share from formal firms regardless of whether or not they have more efficient production techniques by adversely affecting the profitability of the latter. By negatively influencing average return to capital, entrepreneurs may choose not to demand credit from formal financial institutions at available interest rates. Moreover, low average returns may also lead to credit supply constraints where lenders set stricter loan application criteria (i.e. higher collateral requirements, higher interest rates) (de Mel, McKenzie, Woodruff, 2011). Besides, even if formal firms do not face unfair competition from informal ones (dual view), the extent of informality in certain industries and lines of businesses could negatively affect formal firms operating in the same sector (Catão, Pagés and Rosales (2009) and Gandelman and Rasteletti (2012, 2013)). Stiglitz and Weiss (1981), in their seminal paper, note that in order to cope up with the presence of asymmetric information in the credit market, lenders often resort to credit rationing. Moreover, they show that the extent of rationing in the credit market could differ across observationally distinguishable groups. Regardless of whether or not they have higher expected returns, certain borrower groups tend to face bigger credit constraints because of their perceived riskiness. If lenders assume that firm borrowers

operating in industries that have high informal firm presence have less entrepreneurial opportunities, they may restrict credit provided to such firm groups. Consequently, the presence of informal firms could adversely affect the credit access of formal firms catering to same sets of customers.

Moreover, recent studies in the entrepreneurship literature suggest that informality is a choice that firms make in order to take advantage of an entrepreneurial prospect (Neuwirth, 2011; Siqueira et al., 2014). This is in contrast with the romantic view, which sees informality as a consequence of weak quality of institutions and governance. The decision to become formal or informal depends on the existing industry conditions (Siqueira et al., 2014) affecting the set of opportunities available to entrepreneurs (Short, McKelvie, Ketchen and Chandler, 2009). Entrepreneurs or business owners may find it more attractive to be informal in order to minimize costs or reduce risk taking while they '*test the waters*' (Bennett, 2010). In contrast with the general view that characterizes entrepreneurs in the informal sector to be less educated, unproductive and have lower entrepreneurial abilities (Dabla-Norris, Gradstein and Inchauste, 2008, La Porta and Shleifer, 2014), this perspective suggests informal entrepreneurs to be profit-maximizing and/or risk-minimizing. Following this rationale, in contrast with the dual view, it is plausible for both formal and informal firms to cater to an overlapping customer base. McKenzie and Sakho (2010), providing support to this perspective, argue that owners that decide to be informal expect lower profits from formalizing their businesses. Hence, this entrepreneurial perspective implies that informal firms by choice are capable of affecting formal firms' business operations, their profitability and consequently, their credit constraints.

## *2.2 Informal firm presence, formal firms' credit constraints and institutional environment*

Informal firms may or may not adversely affect formal SMEs' business operations depending on the quality of the institutional environment, which affects the costs and benefits of entering and staying in the formal sector, the costs of being informal, the size of the informal economy, and the individual perceptions and social norms regarding informality.

North (1991) defines institutions as consisting of both informal constraints and formal rules binding organizations in an economy. While the former comprises sanctions, taboos, customs, traditions and codes of conduct; the latter includes the constitutions, laws, and property rights. In this paper, we consider four different aspects of institutional environment

quality, namely, rule of law, control of corruption, ease of doing business, and information sharing.

The effectiveness of the rule of law affects the costs attributed to informality. The costs of being informal include official penalties and sanctions applied when the government detects informal activity. Dabla-Norris et al. (2008) and Ulyssea (2010) note that better legal environment and enforcement capacity raise the probability of detecting informal firms. Informal firms hence try to keep their operations small (Farrell, 2004), which limits their productive potential and impedes them to compete aggressively against formal firms. Thus in countries with strong rule of law, informal firms could not directly compete against formal firms in line with the dual view. In contrast, weak enforcement negatively affects the individuals' willingness to comply with regulations and reduces the likelihood of informal firms getting sanctioned. Further, it can encourage informal firms to compete head-to-head with formal businesses. Informal firms in countries with weak rule of law are hence capable of negatively affecting the profitability of formal firms consistent with the parasite view.

Moreover, Friedman, Johnson, Kaufmann and Zoido-Lobaton (2000) highlight that high levels of corruption and bureaucracy may lead to low levels of tax revenues and quality of public services, which increase the costs and lower the benefits associated with formality. High corruption levels not only force governments to impose higher tax rates; it may also lead to poor quality of judiciary services and other public services. Consequently, this may adversely affect formal firms' investment and innovation appetite, which could result in formal firms losing their competitive edge over informal firms. Weak control of corruption hence makes it easier for informal firms to inflict an unfair cost advantage over formal firms consistent with the parasite view. Moreover, other formal firms may voluntarily exit from the formal economy because of their distrust in the state (Rosser, Rosser and Ahmed, 2000; Maloney, 2004) and because entrepreneurs think that they can invest their funds more effectively rather than use their capital to pay taxes (Siqueira et al., 2014).

The quality of the institutional environment may also affect the size of the informal economy. Quintin (2008) and Ihrig and Moe (2004) find that weak contract enforcement and ineffective tax enforcement and penalties, respectively, are associated with a large informal sector. Moreover, higher bureaucracy requirements and registration fees, and lengthier procedures also increase the size of the informal sector (Monteiro, 2012). A large informal economy often locks entrepreneurs and households to a limited set of opportunities (Barry

and Tacneng, 2014), which affect their expected returns and consequently, their chances of obtaining credit from financial institutions. Bae and Goyal (2009) find that when contract enforcement is weak, banks tend to cut lending, reduce loan maturity, and increase loan spreads. Moreover, the size of the informal economy may also influence individual perceptions about 1) the substitutability between formal and informal goods<sup>2</sup> and more importantly, 2) the capacity of the state to enforce regulations and tax collection. A large informal economy may disincentivize owners to formalize their businesses, dissuade firms from complying with tax rules, and lower psychological/ethical costs from law evasion, hence, creating a ‘culture of informality’ (Perry et al., 2007).

Moreover, following the rationale of the “shadow puzzle”, a large informal sector may be widely tolerated despite the presence of technologies, which can easily detect unregistered activities. This is because strengthening the degree of coercion could potentially lead to a high level of unemployment (Boeri and Garibaldi, 2005). Indeed, the informal sector comprises a substantial share of the gross value added in many developing countries and a significant share of the labor force. For example, in India, estimates shows that employment in the informal economy represents 67.5 percent of non-agricultural employment in 2009-2010 (ILO, Department of Statistics, 2012). Thus, the government could be more lenient towards informality, which may compromise rule of law. Under this scenario, informal firms may act as an important source of competitive pressure on formal firms in line with the parasite view.

The presence of better quality of credit information available through credit registries/bureaus may reduce asymmetric information in the credit market. It hence lowers the likelihood for lenders to depend on credit rationing to mitigate information asymmetry across observationally distinguishable groups. Better depth of credit information may help lenders sort out profitable entrepreneurs or firms in sectors with high informal firm presence that would have been credit rationed in the absence of credit registries.

Overall, we purport that a weak quality of institutional environment increases the costs and decreases the benefits assumed by formal firms and in addition, reduces the costs attributed to informality. We hence expect formal businesses competing against informal firms to be more credit-constrained in such environment.

### 3. DATA, VARIABLES, DESCRIPTIVE STATISTICS

#### 3.1 *Data Collection*

Our main data source is the World Bank Enterprise Surveys (WBES) where we obtain firm-level information from 2009 to 2012 in 86 countries. We gather data regarding the institutional environment of each country from three sources – the Worldwide Governance Indicators (2011) developed by Kaufmann et al. (2010), the Doing Business of the World Bank (2011) and the Credit Depth of Information index of the World Bank (2011). We obtain the macroeconomic variables from the World Development Indicators (2013).

We restrict our sample to micro, small, and medium firms because they are more likely to be affected by informal sector practices than large enterprises (Gonzalez and Lamanna, 2007). Following the size definition used by the European Commission, we consider firms with less than 250 employees<sup>3</sup>. Micro firms are defined as those employing less than 10 employees, small firms with at least 10 but no more than 50 employees, and medium firms with at least 50 but no more than 250 employees.

Table A1 (Appendix A) reports the percentage of firms facing competition from informal firms by country on the original survey sample (56.66%), on our study sample which consists of firms with information on all the variables defined in our paper (55.31%), and on our final sample consisting of our study sample but excluding large enterprises (56.3%). It shows that the proportion of firms facing competition from informal firms does not vary a lot across the three samples. The final sample statistics show that Dominica has the lowest percentage (10.71%) whereas 90.22% of the surveyed SMEs in Cameroon (highest percentage) have competitors from the informal sector. Table A2 (Appendix A) presents the distribution of firms according to firm size on our study sample. Micro firms account for more than 24% of the study sample, small firms more than 42%, medium firms more than 24% and large firms less than 9%. Thus, by restricting our sample to firms with less than 250 employees, we consider more than 91% of the study sample. Moreover, Table A2 also reports the percentage of firms facing competition from informal firms according to firm size. We observe that while 63.32% of the micro firms face competition from informal firms, on average, less than half of the large enterprises have competitors from the informal sector.

## 3.2 *Presentation of Variables*

### 3.2.1 *Credit constraint*

Our dependent variable (*Constrained*) is a binary variable that takes the value of one if the firm is credit-constrained and zero, otherwise. Based on firm responses to the WBES, we consider a firm to be credit-constrained if it applied for a loan but was not able to acquire it or

if it needed a loan but did not apply because of several constraints (i.e. application procedures for loans are complex, unfavorable interest rates, high collateral requirements). Figure 1 details the mode of construction of this variable. We do not consider a firm to be credit-constrained if it obtained bank financing or if it has sufficient capital.

[ Insert Figure 1 ]

### 3.2.2 *Competition from informal firms*

Our main independent variable takes into account the existence of competition from the informal sector. We base it from the firms' response to the question "*Does this establishment compete against unregistered or informal firms?*" We hence define *informal\_comp* as a binary variable that takes the value of one if the answer is yes and zero, otherwise.

### 3.2.3 *Quality of institutional environment*

To measure the quality of institutional environment, we consider four different variables. *Rule of law* is an index that captures perceptions of the extent to which agents have confidence in the quality of contract enforcement, property rights, the police, and the courts. *Control of corruption* is an index that reflects perceptions of the extent to which public power is exercised for private gain, including all forms of corruption as well as "capture" of the state by elites and private interests. These two indices range from -2.5 (weak governance) to 2.5 (strong governance) (Worldwide Governance Indicators 2011). To measure the ease of doing business, we define an index, *Ease of doing business*, which measures business regulation and the protection of property rights—and their effect on businesses. It takes into account the complexity of regulations, the time and cost to comply with regulation, the extent of legal protections of property, the tax burden on businesses and different aspects of employment regulation. Economies are ranked from one to 189 (World Bank Doing Business, 2011) according to their ease of doing business. We collect these rankings (R) and compute our index as  $(1/R)*100$ . Thus, this index ranges from 0.53 to 100 with higher values indicating better business environment. We also consider the depth of credit information. *Info* is an index that measures rules affecting the scope, the accessibility, and the quality of credit information available through credit registries (World Bank, 2011). The index ranges from zero to six, with higher values indicating the availability of more credit information from either a public registry or a private bureau in order to facilitate lending decisions.

### 3.2.4 Control variables

We take into account several control variables that are commonly considered in the literature. To control for the characteristics of the location where the firms operate, we consider a dummy variable (*capitalcity*) that is equal to one if the firm is located in the capital city and zero, otherwise. We also control for the sector where the firm belongs. More specifically, we distinguish manufacturing firms from non-manufacturing firms by constructing a dummy variable (*nonmanufacturing*) that takes the value of one if the firm belongs to the services or other sectors and zero, if it belongs to the manufacturing sector. Indeed, several studies identify differences in terms of the overall structure, financing constraints and access to external finance of firms in the services and the manufacturing sectors/industries (Beck, Demirgüç-Kunt and Maksimovic, 2005; Amin, 2010; Carreira and Silva, 2010). We also take into account the firm's affiliation to a larger establishment. We construct a binary variable (*multiple*) that takes the value of one if the firm is part of a larger firm and zero, otherwise. Firms with multiple establishments are assumed to have better and more diverse external financing options. This variable hence is a proxy for a firm's potential to secure a loan. We also consider the firm's age (*age*) as well as its size (*size*) measured respectively by the natural logarithm of the number of years since its inception, and total number of permanent, full-time employees. Larger and older firms may have better reputation, credit histories and longer relationships with banks than smaller and younger firms and hence, are more likely to obtain credit from formal financial institutions. Moreover, we also control for managerial experience. We expect firms with experienced managers to have better access to credit. Hence, we define *management* as the natural logarithm of the number of years of the top manager's working experience in the sector. We also control for labor productivity. We assume that more productive firms have better access to credit. We define *laborprod* as the natural logarithm of the value of firm sales over the number of permanent employees, scaled three years before the survey was conducted.

We also control for country-specific and region-specific factors. We consider macroeconomic variables - inflation rate (*inflation*) and the real GDP per capita (*rgdp*), and construct dummies characterizing the geographical regions where the firms operate. We distinguish firms located in Latin America (*LAC*), East Europe and Central Asia (*ECA*), East Asia Pacific (*EAP*), Middle East and North Africa (*MNA*), South Asia (*SAR*) and Sub Saharan Africa (*SSA*). To avoid matrix singularity, we remove *SSA*, which acts as our reference region.

### 3.3 Descriptive Evidence

Table 1 provides descriptive statistics regarding the relationship between informal firm competition and credit constraints on the original survey sample and the final sample. These statistics show that there are similarities between the two samples. Considering our final sample, statistics show that 34.42% of the firms are credit-constrained, which is close to the proportion of firms that are financially-constrained using the original survey sample (35.35%). Moreover, formal SMEs facing competition from informal firms are more credit-constrained than those that do not have informal competitors (37.26% vs. 30.77%).

[ Insert Table 1 ]

Considering the answer to the survey question "*Are the practices of the informal sector, No obstacle, a Minor obstacle, a Major obstacle, or a very Severe Obstacle to the current operations of this establishment?*" we observe that 47.82% of the formal SMEs facing competition from informal firms perceive informal firm practices as major or very severe obstacles to their operations. Less than 10% of the formal SMEs that do not compete with informal firms, however, consider the practices of the informal firms as major or very severe obstacles to their operations. This is consistent with the firms' responses regarding which factors they consider as the most serious obstacles affecting their operations and growth. While firms facing competition from informal firms rank the practices of the informal sector as their most serious obstacle, those that do not have competitors from the informal sector only rank informal firm practices as the 7<sup>th</sup> most serious obstacle.

## 4. METHOD

### 4.1 Informal Firm Presence and Formal Firms' Financing Constraints

#### *Probit model*

We use the probit model in order to examine whether formal SMEs facing competition from informal firms are more likely to face credit constraints than other formal SMEs. We define  $Constrained_i^*$  as a latent index value that represents the unobserved propensity of SME  $i$  to be credit-constrained conditional on  $informal\_comp_i$ , and covariate-vector  $W$ :

$$Constrained_i^* = informal\_comp_i \beta_1 + W_i \gamma + \varepsilon_i$$

(1)

Where  $informal\_comp$  is our variable of interest indicating whether formal SME  $i$  faces competition from informal firms;  $W$  is a vector of the other covariates,  $\beta_1$  and  $\gamma$  are the corresponding vectors of parameters to be estimated, and  $\varepsilon$  is the error term. We further define:

$$Constrained_i = \begin{cases} 0 & \text{if } Constrained_i^* \leq 0, \\ 1 & \text{if } Constrained_i^* > 0. \end{cases}$$

Substituting the more compact notation  $Z = [informal\_comp, W]$  and  $\phi = \begin{pmatrix} \beta_1 \\ \gamma \end{pmatrix}$ , the probability that  $Constrained_i = 1$  is given by:

$$\begin{aligned} prob(Constrained_i^* > 0) &= prob(Z\phi + \varepsilon > 0), \\ prob(Constrained_i^* > 0) &= prob(\varepsilon > -Z\phi), \\ prob(Constrained_i = 1) &= \Lambda(Z\phi) \end{aligned}$$

Where  $\Lambda(\cdot)$  is the cumulative distribution function.

We use the following baseline regression to test the relationship between  $informal\_comp$  and  $Constrained$ :

$$Constrained_i = \alpha + \beta_1 informal\_comp_i + \sum_{i=1}^k \gamma_i W + \varepsilon_i$$

(2)

Where  $Constrained$  is a dummy variable indicating whether formal SME  $i$  is credit-constrained or not;  $informal\_comp$  is a binary variable corresponding to SME  $i$ 's response to whether or not it faces competition from firms in the informal sector, and  $W$  is a vector of control variables that captures firm- and country-specific characteristics.

We are interested in the coefficient of  $informal\_comp$  ( $\beta_1$ ): a positive and significant coefficient signifies that formal SMEs facing competition from informal firms are more likely to be credit-constrained compared with their other formal SME counterparts, which is in line with the predictions, in general, of the parasite view, the existence of asymmetric information that leads to credit rationing for all firms exposed to informal competition, and the entrepreneurial perspective of informality. A non-significant coefficient, on the other hand, favors the dual view.

### *Endogeneity issue*

There is a potential endogeneity issue between the presence of informal firms competing against formal SMEs' and SMEs being credit-constrained. González and Lamanna (2007) and Friesen and Wacker (2013) characterize small and credit-constrained firms as more likely to face intense competition and get affected by the presence of competition from informal firms. Further, Demirgüç-Kunt and Levine (2008) highlight that access to finance is vital in order for firms to take advantage of expansion opportunities and invest in innovation, which enable them to differentiate their products from the informal sector.

In order to tackle this potential endogeneity problem, we estimate an instrumental variable (IV) probit model with a binary endogenous regressor represented by Eqs. (1) and (3) using the Conditional Mixed Process (CMP) estimator with multilevel random effects and coefficients (Roodman, 2011). In equation,

$$informal\_comp_i^* = \delta_1 V_i + W_i \gamma + v_i \quad (3)$$

Where  $V_i$  represents the instrumental variables used, which should be correlated with  $informal\_comp_i$  but are independent of the financial constraints of individual firms.

#### *4.2 Informal firm presence, formal firms' financing constraints and institutional environment*

In order to examine the influence of the quality of the institutional environment on whether the presence of informal firm competitors affect formal SMEs' credit constraints, we estimate the following equation using the IV probit model with a binary endogenous regressor represented by Eqs. (3) and (4) using the CMP estimator with multilevel random effects and coefficients (Roodman, 2011).

$$Constrained_i = \alpha + \beta_1(informal\_comp_i) + \beta_2(instit\_env) + \beta_3(informal\_comp * instit\_env) + \sum_{i=1}^k \gamma_i W + \varepsilon_i \quad (4)$$

where *Constrained* is a dummy variable indicating whether formal SME<sub>i</sub> is credit-constrained or not; *informal\_comp* is a binary variable corresponding to whether or not SME<sub>i</sub> faces competition from firms in the informal sector; *instit\_env* indicates the quality of institutional environment where the SME is located, which can be either the rule of law, control of corruption, ease of doing business, or the quality of information sharing. *W* is a vector of control variables that capture firm- and country-specific characteristics. We are interested in

the sign of  $(\beta_1 + \beta_3 * instit\_env)$  and the magnitude and sign of the marginal impact of the presence of informal firms as competitors to formal SMEs on the latter's credit constraints.

Table 2 provides the summary statistics of the variables used in the econometric investigations along with the expected signs of the coefficients associated with the independent variables used, the data sources and the definitions of the variables.

[ Insert Table 2 ]

## 5. EMPIRICAL RESULTS

### 5.1 *Competition from Informal Enterprises and Financing Constraints/Obstacles*

Table 3 presents the results of our investigation as to whether formal SMEs facing competition from informal firms are more or less likely to be credit-constrained than those that do not compete with informal firms. We show the results using the simple probit regression in column 1.

[ Insert Table 3 ]

We find that our variable of interest, *informal\_comp*, has the expected positive coefficient and is statistically significant at a 1% level. In terms of economic significance, we find those formal SMEs competing against informal firms to be 16% more likely to be credit-constrained than their counterparts.

To tackle the potential endogeneity issue, we present the results obtained by estimating the IV probit method using the Conditional Mixed Process (CMP) estimator with multilevel random effects and coefficients (Roodman, 2011) in column 2. We use country-level variables representing the average percentage of firms facing competition from informal firms and the average frequency of inspection from tax officials over the 12 months preceding the survey as instruments to *informal\_comp*. We note that there is not an existing method which tests the validity of instruments when using the CMP model. We, however, implement the Amemiya-Lee-Newey test of overidentifying restrictions for the same specifications but using an instrumental variables ML estimator, which treats *informal\_comp* as a continuous regressor. The results of the overidentification tests show that the excluded instruments are valid. The diagnostic test reveals that endogeneity is indeed an issue in our equations and

hence, the IV probit model with a binary endogenous regressor using the CMP estimator should be used as our main estimation method. We find *informal\_comp* to be both statistically and economically significant. Firms facing competition from informal firms are 18% more likely to be credit-constrained than other formal SMEs which do not consider informal firms as their competitors. This result is consistent with the parasite view, which suggests that informal firms are capable of hurting the profits of registered firms through tax evasion and non-compliance with product regulation. Moreover, our result is in line with the entrepreneurial perspective of informality. Informal entrepreneurs are not necessarily unproductive and less educated and hence are capable of adversely affecting formal firms' operations. This result can also be explained by the existence of asymmetric information that is aggravated by weak institutional environment quality, in general, in less developed countries. As discussed in Section 2.1, formal financial institutions may find it easier to stay away from lending to observationally distinguishable groups with large informal firm presence. Regardless of their revenue profiles, this renders firms facing competition from informal firms to be more credit-constrained compared with those offering relatively more differentiated products.

Regarding our control variables, we find that consistent with previous literature, being large (*size*), part of a larger firm (*multiple*), being located in the capital (*capitalcity*), having an experienced top manager (*management*), and being more productive are associated with less severe credit constraints. At the country level, firms located in countries with lower inflation (*inflation*), and higher real GDP per capita (*rgdp*) are less likely to be credit-constrained compared with their counterparts located in countries with high inflation and low real GDP per capita. We also find that non-manufacturing firms are less financially constrained compared to manufacturing firms. The results regarding our regional dummies show that compared with firms in African region, firms located in other regions except Middle East and North African region (MNA) are less credit-constrained.

## 5.2 *Informal Firm Competition, Institutional Environment and Financing Constraints*

Before testing whether the impact of informal competition on formal firms' credit constraint is higher in countries with weak institutional environment, we first discuss the effect of the quality of institutional environment on firms' credit constraints. We note that because stronger quality of institutions is associated with higher real GDP per capita, we cannot put both our indicators of the quality of institutional environments and real GDP per

capita in the same equation. Moreover, we introduce alternately *rule of law*, *control of corruption*, *ease of doing business* and *info*. We present the results in Table 4.

[ Insert Table 4 ]

Overall, as expected, we find that SMEs located in countries with good quality of institutional environments (strong rule of law, high control of corruption, more ease in doing business, high information sharing) are less likely to be credit-constrained than their counterparts. Indeed, we find all four measures of institutional environment quality to be negative and significant at a 1% level. This implies that good quality of institutions increases investor confidence and hence firms, in general, have a higher probability of getting funded for their projects.

Examining the role of institutional environment quality on the informal firm competition presence and credit constraint relationship, we interact *informal\_comp* with *insti\_env*. For the clarity of the exposé, we compute the average marginal effects of *informal\_comp* on the probability of being credit-constrained at different values of the four institutional environment variables. We present in Figure 2 the computed marginal effects in graphic form. Overall, we find firms located in countries with better quality of institutional environments to be less severely, if not at all, affected by the presence of competition from informal firms in terms of their credit access.

[ Insert Figure 2 ]

Exploring the effects of the rule of law, which takes into account the quality of contract enforcement and the courts, on the capability of informal firms to inflict harm on formal SMEs competing against them, we do not find SMEs located in countries with strong rule of law to be affected by the practices of the informal firms. In Chile, where the rule of law index is the highest (1.36) in our sample, our results suggest that the dual view tend to dominate the parasite view with regard to the impact of informal firms on formal firms' operations. This could be due to the measures undertaken by Chile in modernizing its penal codes. In addition, the Heritage (Index of Economic Freedom) reports that in this country, residents strongly respect property rights. Because the costs of compliance is lower in countries with better rule of law, benefits derived from formality effectively outweigh the costs of being in the formal sector. In contrast, registered SMEs in Venezuela, which has the lowest level of rule of law in our sample (-1.67), are 17% more likely to be credit-constrained when faced with competition

from informal firms than their counterparts that are less exposed to the informal sector practices. Moreover, in such country, formal financial institutions are less likely to extend credit in sectors where information asymmetry may be higher which is the case of those whose business models easily attract informal firms, regardless of the quality of their financial statements. This could be attributed to dysfunctional judicial systems which impede the debt recovery mechanism of formal financial institutions when SMEs default. In addition, because weak contract enforcement is associated with a large informal economy, the costs of being formal far outweigh the benefits from formality. This leaves formal firms vulnerable to the unfair business practices of informal firms.

In terms of the impact of the control of corruption on the relationship between the presence of competition from informal firms and SME credit constraints, our findings suggest that the parasite view dominates the dual view when control of corruption is weak. This implies that formal SMEs become more credit-constrained when faced with competition from informal firms. In terms of economic significance, our findings indicate that in Democratic Republic of Congo (D.R.C.), the country with the weakest control of corruption, the likelihood that formal SMEs become credit-constrained increases by 16% when they face competition from informal firms. Barry and Tacneng (2014) mention that past policy actions which include civil wars, colonialism and political instability have contributed immensely to institutional failures such as corruption in Africa. D.R.C. is characterized with a fragile state infrastructure, low paid government staff who have to rely often on petty bribery for subsistence, and public officials who both have the incentives and opportunities of extorting money from their constituents (Global Integrity 2008). Moreover, the 2011 Global Barometer reports that 62% and 52% of the surveyed public in the D.R.C. have disclosed paying bribes when dealing with judiciary officials, and registry and permits administrators, respectively. This undermines government capacity to provide sufficient infrastructure and support mechanisms needed by SMEs, thereby lowering the benefits attributed to formality. In contrast, the Chilean government has made efforts of improving the taxpayer services to SMEs and has significantly reduced value-added tax evasion rates from 20% to 11% between 2000 and 2006. Entrepreneurs enjoy easy access to necessary ICT tools needed to register their businesses in the national fiscal system and hence shoulder low cost in filing taxes. In contrast with the formal SMEs in the D.R.C., Chilean SMEs derive larger benefits, and face lower costs attributed to formality. Hence, strong control of corruption weakens the capacity of informal firms to inflict harm on the profits of formal firms and their access to credit.

Examining countries with different ranks in terms of their ease of doing business, our findings indicate that formal SMEs in the Central African Republic (lowest rank) are 17% more likely to be credit-constrained compared with an increase in the probability by 9% in Mauritius (highest rank). This is not surprising because it is very costly to start a formal business in Central African Republic (228.4% of income per capital in 2011) and as of 2014, the country ranks 187<sup>th</sup> out of 189 economies considered in the World Bank study (Doing Business 2014). Moreover, paying taxes is not easy, which can be attributed to the very high total tax rates estimated at 203.8% of total profits in 2011. While tax revenues increase proportionally with tax rates, it is very important to keep the rates at a reasonable level in order to encourage compliance and business formalization. In contrast, Mauritius ranks high in terms of protecting its investors thereby facilitating business creation and foreign direct investment. Moreover, it is easy to pay taxes in the country because it has less complex tax rules and firms only pay total taxes equivalent to 28.5% of their total profits in 2013 (Doing Business: Mauritius 2013). The lower cost of entering the formal sector in Mauritius compared with Central African Republic reduces the capability of informal firms, in general, to inflict an unfair cost advantage over the formal firms.

Finally, we also examine how the depth of credit information can influence the relationship between the competition from informal firms and the credit constraints of formal SMEs. Our results indicate that in Dominica where information sharing is low (score of 1), formal SMEs, which are more exposed to the practices of the informal sector, are 22% more likely to be credit-constrained compared with their counterparts. In countries where depth of credit information is high (score of 6), however, such as the case of Uruguay, the likelihood that formal SMEs becomes credit-constrained when faced with competition from informal firms increases by 15% compared with other formal SMEs. Our findings suggest that the availability of information in the credit market affects the magnitude of the marginal impact of informal competition on formal SMEs' access to credit. This implies that formal SMEs benefit from improving the quality of information available in lending decisions, regardless of the size of the informal economy.

Overall, our findings indicate that in countries with weak institutional environment quality, informal firms adversely impact formal firms' operations and hence constrain their access to credit. As it exists even in countries with high information sharing, this gives support to the parasite view of informal firms. Moreover, our results show that better rule of law and stronger control of corruption are important in mitigating the negative effects of the

practices of firms in the informal sector on formal SMEs' operations, particularly, on their access to credit. This supports the prevalence of the dual view in countries characterized with high quality of institutional environment.

## 6. FURTHER ISSUES AND ROBUSTNESS CHECKS

We conduct several robustness checks to probe the strength of our results and investigate further issues. First, we examine whether the impact of informal firm competition on formal firms' financing constraints varies differently across firm size groups. Second, we perform the regressions separately between the manufacturing and service sectors. Third, we analyze how firm-specific characteristics affect the informal firm competition presence-financing constraint relationship in countries where the quality of institutional environment is weak. We also consider an alternative measure to our variable of interest, the presence of informal firm competition. Moreover, we use different lower and upper thresholds in our SME definition and lastly, we use alternative instruments for our main independent variable *informal\_comp* when tackling the issue of endogeneity. We report the results of our estimations in Appendices B-D.

### 6.1 Firm size groups

Particularly in the context of less developed countries, barriers which limit smaller firms' participation in formal market support institutions exist. Firm size, which often indicates firm's growth prospects, is a deciding factor to whether or not a start-up should enter the formal sector. Perry et al. (2007) emphasize that the benefits of formality increase with firm size. When firms' operations are small, entrepreneurs can readily enforce implicit contracts for a small clientele. As they expand their business, however, they require enforceable contracts and security through the legal system. Although the net benefits of formality may be negative for smaller firms; as a firm grows, the benefits could eventually outweigh the costs. Consequently, we argue that the presence of competitors from the informal sector could impact the credit constraints of formal firms differently across firm size groups. Because they have relatively smaller scale of operations and lower net benefits of formality, smaller firms may be more affected by the practices of the informal sector.

In order to take into account firm size effects on the impact of informal firm presence on formal SMEs' credit constraints, we estimate Eq. (3) for different subsamples of firms according to the number of their permanent employees. We define micro-firms as those employing 1-9 workers. Small and medium firms, respectively, are firms that employ 10-49

and 50-249 employees. We report the results of our estimations in Table B1 (Appendix B). Regardless of the estimation method utilized, we find that as a firm gets larger, the magnitude of the adverse effect of informal firm competition on the likelihood that a formal firm becomes credit-constrained diminishes. Moreover, it is also worth noting that the endogeneity problem tackled in Section 4 is only crucial for the subsample of micro-firms. This means that the credit constraint status of firms employing 1-9 workers affect whether or not they face competition from informal firms. For those which employ at least 10 workers, however, the endogeneity problem is not an issue and hence, the probit regression estimates should be consistent. In terms of economic significance, our results indicate that formal micro-firms that face competition from informal enterprises are 28% more likely to be credit-constrained than the other formal micro-enterprises. Moreover, small and medium firms facing competition from informal firms are 15% and 13% more likely to be credit-constrained than their respective formal firm counterparts.

We found in Section 5.2 that the negative effects induced by the presence of informal firms as competitors to formal firms diminish as the quality of the institutional environments improves. As emphasized in Section 2.2, weak quality of institutional environments may increase the costs or reduce the benefits of formality. Extending our analysis, we examine whether the impact of better institutional environment on the informal firm competition-credit constraint relationship is different across firm size groups. We show the average marginal effects of *informal\_comp* on the probability that a firm becomes credit-constrained at varying levels of institutional environment quality in Figure B1 (Appendix B) across different firm size groups.

Regardless of the quality of the institutional environment, our results show that formal micro-firms facing competition from informal firms are more likely to be credit-constrained compared with their other micro-firm counterparts. Moreover, it is interesting to note that the magnitude of this likelihood is lower in countries with better rule of law, control of corruption, business regulatory environment and depth of information in credit registries. Micro-firms in Venezuela and the D.R.C. (worst rule of law and control of corruption, respectively) facing competition from informal firms are 30% more likely to get credit-constrained compared with 17% in Chile, which has the best rule of law and control of corruption among the countries included in our study. Small firms (10-49 employees) in Venezuela facing competition from informal firms are 11% more likely to get credit-constrained than their counterparts. However, in Chile, we neither find economic nor

statistical significance of the impact of informal firm competition on formal small firms' access to credit. These results are consistent with Hampel-Milagrosa, Loewe and Reeg's (2015) findings which suggest micro firms to be more vulnerable in the presence of poor quality of institutions vis-à-vis larger firms.

In Central African Republic where the business regulatory environment is the worst in our study sample, we find that firms in the smallest firm size group (1-9 employees) are 28% more likely to be credit-constrained compared with a 22% increase in the likelihood for similar firms in Mauritius, which has the highest rank in terms of the ease of doing business. We find that in countries where credit information is more available in public and private credit registries, there is a slightly lower likelihood (30% vs 25%) that the smallest firms facing informal firm competition get credit-constrained compared with their counterparts.

For firms employing at least 50 employees (biggest firms in the sample), the impact of the quality of institutional environment on the informal firm competition-credit constraint relationship is less evident. This suggests that regardless of the level of the quality of institutional environment, the benefits attributed to formality for such group of firms is large enough to outweigh costs attributed to formality, including the unfair cost advantage of informal firms. Overall, our findings imply that the benefits of formality increase with the level of institutional quality, particularly for micro and small enterprises. For medium-sized firms, the contribution of the institutional quality is minimal.

## 6.2 *Manufacturing vis-à-vis Services Sector*

Several studies in the literature point out differences in terms of the overall structure, financing constraints and access to external finance of firms in the services and manufacturing sectors/industries (Beck et al., 2005; Amin, 2010; Carreira and Silva, 2010). In order to investigate whether or not the impact of the presence of informal firm competition to formal SMEs is sector-specific, we estimate Eqs. (3) and (4) using subsamples of firms belonging to the manufacturing and services sector. We report the results in Table C1 (Appendix C).

Our findings indicate that the impact of the presence of informal firm competition on credit constraints is significant within both the manufacturing and service industries. In terms of economic significance, our results show that firms in the manufacturing and service industries, facing competition from informal firms are, respectively, 27% and 14% more likely to be credit-constrained compared with their counterparts in the same industries.

Consistent with our main results, we find that the quality of institutional environment affects significantly how informal firm competition affects the credit constraints of formal SMEs. In Chile, for example, where rule of law is the strongest, the credit constraints of firms that face informal firm competition do not differ from those of firms that do not have informal firms as competitors. However, when the level of the quality of institutional environment is weak, which is the case for D.R.C. which has the worst control of corruption among the countries included in this study, firms in the manufacturing and services industries facing informal firm competition have higher probabilities (21% and 14%, respectively) of being credit-constrained. Gauging the impact of the costs of entering the formal sector, our findings indicate that in Central African Republic where ease of doing business is the worst, firms in the manufacturing and service industries facing competition from informal firms are, respectively, 23% and 15% more likely to be credit-constrained. We compare this with Mauritius which is currently ranked no. 12 worldwide in terms of the ease of doing business indicators (the best in our sample) where firms belonging to the manufacturing and services industries, respectively are 12% and 9% more probable, respectively, to be financially-constrained. We observe similar patterns when taking into account information sharing.

### 6.3 *Firm-specific characteristics*

We also examine how different firm-specific characteristics, which could be indicative of their growth potential and productivity, affect the informal firm competition-credit constraint relationship in countries where institutional environment quality is weak. To take this into account, we first isolate subsamples of countries whose rule of law or control of corruption indices are nonpositive. We use different firm-specific characteristics to indicate whether or not the firm has growth potential. We hence define several binary variables which indicate whether or not the establishment has 1) acquired internationally-recognized quality certification (*ISO*), 2) its financial statements checked by an auditor (*AUDIT*), 3) been using technology license from foreign-owned companies (*TECHLIC*), and 4) submitted application to obtain a construction-related permit (*CONSTRUCTION*). We introduce these dummy variables separately in Eq. (3) and interact them with our main variable of interest, *informal\_comp*. We report in Table D1 (Appendix D) the marginal effects of the presence of informal firm competition on the credit constraints of formal firms for enterprises with varying firm-specific characteristics.

We find that in countries where the rule of law or control of corruption is weak, firms which do not offer internationally recognized quality products are more likely to be credit-

constrained when faced with competition from informal firms and to a larger extent than those which have certifications. Similarly, we find firms whose financial statements are not audited, do not have technology-licensed from foreign companies and have not applied for construction permits, to be more financially-constrained than their counterparts when faced with informal firm competition. This suggests that the impact of informal firm competition on the formal firms' financing constraints depend on their growth potential. We stress, however, that their growth and expansion prospects do not sufficiently eradicate the negative effects of the practices of informal firms and the sector, in general, on their credit possibilities, when the rule of law or control of corruption in their country is weak. Overall, these results show that though firms gain benefits from improving the quality of their products and services when faced with competition from informal firms, there is still a need for policymakers to strengthen the quality of institutional environments to temper the negative impacts of informality.

#### 6.4 Other robustness checks<sup>4</sup>

We also consider an alternative definition of our main independent variable of interest: *informal\_comp*. We define a more restrictive explanatory variable *informal\_comp\_alt*, which is constructed by excluding firms from the sample which do not perceive the practices of the informal sector to be an obstacle to their operations through their responses to the WBES surveys.

Overall, considering this new definition yields similar conclusion that there is a higher probability for firms facing competition from informal firms to be credit/financially-constrained compared with their counterparts. Our findings also imply that a stronger quality of institutional environment may help in mitigating the impact of informality on formal SME's operations.

We also check the robustness of our results by using different thresholds to define an SME as there is no single way to define it. We replicate our estimations by excluding firms with less than five employees, and by considering an upper threshold of 500 employees. We also use as alternative instruments of *informal\_comp*, the average percentages of firms that: 1) made informal payments during inspection from tax officials, and 2) experienced inspection or visit from tax officials to check the robustness of our results. Regardless of the instruments and the definition used, the results regarding our variable of interest remain the same.

## 7. CONCLUSION

Lack of access to finance and the practices of the informal sector are the two most serious obstacles affecting the operations and growth of registered SMEs. While a large body of empirical literature has looked into the factors determining access to finance, very few if not inexistent, tackle how the informal sector affects registered SMEs' business operations using micro-level data. In this paper, we particularly investigate the impact of the competition from informal firms on the credit constraints of registered SMEs. Moreover, we also analyze the role played by the quality of institutional environment in exacerbating or mitigating the adverse impact of the practices of the informal sector.

Working on 23084 registered SMEs in 86 countries, our findings indicate that formal SMEs facing competition from informal firms are more likely to be credit-constrained than their counterparts, which are assumed to be less affected by the practices of the informal sector. Moreover, further investigation shows that registered micro and smaller firms are the ones which are most severely affected by the competition from informal firms. This is because the benefits attributed to formality increase as a firm grows its operations. Our results also highlight that the competition from informal firms adversely affects registered SMEs' external credit possibilities but only in countries characterized with weak quality of institutional environment. A weak quality of institutional environment increases the size of the informal economy, raises the costs and lowers the benefits attributed to formality, and in addition, creates a 'culture of informality'. Conversely, when rule of law is effective and control of corruption is strong, there are fewer incentives for informal firms to expand their operations for fear of detection. Moreover, a strong quality of institutional environment weakens the inter-linkages between the formal and informal sectors and thus, firms in both sectors are less likely to cater to an overlapping customer base.

Overall, our results stress the importance for policymakers to provide appropriate and sufficient incentives particularly to start-up firms to register their businesses. The benefits attributed to formality should be reinforced particularly for micro and smaller firms. Access to financing being the most important benefit of being formal, has to be facilitated by providing credit guarantees to registered SMEs. Moreover, our findings are in line with studies that highlight the importance of improving the quality of the institutional environment, particularly in less developed economies where the informal sector is large.

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## ENDNOTES

<sup>1</sup> Throughout the text, formal and registered are used interchangeably.

<sup>2</sup> In West Africa, Böhme and Thiele (2012) find evidence showing overlapping customer bases between the formal and informal sectors.

<sup>3</sup> Robustness checks are made considering micro, small and medium enterprises separately, considering only SME or changing the definition of SME (see section 6).

<sup>4</sup> For the sake of brevity, in this subsection, we do not report the table of results. They are, however, available upon request to the authors.

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TABLES

TABLE 1. Descriptive Statistics on the Relation between Informal Firm Competition and Financing Constraints in 86 countries, 2009-2012

Financing Constraints	Survey Responses	ORIGINAL SURVEY SAMPLE			FINAL SAMPLE		
		Facing Competition from Informal Firms?			Facing Competition from Informal Firms?		
		All	Yes	No	All	Yes	No
<i>Constrained</i>	Yes	35.35	38.46	31.49	34.42	37.26	30.77
Degree by which the practices of the informal sector affect the firm's operations	No Obstacle	31.28	7.39	62.53	30.38	6.93	62.46
	Minor Obstacle	16.38	16.48	16.25	16.57	16.58	16.56
	Moderate Obstacle	21.19	28.17	12.06	21.56	28.66	11.84
	Major Obstacle	18.04	27.09	6.2	18.31	27.09	6.28
	Very Severe Obstacle	13.12	20.87	2.97	13.18	20.73	2.86
Most serious obstacle faced by the firm	Practices of informal sector	14.07	21.47	4.47	14.56	22.13	4.38
	Rank	2	1	7	2	1	7
	Other top obstacles	access to finance	access to finance	tax rates	access to finance	access to finance	tax rates
		tax rates	tax rates	access to finance	tax rates	tax rates	access to finance

Variable definitions: *constrained* is a dummy variable that takes the value of one if a firm applied for a loan but was not able to obtain it or if a firm did not apply for a loan but needed it, and zero, if otherwise.

TABLE 2. Definition of Variables and Summary Statistics

Variables	Definition	Data Source	Expected sign of the coefficient	Obs	Mean	Std Dev	Min	Max
<i>Constrained</i>	It is a dummy variable that is equal to one if the firm applied for a loan but was not able to acquire it or if a firm did not apply for a loan but needed a loan, and zero, if the firm obtained bank financing or the firm has sufficient capital. ( <i>k8, k16, k17</i> )	WBES 2009-12		23084	0.34	0.48	0	1
<i>informal_comp</i>	It is a dummy variable constructed based on the survey question: <i>e11- Does this establishment compete against unregistered or informal firms?</i> It is equal to one if the answer is Yes and zero, if otherwise.	WBES 2009-12	(+)	23084	0.56	0.50	0	1
<i>size</i>	It is the natural logarithm of the total number of permanent, full-time employees at the end of the fiscal year ( <i>l1</i> ).	WBES 2009-12	(-)	23084	3.09	1.12	0	5.52
<i>laborprod</i>	It is a measure of labor productivity. It is computed as the natural logarithm of the value of firm sales over the number of permanent employees, scaled three years before the survey was conducted	WBES 2009-12	(-)	23084	13.81	3.02	1.66	26.58
<i>nonmanufacturing</i>	It is a dummy variable that is equal to one if the firm is under the services sector or other sectors, and zero, if under the manufacturing sector.	WBES 2009-12	(+)(-)	23084	0.51	0.50	0	1
<i>reg_LAC</i>	It is a dummy variable that is equal to 1 if the firm is located in the Latin America and Caribbean region and zero, if otherwise.	World Bank	(+)(-) Vis-à-vis Sub-Saharan African Region	23084	0.37	0.48	0	1
<i>reg_ECA</i>	is equal to 1 if the firm is located in the Eastern European and Central Asian region and zero, if otherwise.	World Bank	(+)(-) Vis-à-vis Sub-Saharan African Region	23084	0.28	0.45	0	1
<i>reg_EAP</i>	is equal to 1 if the firm is located in the East Asia and Pacific region and zero, if otherwise.	World Bank	(+)(-) Vis-à-vis Sub-Saharan African Region	23084	0.13	0.34	0	1
<i>reg_MNA</i>	is equal to 1 if the firm is located in the Middle East and North African region and zero, if otherwise.	World Bank	(+)(-) Vis-à-vis Sub-Saharan African	23084	0.04	0.19	0	1

			Region					
<i>reg_SAR</i>	is equal to 1 if the firm is located in the South Asian region and zero, if otherwise.	World Bank	(+)(-) Vis-à-vis Sub-Saharan African Region	23084	0.04	0.19	0	1
<i>multiple</i>	It is a dummy variable that is equal to one if the establishment is a part of a larger firm, and zero, if otherwise.	WBES 2009-12	(-)	23084	0.12	0.33	0	1
<i>age</i>	It is the natural logarithm of the number of years the firm is operating from the time of establishment.	WBES 2009-12	(-)	23084	2.64	0.71	0	5.42
<i>capitalcity</i>	It is a dummy variable that is equal to one if the establishment is located in the capital city and zero, if otherwise.	WBES 2009-12	(+)(-)	23084	0.34	0.47	0	1
<i>management</i>	It is the natural logarithm of the number of years of experience the top manager has in working in the sector.	WBES 2009-12	(-)	23084	2.68	0.73	0	4.25
<i>inflation</i>	Inflation.	World Development Indicators (WDI) 2013	(+)	23084	5.80	8.94	-2.41	85.07
<i>rgdp</i>	It is the natural logarithm of the real gross domestic product per capita.	World Development Indicators (WDI) 2013	(-)	23084	7.91	1.08	5.02	9.95
<i>instit_env: Rule of law</i>	It is an index, which measures the rule of law. It captures the extent to which agents abide by the rules of society, and the quality of contract enforcement, property rights, the police and the courts.	Worldwide Governance Indicators 2011, Kaufmann et al. (2010)	(-)	23084	-0.37	0.68	-1.67	1.36
<i>instit_env: Control of corruption</i>	It is an index, which measures control of corruption. It captures the extent to which public power is exercised for private gain.	Worldwide Governance Indicators 2011, Kaufmann et al. (2010)	(-)	23084	-0.35	0.71	-1.40	1.52
<i>instit_env: Ease of doing business</i>	It is an index, which measures regulations that affect businesses, including those associated with starting a business, getting credit, dealing with construction permits, paying taxes, among others.	World Bank Doing Business 2011	(-)	23084	1.32	0.93	0.54	5.26
<i>instit_env: Info</i>	It is the credit depth of information index which measures rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions.	World Bank (2011)	(-)	23084	3.97	1.94	0	6

TABLE 3. The impact of the presence of informal/unregistered firms as competitors to formal SMEs on the latter's financing constraints across 86 economies, from the 2009 to 2012 World Bank Enterprise Surveys

	Probit regression	Conditional mixed process (CMP) regression
	Pr( <i>Constrained=1</i> )	
<i>informal_comp</i>	0.16*** (8.66)	0.18*** (6.71)
<i>size</i>	-0.20*** (-23.19)	-0.18*** (-19.15)
<i>laborprod</i>	-0.03*** (-8.00)	-0.03*** (-7.97)
<i>nonmanufacturing</i>	-0.12*** (-6.63)	-0.12*** (-6.18)
<i>reg_LAC</i>	-0.57*** (-16.05)	-0.58*** (-15.98)
<i>reg_ECA</i>	-0.38*** (-10.30)	-0.31*** (-7.69)
<i>reg_EAP</i>	-0.35*** (-10.11)	-0.30*** (-8.02)
<i>reg_MNA</i>	0.16*** (3.04)	0.19*** (3.65)
<i>reg_SAR</i>	-0.29*** (-6.00)	-0.19*** (-3.60)
<i>multiple</i>	-0.10*** (-3.52)	-0.09*** (-3.23)
<i>age</i>	-0.02 (-1.12)	-0.03** (-1.97)
<i>capitalcity</i>	-0.14*** (-7.04)	-0.15*** (-7.49)
<i>management</i>	-0.10*** (-4.07)	-0.06*** (-4.68)
<i>inflation</i>	0.01*** (7.08)	0.01*** (7.03)
<i>rgdp</i>	-0.05*** (-4.23)	-0.04*** (-3.20)
constant	1.51*** (13.37)	1.45*** (12.35)
Test of exogeneity (atanhrho)		-0.10*** (-3.30)
Amemiya-Lee-Newey test of overidentifying restrictions (ivprobit)		0.60
Wald test of exogeneity (after ivprobit)		22.32***
OBS	23084	23084
Pseudo R <sup>2</sup>	0.07	
$\chi^2$	2011.3***	4767.6***

TABLE 4. The impact of the presence of informal firms as competitors to formal SMEs to the latter's financing constraints dependent on the quality of institutional environment in 86 economies, from the 2009 to 2012 World Bank Enterprise Surveys

	Pr( <i>constrained</i> =1)			
	Conditional mixed process (CMP) regression			
	( I )	( II )	( III )	( IV )
	<i>Rule of Law</i>	<i>Control of Corruption</i>	<i>Ease of Doing Business</i>	<i>Info</i>
<i>instit_env</i>				
<i>informal_comp</i>	0.29*** (3.78)	0.32*** (4.12)	0.50*** (6.56)	0.60*** (7.94)
<i>instit_env</i>	-0.15*** (-6.88)	-0.16*** (-7.74)	-0.14*** (-9.30)	-0.045*** (-5.38)
<i>informal_comp* instit_env</i>	-0.10*** (-3.53)	-0.10*** (-3.64)	-0.02 (-0.89)	-0.012 (-1.26)
<i>size</i>	-0.19*** (-20.07)	-0.19*** (-19.93)	-0.18*** (-19.00)	-0.17*** (-17.90)
<i>laborprod</i>	-0.03*** (-7.68)	-0.03*** (-8.13)	-0.02*** (-7.14)	-0.026*** (-7.91)
<i>nonmanufacturing</i>	-0.12*** (-6.26)	-0.12*** (-6.22)	-0.12*** (-6.67)	-0.13*** (-7.02)
<i>reg_LAC</i>	-0.60*** (-20.15)	-0.58*** (-19.29)	-0.63*** (-20.99)	-0.51*** (-15.56)
<i>reg_ECA</i>	-0.39*** (-10.51)	-0.45*** (-11.91)	-0.31*** (-8.45)	-0.20*** (-4.77)
<i>reg_EAP</i>	-0.35*** (-9.34)	-0.40*** (-10.31)	-0.37*** (-9.85)	-0.21*** (-5.37)
<i>reg_MNA</i>	-0.04 (-0.68)	-0.01 (-0.17)	0.08 (1.52)	0.11** (2.08)
<i>reg_SAR</i>	-0.21*** (-3.82)	-0.21*** (-3.93)	-0.23*** (-4.24)	-0.061 (-1.10)
<i>multiple</i>	-0.10*** (-3.47)	-0.10*** (-3.36)	-0.09*** (-3.26)	-0.082*** (-2.94)
<i>age</i>	-0.01 (-0.78)	-0.01 (-0.74)	-0.02 (-1.56)	-0.032** (-2.23)
<i>capitalcity</i>	-0.13*** (-6.74)	-0.13*** (-6.35)	-0.12*** (-6.34)	-0.13*** (-6.60)
<i>management</i>	-0.06*** (-4.21)	-0.06*** (-4.19)	-0.06*** (-4.25)	-0.055*** (-4.15)
<i>inflation</i>	0.01*** (4.74)	0.01*** (4.61)	0.01*** (5.61)	0.0083*** (7.55)
constant	0.92*** (10.66)	0.93*** (10.79)	1.05*** (11.74)	0.91*** (10.26)
Tests of exogeneity (atanhrho)	-0.12** (-2.41)	-0.13*** (-2.73)	-0.21*** (-4.34)	-0.26*** (-5.36)
OBS	23084	23084	23084	18212
$\chi^2$	5213.8***	5255.9***	5394.7***	6235.3***

## FIGURES

Figure 1: Mode of construction of the dependent variable on the basis of the questions in the WBES.

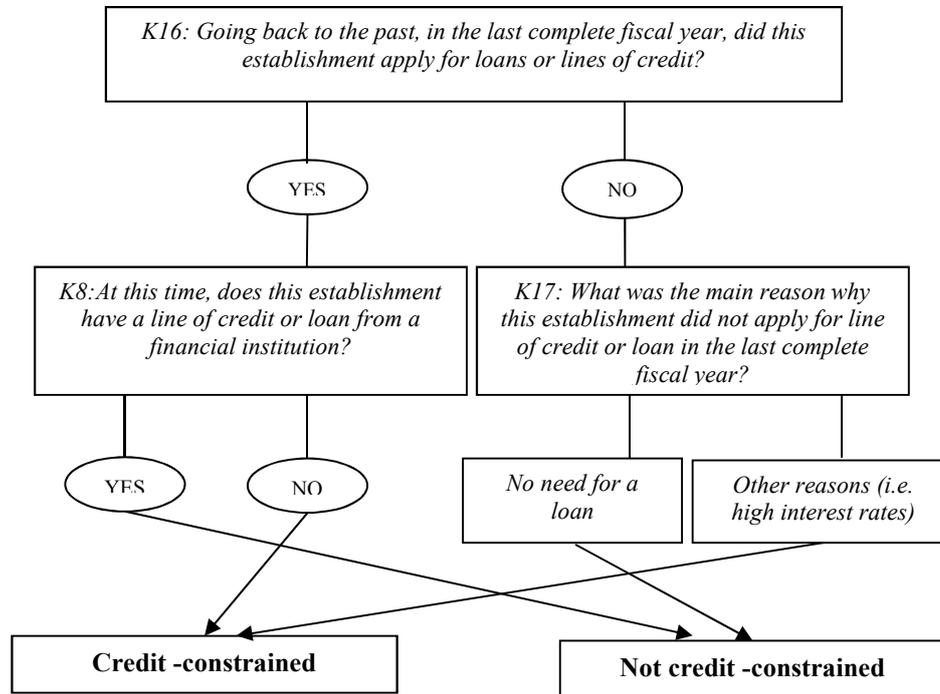
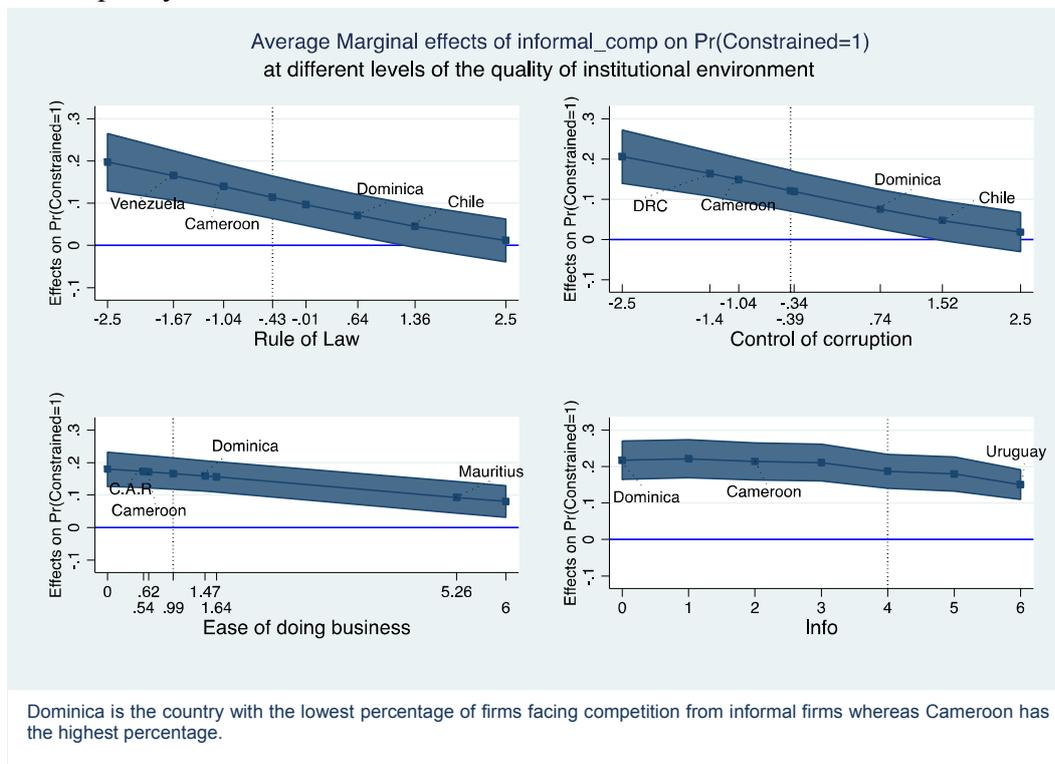


Figure 2. Average Marginal Effects of *informal\_comp* on  $\text{Pr}(\text{constrained}=1)$  at different levels of the quality of institutional environment



## APPENDICES

### APPENDIX A

TABLE A1. Statistics on the Percentage of Firms Facing Competition from Informal Firms by Country, 2009-2012

COUNTRY	ORIGINAL SURVEY SAMPLE		STUDY SAMPLE : ALL FIRMS		STUDY SAMPLE : <250 employees	
	% of firms facing competition with informal firms	Total no. of firms	% of firms facing competition with informal firms	Total no. of firms	% of firms facing competition with informal firms	Total no. of firms
Angola	35.93	334	45.35	172	45.61	171
Antigua and Barbuda	77.33	150	75.81	124	76.42	123
Armenia	41.11	360	36.84	190	37.99	179
Azerbaijan	37.07	348	39.59	245	40.95	232
Bahamas	56.39	133	58.65	104	60.2	98
Belize	64	150	64.58	144	65.49	142
Benin	82.35	136	84.71	85	84.71	85
Bhutan	20.56	248	22.43	214	21.05	209
Bolivia	79.94	359	79.61	152	79.41	136
Bosnia and Herzegovina	48.82	338	49.56	226	49.28	207
Botswana	55.78	251	57.67	189	58.19	177
Brazil	66.04	1758	67.86	1397	69.27	1266
Bulgaria	48.69	191	47.86	140	49.61	129
Burkina Faso	71.71	350	70.93	258	71.26	254
Cameroon	88.34	343	88.47	295	90.22	276
Cape Verde	48.98	147	52.17	69	50.77	65
Central African Republic	68.28	145	69.89	93	69.23	91
Chad	85.21	142	84.62	104	86.27	102
Chile	53.47	1008	54.92	834	56.5	715
Colombia	76.24	926	76.61	808	77.22	711
Congo	66.42	137	74.36	39	73.68	38
Costa Rica	73.12	532	74.02	331	75.75	301
Dominica	11.33	150	10.71	140	10.71	140
Dominican Republic	72.83	357	76.25	261	79.06	234
DRC	86.49	333	87.33	221	87.26	212
Ecuador	64.27	361	64.98	277	67.36	239
El Salvador	67.14	237	67.47	249	71.04	221
Estonia	21.29	263	21.97	223	23.76	202
Ethiopia	38.87	566	40.43	329	40.98	305
Fiji	37.89	161	40.58	69	42.42	66
Fyr Macedonia	69.61	362	71.15	253	71.24	233
Gabon	74.7	124	79.73	74	80.28	71
Grenada	72.54	142	75.65	115	75.22	113
Guatemala	72.68	582	72.1	362	75.32	312
Guyana	60.26	156	65.49	113	63.72	102
Honduras	59.18	343	65.08	189	64.94	174
Hungary	51.61	279	53.2	250	50.91	220
Indonesia	59.16	1327	58.66	970	61.75	868
Iraq	64.54	705	64.82	614	64.82	614
Ivory Coast	76.04	434	79.75	242	80	235
Kazakhstan	33.74	495	35.84	332	36.42	302
Kosovo	63.19	182	66.42	134	65.91	132
Kyrgyz Republic	64.5	231	62.22	180	64.33	171
Lao PDR	24.78	577	24.53	428	25.87	402
Latvia	38.67	256	40	200	41.01	178

Lesotho	53.19	141	54.81	104	60.67	89
Liberia	62.5	144	61.42	127	61.11	126
Lithuania	41.57	255	40.11	182	40.72	167
Madagascar	59.77	435	60.28	287	63.36	262
Malawi	69.8	149	71.72	99	77.65	85
Mali	72.05	322	81.58	76	82.67	75
Mauritius	53.66	382	57.5	280	59.39	261
Mexico	65.04	1456	65.18	1189	67.1	1009
Moldova	37.5	344	36.21	301	37.73	273
Mongolia	44.94	356	45.7	337	45.35	311
Montenegro	32.67	101	40	60	41.38	58
Nepal	40.5	363	38.13	299	38.68	287
Nicaragua	65.55	328	64.68	235	64.06	217
Niger	81.56	141	80.28	71	81.43	70
Panama	59.39	362	53.1	145	52.52	139
Paraguay	74.72	356	73.98	246	73.36	229
Peru	73.04	994	72.06	798	72.36	673
Philippines	37.33	1259	39.82	796	40.84	715
Poland	33.01	418	37.18	234	37.1	221
Romania	34.29	455	33.9	236	33.78	222
Russia	30.07	3748	32.79	2644	33.35	2426
Rwanda	54.09	220	57.35	136	57.81	128
Samoa	63.46	104	64.52	62	65.57	61
Serbia	53.56	379	52.48	303	54.61	271
Sierra Leone	73.13	134	72.66	128	72	125
Slovak Republic	37.39	230	34.85	132	35.83	120
Slovenia	24.18	273	26.36	220	28.34	187
Sri Lanka	45.38	573	47.27	440	48.64	405
St Kitts and Nevis	62.24	143	59.57	94	58.7	92
St Lucia	23.33	150	23.61	144	24.11	141
St Vincent and Grenadines	58.96	134	58.49	106	58.65	104
Suriname	85.53	152	85.53	152	85.91	149
Timor Leste	66.22	148	72.46	69	72.46	69
Togo	78.32	143	81.82	77	81.94	72
Tonga	86.01	143	87.62	105	87.62	105
Trinidad and Tobago	67.36	337	66.02	256	66.94	245
Uruguay	72.56	594	69.92	379	69.8	351
Vanuatu	40.34	119	38.81	67	38.81	67
Venezuela	35.87	315	47.01	134	46.77	124
Vietnam	50.87	1036	51.38	831	55.52	670
Yemen	40.76	449	43.98	241	43.04	230
Ave/Total	56.66	35394	55.31	25260	56.3	23084

TABLE A2. Distribution of Firms According to Firm Size by Country and Statistics on the Percentage of Firms Facing Competition from Informal Firms According to Firm Size by Country, 2009-2012

COUNTRY	Distribution of firms according to firm size				% of firms facing competition with informal firms according to firm size			
	1 to 9 employees	10 to 49 employees	50 to 249 employees	>249 employees	1 to 9 employees	10 to 49 employees	50 to 249 employees	>249 employees
Angola	14.53	72.67	12.21	0.58	40	45.6	52.38	0
Antigua and Barbuda	31.45	55.65	12.1	0.81	87.18	72.46	66.67	0
Armenia	35.26	38.95	20	5.79	44.78	31.08	39.47	18.18
Azerbaijan	26.53	46.12	22.04	5.31	50.77	44.25	22.22	15.38
Bahamas	27.88	41.35	25	5.77	65.52	55.81	61.54	33.33
Belize	25.69	53.47	19.44	1.39	54.05	70.13	67.86	0
Benin	50.59	44.71	4.71	0	90.7	81.57	50	-
Bhutan	36.45	47.66	13.55	2.34	20.51	21.57	20.69	80
Bolivia	17.76	40.79	30.92	10.53	81.48	79.03	78.72	81.25
Bosnia and Herzegovina	17.7	48.23	25.66	8.41	50	48.62	50	52.63
Botswana	22.22	50.26	21.16	6.35	52.38	65.26	47.5	50
Brazil	14.75	49.33	26.49	9.38	75.24	72.03	60.81	54.2
Bulgaria	29.29	48.57	14.29	7.86	48.78	51.47	45	27.27
Burkina Faso	42.25	41.86	14.34	1.55	85.32	61.11	59.46	50
Cameroon	32.54	40.34	20.68	6.44	92.71	93.28	80.33	63.16
Cape Verde	21.74	40.58	31.88	5.8	40	67.86	36.36	75
Central African Republic	24.73	61.29	11.83	2.15	73.91	71.93	45.45	100
Chad	30.77	51.92	15.38	1.92	90.63	88.89	68.75	0
Chile	8.99	45.68	31.06	14.27	70.67	62.47	43.63	45.38
Colombia	19.31	42.2	26.49	12	84.62	78.59	69.63	72.16
Congo	30.77	51.28	15.38	2.56	66.67	75	83.33	100
Costa Rica	18.73	44.41	27.79	9.06	79.03	79.59	67.39	56.67
Dominica	45.71	41.43	12.86	0	7.81	91.76	16.67	-
Dominican Republic	14.94	40.61	34.1	10.34	79.49	12.07	78.65	51.85
DRC	44.34	38.46	13.12	4.07	89.8	79.25	65.52	88.89
Ecuador	14.8	42.96	28.52	13.72	75.61	66.39	64.56	50
El Salvador	15.26	39.76	33.73	11.24	68.42	70.71	72.62	39.29
Estonia	16.14	42.15	32.29	9.42	25	24.47	22.22	4.76
Ethiopia	18.24	48.63	25.84	7.29	51.67	45.63	24.71	33.33
Fiji	23.19	60.87	11.59	4.35	31.25	52.38	12.5	0
Fyr Macedonia	26.09	37.55	28.46	7.91	83.33	71.58	59.72	70
Gabon	40.54	47.3	8.11	4.05	83.33	77.14	83.33	66.67
Grenada	35.65	46.96	15.65	1.74	80.49	72.22	72.22	100
Guatemala	19.61	35.08	31.49	13.81	84.51	80.31	64.04	52
Guyana	8.85	45.13	36.28	9.73	40	70.59	60.98	81.82
Honduras	37.04	33.33	21.69	7.94	62.86	73.02	56.1	66.67
Hungary	14.4	40	33.6	12	44.44	50	54.76	70
Indonesia	44.64	29.07	15.77	10.52	64.67	65.25	47.06	32.35
Iraq	47.88	49.19	2.93	0	74.15	55.3	72.22	-
Ivory Coast	47.52	35.54	14.05	2.89	89.57	70.93	70.59	71.43
Kazakhstan	12.65	48.19	30.12	9.04	42.86	38.13	31	30
Kosovo	50	36.57	11.94	1.49	67.16	65.31	62.5	100
Kyrgyz Republic	23.33	49.44	22.22	5	69.05	65.17	57.5	22.22
Lao PDR	37.85	34.58	21.5	6.07	14.04	20.62	19.35	0
Latvia	19	35	35	11	39.47	42.86	40	31.82
Lesotho	25	44.23	16.35	14.42	65.38	56.52	64.71	20
Liberia	61.42	27.56	10.24	0.79	57.69	65.71	69.23	100
Lithuania	21.43	42.31	28.02	8.24	43.59	41.56	37.25	33.33
Madagascar	13.24	50.87	27.18	8.71	68.42	69.18	50	28
Malawi	15.15	30.3	40.4	14.14	86.67	80	72.5	35.71
Mali	44.74	40.79	13.16	1.32	79.41	87.1	80	0
Mauritius	30.71	40	22.5	6.79	63.95	59.82	52.38	31.58

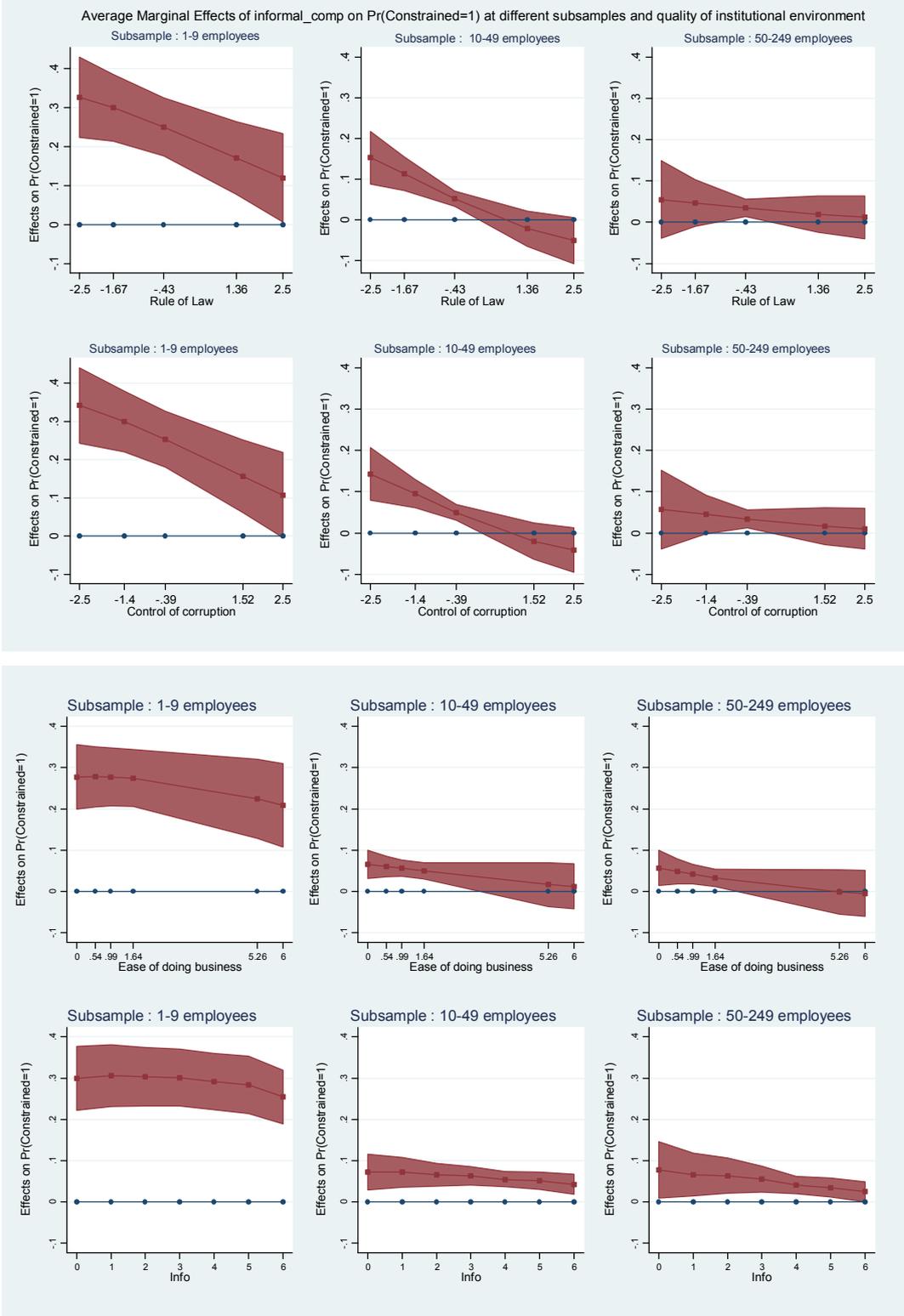
Mexico	18.42	33.64	32.8	15.14	75.34	69.25	60.26	54.44
Moldova	20.6	44.52	25.58	9.3	46.77	34.33	36.36	21.43
Mongolia	20.77	47.77	23.74	7.72	41.43	48.45	42.5	50
Montenegro	30	46.67	20	3.33	50	35.71	41.67	0
Nepal	34.45	47.49	14.05	4.01	50.49	33.8	26.19	25
Nicaragua	25.11	45.96	21.28	7.66	64.41	68.52	54	72.22
Niger	25.35	54.93	18.31	1.41	66.67	87.18	84.62	0
Panama	16.55	41.38	37.93	4.14	62.5	43.33	58.18	66.67
Paraguay	19.51	42.28	31.3	6.91	62.5	76.92	75.32	82.35
Peru	14.54	39.47	30.33	15.66	85.34	75.87	61.57	70.4
Philippines	13.82	44.47	31.53	10.18	46.36	43.5	34.66	30.86
Poland	33.33	35.47	25.64	5.56	38.46	39.76	31.67	38.46
Romania	17.37	38.56	38.14	5.93	48.78	35.16	25.56	35.71
Russia	22.73	45.23	23.79	8.25	42	41.49	36.32	30.7
Rwanda	27.94	51.47	14.71	5.88	65.79	51.43	65	50
Samoa	35.48	59.68	3.23	1.61	59.09	70.27	50	0
Serbia	22.77	37.95	28.71	10.56	68.12	53.91	44.83	24.28
Sierra Leone	46.88	40.63	10.16	2.34	81.67	73.08	23.08	100
Slovak Republic	21.97	36.36	32.58	9.09	34.48	33.33	39.53	25
Slovenia	22.73	33.64	28.64	15	26	29.73	28.57	15.15
Sri Lanka	35.68	38.86	17.5	7.95	53.5	49.71	36.36	31.43
St Kitts and Nevis	34.04	51.06	12.77	2.13	71.88	60.42	16.67	100
St Lucia	28.47	52.08	17.36	2.08	21.95	25.33	24	0
St Vincent and Grenadines	50.94	35.85	11.32	1.89	66.67	55.26	33.33	50
Suriname	19.74	63.82	14.47	1.97	86.67	84.54	90.91	66.67
Timor Leste	34.78	60.87	4.35	0	66.67	73.81	100	-
Togo	37.66	40.26	15.58	6.49	82.76	90.32	58.33	80
Tonga	59.05	40.95	0	0	85.48	90.7	-	-
Trinidad and Tobago	20.7	42.97	32.03	4.3	75.47	62.73	67.07	45.45
Uruguay	16.09	42.74	33.77	7.39	65.57	75.93	64.06	71.43
Vanuatu	37.31	52.24	10.45	0	44	37.14	28.57	-
Venezuela	19.4	46.27	26.87	7.46	53.85	46.77	41.67	50
Vietnam	9.51	36.1	35.02	19.37	58.23	57	53.26	34.16
Yemen	44.81	34.02	16.6	4.56	36.11	48.78	50	63.64
Ave	24.39	42.67	24.33	8.61	63.32	60.34	51.75	46.1

APPENDIX B

Table B1. The impact of the presence of informal firms as competitors to formal SMEs on the latter's financing constraints using different subsamples of firms according to size, across 86 countries from the 2009 to 2012 World Bank Enterprise Surveys

Dependent variable: Pr ( <i>constrained</i> =1)						
	Probit Regression			Conditional Mixed Process Regression		
	1 to 9 employees	10 to 49 employees	50 to 249 employees	1 to 9 employees	10 to 49 employees	50 to 249 employees
<i>informal_comp</i>	0.19*** (5.29)	0.15*** (5.59)	0.13*** (3.47)	0.28*** (7.08)	0.12*** (2.88)	0.10 (1.41)
control variables	yes	yes	yes	yes	yes	yes
Test of exogeneity (atanrho)				-0.21*** (-4.44)	-0.036 (-0.79)	-0.027 (-0.35)
Amemiyaa-Lee-Newey test of overidentifying restrictions (ivprobit)				1.85	0.512	0.55
Wald test of exogeneity (after ivprobit)				31.42***	2.66	0.35
OBS	6160	10778	6146	6160	10778	6146
Pseudo-R <sup>2</sup>	0.06	0.05	0.03			
chi2	467.3***	614.2***	213.8***	1350.0***	1942.0***	781.8***

Figure B1. The average marginal effects of the presence of informal firms as competitors to formal SMEs' to the latter's financing constraints at varying levels of the quality of institutional environment for different firm size groups across 86 countries from the 2009 to 2012 World Bank Enterprise Surveys



APPENDIX C

Table C1. The impact of the presence of informal firms as competitors to formal SMEs on the latter's financing constraints according to sector of firm activity across 86 countries from the 2009 to 2012 World Bank Enterprise Surveys

Dependent Variable: Pr( <i>Constrained</i> = 1)										
<i>instit_env</i>	Rule of Law		Control of Corruption		Ease of Doing Business		Info			
<i>sector</i>	Manufacturing	Services	Manufacturing	Services	Manufacturing	Services	Manufacturing	Services	Manufacturing	Services
<i>informal_comp</i>	0.27*** (5.84)	0.14*** (4.32)	0.41*** (3.24)	0.26*** (2.72)	0.47*** (3.78)	0.27*** (2.79)	0.67*** (5.63)	0.42*** (4.33)	0.80*** (6.70)	0.49*** (5.21)
<i>instit_env</i>			-0.13*** (-3.89)	-0.16*** (-5.34)	-0.15*** (-4.54)	-0.17*** (-5.95)	-0.13*** (-5.36)	-0.14*** (-6.93)	-0.047*** (-3.57)	-0.047*** (-4.34)
<i>instit_env *informal_comp</i>			-0.12*** (-3.00)	-0.07* (-1.84)	-0.09** (-2.25)	-0.09** (-2.43)	-0.03 (-0.90)	-0.01 (-0.32)	-0.019 (-1.32)	-0.0038 (-0.30)
control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
OBS	11053	11615	11053	11615	11053	11615	11053	11615	11053	11615
$\chi^2$	2434.3***	2295.2***	2752.5***	2546.0***	2778.4***	2574.1***	2879.5***	2629.7***	2931.9***	2620.2***
Marginal impact of <i>informal_comp</i> on the Pr( <i>Constrained</i> =1) at different values of <i>instit_env</i>										
Min			0.22*** (4.81)	0.14*** (3.52)	0.21*** (4.84)	0.14*** (3.84)	0.23*** (5.86)	0.15*** (4.53)	0.29*** (6.93)	0.18*** (5.31)
Median			0.16*** (3.90)	0.10*** (3.13)	0.17*** (4.20)	0.11*** (3.36)	0.22*** (5.80)	0.14*** (4.58)	0.25*** (6.66)	0.16*** (5.41)
Max			0.07* (1.67)	0.05 (1.46)	0.09** (2.29)	0.04 (1.14)	0.12*** (3.05)	0.09*** (2.69)	0.19*** (6.12)	0.14*** (5.04)

APPENDIX D

Table D1. The marginal impact of the presence of informal firms as competitors to formal SMEs on the latter's financing constraints dependent on different firm-specific characteristics, across 86 countries from the 2009 to 2012 World Bank Enterprise Surveys

Marginal impact of <i>informal comp</i> when control of corruption is weak								
<i>ISO</i> =0	0.24*** (8.94)				0.23*** (7.86)			
<i>ISO</i> =1	0.18*** (6.31)				0.17*** (5.78)			
<i>AUDIT</i> =0		0.26*** (9.00)				0.25*** (8.28)		
<i>AUDIT</i> =1		0.22*** (8.41)				0.20*** (7.21)		
<i>TECHLIC</i> =0			0.38*** (11.79)				0.38*** (10.83)	
<i>TECHLIC</i> =1			0.30*** (8.02)				0.31*** (7.71)	
<i>CONSTRUCTION</i> =0				0.25*** (8.92)				0.23*** (7.91)
<i>CONSTRUCTION</i> =1				0.19*** (6.84)				0.17*** (5.84)
OBS	18421	18400	10783	18508	17171	17148	9817	17248