Courant Research Centre

'Poverty, Equity and Growth in Developing and Transition Countries: Statistical Methods and Empirical Analysis'

Georg-August-Universität Göttingen
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Discussion Papers

No. 139

Do Financially Constrained Firms Suffer from More Intense Competition by the Informal Sector? Firm-Level Evidence from the World Bank Enterprise Surveys

Julia Friesen, Konstantin M. Wacker

May 2013

Wilhelm-Weber-Str. 2 · 37073 Goettingen · Germany
Phone: +49-(0)551-3914066 · Fax: +49-(0)551-3914059

Email: crc-peg@uni-goettingen.de Web: http://www.uni-goettingen.de/crc-peg

Do Financially Constrained Firms Suffer from More Intense Competition by the Informal Sector? Firm-Level Evidence from the World Bank Enterprise Surveys

Julia Friesen*, *University of Göttingen,* friesen.julia@googlemail.com
***Konstantin M. Wacker**, *Vienna University of Economics and Business,* kwacker@wu.ac.at

Abstract

This paper investigates which firms suffer from informal competition and highlights the role of access to finance in this context.

We use cross-sectional data from the World Bank Enterprise Surveys covering 42,000 firms in 114 developing and transition countries for the period 2006 to 2011 and take discrete responses on the perceived severity of financial constraints and informal competition for our empirical analysis.

We find that financially constrained firms face significantly more intense competition by the informal sector and that this effect is economically large. In fact, financial constraints are the most important reason why firms suffer from informal competition. Other influential variables are ill-designed labor market regulations, corruption, and firm size. A wide range of robustness checks substantiates this finding.

Keywords: Firm finance, informal competition, enterprise survey data, ordered logit model

JEL Classifications: C25, D21, O17

Acknowledgements

We would like to thank Stephan Klasen, Ross Levine, and participants at a seminar in Göttingen for helpful comments. All remaining errors are ours.

Disclaimer

The views expressed in this paper are those of the authors and do not necessarily represent those of any of their affiliations.

* Corresponding Author

1 Introduction

A large informal sector is characteristic of many developing, emerging and transition countries. Schneider et al. (2010) estimate that more than 30 percent of the developing world's GDP is generated in the informal sector and that informality[1] accounts for up to 60 percent of economic activity in some countries. The natural question arising from these breathtaking figures is: What influences the decision of a firm to become informal, what does this decision imply for formal firms, and how can negative externalities from a large informal sector be avoided?

The recent decade has seen a surge of studies on the definition, measurement and determinants of the informal sector. Various methods to quantify the size of the informal sector have been developed (e.g. Tanzi, 1980; Johnson et al., 1997; Schneider and Enste, 2000; Perry et al., 2007) and the diverse motives for going 'underground' have been investigated (e.g. DeSoto, 1989; Schneider and Neck, 1993; Johnson et al. 1997, 1998, 2000; Friedman et al., 2000; Djankov et al., 2002; Botero et al., 2004; Gerxhani, 2004; Auriol and Walters, 2005; Straub, 2005; Dabla-Norris et al., 2008; Catão et al., 2009; Beck et al., 2010; Djankov et al., 2010; Caro et al., 2012). Yet, research on the consequences of informality for formal firms has been noticeably absent. This is all the more surprising given the potentially detrimental effects of informality on formal firms' productivity and economic growth. For example, informal firms might crowd out more productive formal firms, as their cost saving from operating informally allows them to undercut formal competitors. This reduces the incentive to innovate and adopt new technologies which is crucial for economic growth. As a result, an economy might be trapped in a low-productivity equilibrium characterized by many small informal firms and few large formal firms. Therefore, it is important to understand the consequences of informality on firms in the formal economy.

This paper brings forward the research frontier in this context. We are particularly interested in what determines the degree of informal competition that formal firms face and whether access to finance eases competitive pressures from informal firms. Our study thus relates to the vast literature on access to finance as an important engine of firm growth and the growing literature on the determinants of informality but adds a completely novel and - as we argue - essential aspect: While activity in the informal sector can per se have both positive

[1] Broadly speaking, informality refers to all economic activities that are not registered in accordance with legal requirements and that are hence not directly captured by official statistics (cf. Gerxhani, 2004). Note that 'informal sector' does not mean that informality is confined to a specific sector.

and negative effects,[2] we exclusively focus on the adverse welfare implications of informal activity on formal firms. This is crucial from a policy and welfare perspective since a social planer or policy maker should probably not use her limited resources on draconically fighting agents who decided - often less than more deliberately - to become informal but should provide an environment that allows formal firms to flourish, thereby reducing competitive pressures from informal firms and creating incentives to formalize. That would expand the economy's tax base, allow for product regulation where necessary to ensure quality, and enable firms to exploit comparative advantages via world market integration.[3] In our view, it is hence not the mere existence of informal firms that hampers economic development but their vicious interference with the formal economy. Our contribution thus takes up the point raised by Schneider and Enste (2000: 78) that "the effects of a growing shadow economy on the official one must … be considered." It is to our knowledge the first paper that studies competition by the informal sector from the viewpoint of formal firms and explicitly links it to access to finance.[4]

After theoretically motivating our contribution, we analyze survey data covering 42,000 firms in 114 developing and transition countries during the period 2006 to 2011 from the World Bank Enterprise Surveys (ES). These surveys explicitly ask firm managers and owners to rank the degree of obstacle that competition by the informal sector and access to finance present to their business operations. We use firm responses on these two questions to assess the link between access to finance and informal competition within the framework of an ordered logit model and provide a broad range of robustness checks to control for different forms of potential endogeneity. Our paper is hence not only the first that systematically investigates the relationship between competition by the informal sector and access to finance but also applies convincing solutions to the endogeneity problems that researchers using cross-sectional survey data frequently encounter.

[2] The mainstream literature attributes negative impacts to the informal sector via channels such as underinvestment (Johnson et al., 2000: 496), socially undesirable costs associated with avoiding detection (Perry et al., 2007: 22), or erosion of tax base (Schneider and Enste, 2000: 78). In the context of inefficient regulation and/or a rent-seeking bureaucracy in the formal economy, however, informality might be a second best by stimulating competition and putting a limit on inefficient official activities (e.g. Sarte, 2000).

[3] Informal firms would not obtain custom clearance and therefore cannot trade internationally (or only via intermediaries, which introduces inefficiencies). Cf. dePaula and Sheinkman, 2008.

[4] So far, only González and Lamanna (2007) have analyzed competition by the informal sector but their sample only includes manufacturing firms in Latin America and their focus is on the effect of regulation and government enforcement on informal competition. They do include a measure of access to finance in their regressions, which shows a significant and negative effect on the severity of informal competition, but they do not study the link in depth, neither in theoretical nor in econometric terms. We intend to fill this gap and explore the link in detail, thereby highlighting the economic relevance of this channel and showing its statistical robustness.

We find that financially constrained firms face significantly more intense competition by the informal sector. In fact, financial constraints are the most influential determinant of the severity of informal competition. Other influential variables are labor regulations, corruption and firm size, with the latter gaining in importance in more business-friendly environments. Moreover, we provide evidence that firms in industries that are more heavily dependent on external financing are less susceptible to informal competition than firms in industries with lower financing needs, highlighting the fact that finance is both necessary and supportive to grow out of low-productivity and low-quality markets where informal competition is traditionally fierce. Our findings clearly underscore the importance of fostering financial development and reforming the business environment, and lead to important policy conclusions.

The remainder of the paper is organized as follows. Section 2 theoretically motivates our empirical research hypothesis and reviews the relevant literature. Section 3 describes the data and methodology. Section 4 presents descriptive statistics, while section 5 shows the parametric estimation results and section 6 demonstrates the robustness of our results. We conclude and provide policy recommendations in section 7.

2 Theoretical Motivation

The standard literature on firm informality associates lower productivity levels with informality. This either results from stochastic models where a firm's productivity A_{it} is seen as a random draw from a probability distribution and where firms drawing higher productivities opt to become formal (e.g. Cerda and Saravia, 2013), or because it is assumed that the informal sector can only employ labor while the formal economy can additionally use capital in the production process (e.g. Ihrig and Moe, 2004; Turnovsky and Basher, 2009).[5] Both lines of reasoning imply that informal firms will be found at the lower end of the productivity distribution, which corresponds to stylized facts (La Porta and Shleifer, 2008; D'Erasmo and Moscoso Boedo, 2012). Furthermore, this suggests that the decision to operate in the formal/informal sector largely correlates with individual productivity concerns, besides

[5] This second consideration already points to our later argument about the relevance of access to finance because capital as a fixed asset and production factor is often financed via capital or debt as a liability. See also D'Erasmo and Moscoso Boedo (2012).

cost-benefit considerations which are mainly determined by the macroeconomic environment.[6]

The continuum of firms in an economy can hence be seen as a mixed frequency *h(x)* of formal and informal firms, as depicted in figure 1. Informal firms concentrate at the lower part of the productivity spectrum while formal firms are more likely to be at upper parts of the productivity distribution. Any given firm, formal or informal,[7] will thus encounter more informal competition if its productivity is low.[8]

Such informal competition can be severe for formal firms because the latter face an externality of other firms' decision to operate informally (Perry et al., 2007; Yadav and Mitra, 2009). For example, Dabla-Norris and Inchauste (2008) confirm that practices by the informal sector reduce growth in formal firms of all sizes which in turn can harm the aggregate economy (see also Loayza, 1996; Johnson et al., 1997, 2000; Schneider and Enste, 2000; Loayza et al., 2005; La Porta and Shleifer, 2008).

What influences firms to locate at different segments of the productivity spectrum, i.e. the x-axis in figure 1? It is important to remember that productivity in reality is not as one-dimensional as depicted, but can take different forms such as total factor productivity, price competitiveness, product innovation, etc. Therefore, anything that increases the capacity of firms will induce movements along the x-axis.

In our view, access to finance plays a key role in this context because of its interpretation as "economic opportunity" (Demirgüç-Kunt and Levine, 2008). More concretely, access to finance creates the opportunity to invest in innovation, product differentiation or product upgrading,[9] in modern technologies and efficient sourcing activities. It allows firms to specialize according to competitive advantages because it can help mitigate intertemporal

[6] Where they have the opportunity to choose, firms base their decision to operate formally or informally mainly on a cost-benefit comparison and choose the alternative which yields the highest net benefit. The (monetary and opportunity) costs of operating formally include tax payments, social security contributions, the compliance with labor regulations, product quality standards and environmental regulations, entry costs, license fees and the risk of bribe-taking by corrupt government officials (Loayza, 1996; Schneider and Enste, 2000; Straub, 2005). The main benefits of formality include the increased access to club goods and services, e.g. to infrastructure, courts and governmental services, access to formal finance and other businesses, and saving on bribes and potential fines (e.g. Straub, 2005; dePaula and Sheinkman, 2008).

[7] In practice, it is difficult to clearly distinguish formal from informal firms, since some firms, for example, may only declare part of their sales to state authorities and could thus be considered as partially informal (cf. Perry et al., 2007: 25). Our approach of addressing *competitional pressures* by the informal sector (as opposed to its size per se) has the key advantage that the surveyed firm itself can be fully formal or partly informal.

[8] Note that figure 1 depicts the number of firms *h(x)* at every productivity level, not directly the overall competitive pressure which we define below.

[9] The imitation of products is equally important in less developed countries (Ayyagari et al. 2011).

constraints in developing countries, which often suffer from a shallow division of labor (cf. Rodriguez-Clare, 1996) and where the matching process between employers and skilled laborers and between producers and buyers is hence more complicated. Moreover, access to finance is especially important for productivity in the context of developing and emerging economies because they are often prone to large macroeconomic fluctuations which adversely influence the investment channel. Access to finance can help to smooth out such shocks over time and increase incentives to undertake an investment (see the related contributions of Morduch, 1995; Ramey and Ramey, 1995; Moser and Barrett, 2006; Dercon and Christiaensen, 2011; Cowan and Raddatz, 2013; Neanidis and Savva, 2013).

In a recent contribution, D'Erasmo and Moscoso Boedo (2012) derived a theoretical model that broadly resembles our considerations: Entering and operating in the formal sector increases productivity but is costly, which can be offset by providing access to credit markets.[10] The interest rate on the credit market, however, is endogenous to debt enforcement, and therefore to the demand of the informal sector and institutional quality, which highlights the externalities of informal firms and the linkage to the institutional setting.

Our considerations also resonate the empirical literature that establishes a positive link between access to finance and firm productivity (Banerjee and Duflo, 2004; Gatti and Love, 2006; Ayyagari et al., 2008; De Mel et al., 2008; McKenzie and Woodruff, 2008; Fajnzylber et al., 2009) through R&D spending (Sharma, 2007; Brown et al., 2012), innovations (Ayyagari et al., 2011; Dabla-Norris et al., 2012), and entrepreneurship (Guiso et al., 2004; Klapper et al., 2006). Better access to finance also enables firms to reach a larger equilibrium size (Beck et al., 2006). More broadly, our considerations are in line with macro studies that find financial development to be positively associated with economic growth (King and Levine, 1993; Beck et al., 2000, 2008a) and with the growth of financially more dependent

[10] Since banks are not willing to grant loans to firms lacking proper documentation, informal firms do not have access to formal credit markets or at best have limited access, as evidenced by Dabla-Norris and Koeda (2008) and Gatti and Honorati (2008). They do have access to informal sources of financing, such as informal moneylenders, landlords and relatives, but these are considered a second best to formal sources in terms of interest rates, loan size, maturity and repayment procedures (Berensman et al., 2000). Fajnzylber et al. (2009) estimate that the impact of formal finance on firm profitability is two to three times higher than of informal finance (see also Sharma, 2007; Ayyagari et al., 2010b, 2011). Our analysis of the Informal Surveys from the World Bank for 10 countries (Angola, Botswana, Burkina Faso, Cameroon, Democratic Republic Congo, Guatemala, Ivory Coast, Mali, Mauritius and Nepal) confirms that 96.65 (95.59) percent of the surveyed fully informal firms report not using banks to finance investments (their day-to-day operations), while the most commonly used source of financing is internal funds. The great majority of firms (43.07 percent) considers better access to financing as the main benefit of registering (out of ten benefits) and about the same share of firms (40.46 percent) reports limited access to finance as the biggest obstacle to their operations (out of eleven obstacles).

industries (Rajan and Zingales, 1998; Fisman and Love, 2007; Manganelli and Popov, 2013).[11]

Building on these theoretical considerations, we expect a positive association between lack of access to finance and competition by the informal sector. In the following empirical analysis, we hence test the hypothesis that financially constrained firms suffer from more intense competition by the informal sector than financially unconstrained ones, conditional on other factors that might influence both business constraints. The latter is not only necessary from a statistical perspective to avoid omitted variable bias, but interesting per se because our approach of looking at competitive pressures from informality (as opposed to determinants of informality) is rather novel in the literature and it is therefore instructive to see which variables can help ease such pressures and how economically important they are compared to access to finance.

3 Data and Model

3.1 Informal Competition

For our empirical analysis, we use firm-level survey data and derive the degree of informal competition from responses given by formal firms.[12] While we analyze competition by the informal sector as opposed to its size, informal competition could also be taken as an imperfect measure of the size of the informal sector or, more importantly, it could be argued that it grasps the most relevant dimension of informality insofar as only those informal firms are considered that compete with formal firms and presumably affect growth and welfare, while lowest-productivity 'survivalist' informal firms[13] are not included in the measure.[14] It could further be put forward that competition by the informal sector is a more precise measure of (this specific dimension of) informality[15] as the surveyed formal firms know their

[11] For an overview of the theoretical and empirical literature on finance and growth, see Levine (2005). Ayyagari et al. (2012) provide an excellent review of the role of finance in developing countries.

[12] The fact that the survey covers formal firms does not necessarily mean that they do not engage in informal activities, see footnote 7 above. However, this does not adversely impact our analysis.

[13] 'Survivalist' firms are those who do not voluntarily opt to operate in the informal sector but have no other choice. In terms of figure 1, they are so much to the left that $h(formal) \rightarrow 0$ but $h(informal) = c, c>0$.

[14] In our sample, the cross-country correlation between competition by the informal sector and the average size of the informal sector (as a percentage of real GDP, taken from Schneider et al. 2010) between 1999 and 2007 is 0.38. This highlights that both measures can capture very different aspects.

[15] Typical methods to measure informality are the currency demand approach (Tanzi, 1980), the electricity consumption method (Johnson et al., 1997), the Multiple Indicators Multiple Causes method (Schneider and

markets and competitors best. Irrespective of its shortcomings as a proxy for the extent of informality, competition by the informal sector certainly provides enriching additional insights on the multidimensional phenomenon of informality.

For simplicity in exposition, we assume that every firm j in figure 1 at the productivity level $A_{jt} = a$ sees firms with equal or higher productivity levels $A_{it} \geq a$ as potential competitors.[16] That is, the least productive firm sees every firm as a potential competitor, while the most productive firm does not suffer from any competitors. Out of these, we focus only on informal competitors, which belong to the set T_{inf}, because of the potential welfare costs associated with this type of competition. At every productivity level A_{jt}, the informal competition Y^*_{jt} to any firm j is thus perceived as the sum of all informal firms to the right of the productivity spectrum:

$$Y^*_{jt} = \sum_i^N x_{it}, \text{ where } x_{it} = \begin{cases} 1 \; if \; A_{it} \geq A_{jt} \cap x_{it} \in T_{inf} \\ 0 \quad otherwise \end{cases}. \tag{1}$$

Note that if we see the firm frequency distribution in figure 1 as a probability density function (p.d.f.), we can express the degree of informal competition at every point A_{it} as the inverse of the corresponding cumulative distribution function (c.d.f.), which is depicted in figure 2.

We can derive an estimate of this c.d.f. by asking a sample of firms with different A_{it} how much informal competition they encounter. This is generally done by the World Bank Enterprise Surveys (ES), which is a firm-level survey of representative samples of economies' formal private sector. We use data for 114 countries over the period 2006 to 2011 and describe the World Bank ES in more detail in Appendix A.[17]

While one can see firm productivity and its resulting competitive pressure as a continuous spectrum, the World Bank ES ask firm owners or firm managers: "Do you think that the

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Enste, 2000) or the analysis of survey data on tax compliance, social security contributions, firm size and professional status (Perry et al., 2007: 28ff.). Each of these measures focuses on one specific aspect of informality, while our approach covers informality more broadly.

[16] This can be motivated by assuming that every firm can just survive at its respective productivity level by selling at marginal costs. Under certain conditions (e.g. a shock to consumer preferences), firm 1 with higher productivity than firm 2 ($A_{1t} > A_{2t}$) might decide to move down the ladder of product quality (or sell at higher prices), thereby becoming a direct competitor of firm 2. Firms with lower productivity cannot easily move upward the productivity spectrum. I.e. every firm may decide to compete with lower-productivity segments, but at a given time t it cannot compete by itself with more productive firms.

[17] Note that we assume in equation (1) that firms give equal weight to all potential competitors for which $A_{it} \geq a$ holds, regardless of the distance in productivity. This is of course a simplifying assumption. Economically, firms should face more competition from firms with much higher productivity, but in a survey they would probably give more weight to "closer" competitors because they are more severely felt in daily business. We defer such sophistries to future research.

practices of competitors in the informal sector are no obstacle (0), a minor obstacle (1), a moderate obstacle (2), a major obstacle (3), or a very severe obstacle (4) to the current operations of this establishment?" That is, the "true" degree of informal competition is a latent continuous variable, which is observed only as an ordered variable.

3.2 Modeling Ordered Responses

In such cases where the dependent variable is discrete, has more than two possible outcomes and the outcomes have a natural ordering but distances between them are unkown and not necessarily meaningful (Long and Freese, 2006: 137), the linear regression framework is inappropriate because a discrete dependent variable violates the Gauss-Markov assumptions and can lead to incorrect conclusions (McKelvey and Zavoina, 1975). Instead, a (non-linear) ordered response model has to be used. The ordered response model can be derived from an underlying latent variable model of the form:

$$Y^*_{jkl} = X_{jkl}\theta + \epsilon_{jkl} \quad (2)$$

where Y^* is a continuous latent variable, in our case the "true" degree of informal competition faced by firm j in sector k and country l, X is a row vector of explanatory variables[18] (not including an intercept), θ is a column vector of parameters and ϵ is the error term, which is assumed to be independent of X. To relate to the above motivation, one can think of $X\theta$ as proxying for A_{it}. More precisely, it contains the financial indicator F at the firm-level, i.e. the self-reported financial constraint (see section 3.4), and other firm-specific control variables in a vector E, country-, sector- and time-fixed effects C, S, T:[19]

[18] For simplicity, X_{jkl} contains all explanatory variables at the firm, industry and country-level presented below.

[19] We include country- and industry-fixed effects to control for unobserved heterogeneity, which might lead to biased and inconsistent results if the latter are correlated with one or more explanatory variables. The reasoning behind country-fixed effects is that unobservable factors that are specific to a country and potentially differ between countries affect the degree of competition by the informal sector, for example the true size of the informal sector or the propensity of a country's citizen to violate the law. Similarly, unobservable factors specific to industry sectors can have an influence on the degree of informal competition, such as industry-specific entry costs. The use of industry-fixed effects implies that unobservable factors at the industry-level play a role for the severity of informal competition and that this role is different for each sector but the same (within a sector) across countries. In contrast to industry-fixed effects, country-industry-fixed effects assume that unobserved industry-specific effects are also country-specific. An argument for using country-industry-fixed effects might be that some countries promote the growth of some sectors more intensively or protect and control some industries more heavily than others, which has implications for the degree of informal competition. Since the use of country-industry-fixed effects was computationally not feasible, we only use country- and industry-fixed effects. Additionally, we use time-fixed effects to control for global effects that affect informal competition in all countries and that might be correlated with any of the covariates. The recent financial and economic crisis is one example for a global event that has led to an expansion of the informal sector and that, through this channel, might have spurred informal competition.

$$Y^*_{jkl} = \propto F_j + \beta E_j + \gamma C_l + \delta S_k + \tau T_t + \epsilon_{jkl} \quad (3)$$

Note that such an econometric model identifies the relevant parameters mainly via *variation across firms*, conditional on their country and the industry of operation and on the year of the survey.[20, 21]

Since *Y** cannot be observed, the 'measurement model' links the latent *Y** to the observed discrete *Y*:

$$Y_{jkl} = m \qquad if\ c_{m-1} \leq Y^*_{jkl} < c_m \qquad for\ m = 1, \dots, J \quad (4)$$

where *m* stands for the *J* different outcome possibilities and *c* for cut points or thresholds. Cut points divide the c.d.f. into *J* categories, similar to figure 2. The probability of an

[20] We do *not* use over-time variation *within* firms for identification for which panel data would generally allow, due to the small number of countries surveyed twice and the very small fraction of firms having been interviewed in both rounds. Apart from reasons of data availability, there are further considerations that recommend a cross-sectional analysis. First, for ordered response models, panel data methods are not as well-developed and widely employed as for models with a continuous dependent variable. Second, our main variables of interest - competition by the informal sector and lack of access to finance - are rather persistent and will therefore provide a stronger signal across firms than over time. Consequently - and in line with most research using the ES or their precursors - our analysis identifies parameters via variation across firms.

[21] There are decisive advantages in using firm-level data instead of country-level data in general and for our research question in particular. First, firm-level data allow to not only investigate cross-country differences but also within-country differences. Firms of different sizes and with different degrees of financial constraints can be compared across and within countries, industries and locations. Firm-level data thus allow to conduct a more nuanced analysis that is better qualified for identifying mechanisms and establishing causal relationships. Second, the questions in the ES on the perceived degree of informal competition and lack of access to finance are unique and of unparalleled value since aggregate estimates are either not available or highly debated. As pointed out in footnote 15, there are various methods of estimating the size of the informal sector but none captures all dimensions of informality in a satisfactory manner and, more importantly, none informs about the degree of competition stemming from the informal sector. Aggregate measures of financial development - the most commonly used being private credit to GDP - typically reflect usage, not access to finance. Beck et al. (2007: 245) show in this context that the correlation between private credit to GDP and access to finance measured by geographic branch penetration (number of bank branches per square kilometer) is only 0.435. Access to finance is equally essential for evaluating a country's financial development because it indicates the degree of financial outreach and inclusiveness. Thus, firm-level survey data, especially the comprehensive ES, are enriching data that trump with advantages country-level data cannot offer.
However, survey data are not without flaws. Survey non-response, i.e. the refusal of a firm to participate in the survey, and item non-response, i.e. the refusal of a firm to answer a question, are common challenges that might compromise the quality of the survey (World Bank 2009: 8). Less productive firms or firms more adversely affected by the business environment might systematically be unwilling to participate in the survey. Item-non-response is particularly an issue with regard to sensitive questions. The questions on informal competition and access to finance both fall into the category of sensitive questions and an answer was not given in 2,000 and 3,000 (of 64,000) cases respectively. We examined the observations that denied a response or were not capable of responding. We did not detect any distinctive features with respect to country, sector, location, size and ownership and therefore rule out any selection bias. As long as there is no systematic selection of firms that refuse to respond, estimates are not biased. Another problem can occur when questions ask for perceptions, i.e. when answers are not verifiable on objective grounds. While subjective answers can be very insightful, they might not be in accordance with real circumstances. Underreporting is a common phenomenon, which is driven by fears of retaliation (Kuntchev et al., 2012: 8). Overreporting is as well an option: Firms might lament a constraining business environment to blame the business climate for their low performance. If incorrect answers are systematic, the average response obtained from the sample will not reflect the true mean of the sample. Although this problem cannot be ruled out completely, the World Bank tried to mitigate it by choosing simple and direct questions, assuring high confidentiality of answers and training interviewers carefully. We address the flaws of firm-level survey data in the robustness checks of section 6.

outcome *m* for given values of *X* is the area under the corresponding p.d.f. (similar to figure 1) between two cut points.

In the present case, there are *J=5* different outcomes for the observed dependent variable, ranging from 'no obstacle' (0) to 'very severe obstacle' (4), and thus four cut points:

$$Y_{jkl} = \begin{cases} 0 \rightarrow No\ obstacle & if\ c_0 = -\infty \leq Y_{jkl}^* < c_1 \\ 1 \rightarrow Minor\ obstacle & if\ c_1 \leq Y_{jkl}^* < c_2 \\ 2 \rightarrow Moderate\ obstacle & if\ c_2 \leq Y_{jkl}^* < c_3 \\ 3 \rightarrow Major\ obstacle & if\ c_3 \leq Y_{jkl}^* < c_4 \\ 4 \rightarrow Very\ severe\ obstacle & if\ c_4 \leq Y_{jkl}^* < c_5 = \infty \end{cases} \quad (5)$$

Since there are only five possible answers (i.e. 'no obstacle', 'minor obstacle', 'moderate obstacle', 'major obstacle' and 'very severe obstacle'), the firm chooses the answer option that most closely represents the degree of informal competition it faces. In a sense, the observed *Y* provides incomplete information about the latent *Y**, as we only observe the outcomes 0 to 4, depending on whether or not *Y** crosses a threshold. For example, the observed outcome is *Y=1* ('minor obstacle') when *Y** falls between $c_1$and c_2.[22]

The probability of each of the five outcomes in the econometric model is then given by:

$$\begin{aligned} P(Y_{jkl} = m|X_{jkl}) &= P(c_{m-1} \leq Y_{jkl}^* < c_m|X_{jkl}) \\ &= P(c_{m-1} \leq X_{jkl}\theta + \varepsilon_{jkl} < c_m|X_{jkl}) \\ &= F(c_m - X_{jkl}\theta) - F(c_{m-1} - X_{jkl}\theta) \end{aligned} \quad (6)$$

where *F* is a c.d.f.. In an ordered logit model, *F* is the c.d.f. of the logistic distribution; in an ordered probit model, *F* is the standard normal c.d.f.

Whether a logit or probit model should be used is not a-priori clear. The decision mainly relies on convenience and personal preference. The logit model has the advantage that its formulas are relatively simple and allow the interpretation in terms of odds ratios (see Appendix B). The largest difference between logit and probit lies in the shape of the p.d.f. The p.d.f. of the logit has a fatter tail and a lower peak than the p.d.f. of the probit, but the difference in shapes is negligible for estimation results. Since the logit model allows the interpretation of output in terms of odds ratios, we use the logit model. In the robustness checks, we confirm the findings using an ordered probit model.

[22] Note that the wider-known binary response models (such as logit or probit) can be considered a special case of the ordered response model.

3.3 Estimation

The regression parameters θ and the *(J-1)* cut points c_1-c_4 are estimated by the method of maximum likelihood (MLE). MLE chooses the values for the parameters that have the maximum likelihood of generating the observed data, provided that the assumptions of the model are true (Long and Freese, 2006: 63f.). Under some regularity conditions (see Greene, 2003: 473ff.), MLE provides consistent (i.e. the estimator converges in probability to the correct population value as the sample size grows), asymptotically normal (which is a necessary assumption for hypothesis testing along with the assumption of homoskedasticity) and asymptotically efficient (i.e. among the unbiased estimators the ML estimator has the smallest variance) estimates (see Wooldridge, 2009). It is essential to understand that the estimated parameters cannot be interpreted in an economically meaningful way immediately. We therefore derive the predicted probabilities of the estimates in our empirical exercise and briefly outline the derivation of these predicted probabilities in Appendix B.

3.4 Explanatory and Control Variables[23]

We now elaborate on the $X\theta$ in equation (2) which we assume to determine a given firm's level of informal competition and can be thought of representing A_{it} in the motivational part of our paper.

The main variable included in X is the degree to which access to finance presents an obstacle to the operations of the interviewed firm.[24] Just as *informal competition*, *lack of access to finance* is an opinion-based variable ranging from 'no obstacle' (0) to 'very severe obstacle' (4). Access to finance refers to both the availability of finance and the cost of finance. Availability refers to the difficulty of obtaining a loan, cost of finance includes the price of the loan and the associated transaction costs (interest rates, fees, collateral requirements; cf. World Bank, 2007: 23). For the reasons explained in section 2, we expect *lack of access to finance* to have a positive effect on the degree of informal competition, i.e. we expect financially constrained firms to suffer from more intense competition by the informal sector.

[23] Detailed variable definitions, with the corresponding question codes in the ES, are provided in table F.4 in Appendix F.
[24] Lack of access to finance and financial constraints are used interchangeably in this paper.

Additionally, we control for various firm characteristics. Firm size is represented by the binary (i.e. dummy) variables *small* (firms with less than 20 employees), *medium-sized* (firms with 20-99 employees) and *large* (firms with more than 99 employees). We expect large firms to be less affected by informal competition than small firms, since they dispose of more resources to successfully confront informal competition by investing heavily in R&D, pressing ahead with innovations and exploiting economies of scale. It is important to control for firm size, as it is likely correlated with access to finance and informal competition. As evidenced by Beck et al. (2005, 2008), small firms are more financially constrained than large firms. They typically lack collateral and special connections and banks do not consider them creditworthy or attractive clients. Moreover, small firms might more likely operate in similar environments as informal firms, giving rise to a potential omitted variable bias if it is not controlled for firm size.

The binary variables *small city* (city/town with a population of less than 250,000), *medium-sized city* (city with a population of more than 250,000) and *capital* control for firm location. The data set was plagued by inconsistencies and about 20,000 missing values which we filled as comprehensible as possible[25] and managed to fill all missing values. There is no ex-ante expectation for the direction of effect of firm location. It is possible that firms in small cities report a higher extent of informal competition, since audits are expected to be less frequent in smaller cities. The perceived severity of informal competition might, in turn, be lower in capitals where inspections appear on the daily agenda and the probability of being caught is higher. Controlling for firm location is essential because firms in more remote areas have more difficulties in accessing finance. Financial institutions have their main offices in big cities and local branches do not always offer the whole range of financial services. In many countries, firm owners must travel to the capital to apply for a loan (Beck et al., 2008a).

Logged firm *age* controls for the effect of age on the reported degree of competition by the informal sector. Again, the effect can be both ways. Older firms might better know the

[25] First, we checked whether listed values for each city were consistent across observations. If not, we adjusted them. For instance, many country capitals were not listed as capitals but instead reported with their population size. Second, if "capital" was inserted for a state with no reference to the name of the city, we looked up the capital of the state and included the population of the state's capital provided that the country's capital was not located in the same state. Third, if only the name of the city was provided, we looked up its population. Fourth, if only the name of the state was given without any population size, we looked up the population of the state's capital. The probability that the firms were indeed surveyed in the state's capital is high given the fact that the surveys were conducted in the main economic centers. For a few Latin American countries, "rest of the country" or "central" were provided as location in the 2006 survey without specifying population size. To fill these missing values we used the most frequent population size reported for "rest of the country" and "central" in the 2010 survey.

market and confront informal competition more successfully. Yet, younger firms might be more innovative and might identify a market niche that is spared by informal firms. The higher talent for innovation of younger firms is supported by Gorodnichenko et al. (2008). Younger firms presumably have bigger difficulties in getting external finance, as they do not hold enough assets for liabilities and their future performance is uncertain.

Foreign, *part of larger firm*, *export* and *female* are further controls. *Foreign* is equal to one if foreign ownership exceeds 10 percent. This is consistent with classifying the underlying capital flow as "foreign direct investment" and the firm can hence be seen as being part of a multinational corporation. Foreign-owned firms are expected to report lower levels of informal competition as they are usually more productive (cf. Lipsey, 2004: 355ff.) and have privileged access to financial markets (cf. Lehmann et al., 2004). Yet, it can also be argued that foreign-owned firms lack local expertise to successfully confront informal competition.

Whether being part of a larger firm has an effect on the reported severity of informal competition is verified with *part of larger firm*. The direction of influence of *part of larger firm* can be both ways: Being part of a large firm can have the advantage of having access to diverse physical, human and financial resources and exploiting economies of scale, while conglomerates might also be inert in tackling informal competition.

Export is equal to one if the revenue from national sales is below 90 percent for the firm in the last fiscal year. Since engagement in exporting is indicative of advanced and competitive production methods and product quality (note that agricultural firms are not included in the surveys) and documentation is required for custom clearance, exporting firms are less likely concerned by informal competition. Just as foreign-owned firms, exporting firms might have preferential access to finance.

Female is equal to one if one of the owners is female. We filled 4,000 missing values with answers to the questions of whether the largest owner is female or whether the top manager is female (in that order).[26] *Female* is expected to be positively associated with the reported severity of informal competition, as female-owned firms are typically smaller and often face various gender-specific discriminations which makes them less productive than male-owned

[26] We are aware that being an owner and a manager are different things. Yet, as a question on the largest owner's involvement in decision-making reveals, the largest owner makes most decisions on his or her own (52 percent) or in consultation with the other owners (22.42 percent). Furthermore, most of the firms are privately held limited liability companies (46.47 percent) or sole proprietorship (33.77 percent). So in most cases, owners are also the managers of the firm.

businesses. However, the effect is likely to be stronger if the question on whether the largest owner (rather than *any* owner) is female was available for more observations. Again, it is important to control for gender because in many countries financial institutions discriminate against women in the form of denying financial products altogether or offering financial products at unfavorable terms.

Experience, measured as years of experience the top manager has in the sector, is another potential determinant of the degree of informal competition a firm reports. It is expected to have a negative effect on the severity of informal competition as a more experienced top manager has market-specific knowledge and knows how to deal with informal competition. Yet, the market-knowledge might precisely be the reason why a more experienced manager reports higher levels of informal competition than a less experienced one, because the latter might be unable to distinguish informal from formal competitors. Moreover, more years of experience means that the top manager is older in age. An older manager might be less innovative and open for change than a younger, though less experienced manager. The direction of influence for *experience* can therefore be both ways.

Labor productivity is measured as the logarithm of total annual sales over the total number of full-time employees, including both permanent and temporary workers:

$$\text{labor productivity} = \log\left(\frac{\text{sales}}{\text{employees}}\right) \tag{7}$$

Temporary workers are weighted with their average length in months of employment according to firm size.[27] The amount of total annual sales was reported in national currencies which we converted into international dollars using PPP exchange rates from the World Economic Outlook Database.[28] *Labor productivity* is expected to be negatively associated with the reported intensity of informal competition. Higher labor productivity typically signals higher profitability so that more productive firms presumably have better access to financing.

Additionally, we include the degrees of obstacle from corruption, tax rates, tax administration, labor regulations, business licensing and courts presents to the firm (see World Bank, 2007: 20). Just as *informal competition* and *lack of access to finance*, these variables range from 'no obstacle' (0) to 'very severe obstacle' (4). *Corruption* refers to

[27] Since the average length of employment was only available for a small fraction of firms, we used the mean of each firm size.
[28] Other sources had not released figures for 2011 yet.

public corruption which manifests itself in informal payments to government officials and contracts offered to those with political connections. It is expected to have a strong positive effect on informal competition, as a corruptive environment facilitates operating informally and is generally harmful to a competitive business climate. On the other hand, however, corrupt officials might also protect donors against competition. *Tax rates* refers to the amount of money paid and *tax administration* refers to the manner in which tax obligations are enforced in practice, e.g. inspections, audits, red-tape, unclear regulations. Both are expected to be positively associated with informal competition. Firms that consider taxes a heavy burden pay a large amount of money relative to their sales to the government, which reduces their profits and limits the amount of money available for investments. It is not only the money forgone for investment but also the time that complying with tax regulations consumes. An inefficient tax administration aggravates the problem. Informal firms, on the other hand, do not pay taxes, thus they neither spend money nor time on tax issues, thereby setting formal firms at a competitive disadvantage. Similarly, strict *labor regulations* reduce a formal firm's competitiveness versus informal firms which do not comply with restricted working or opening hours, do not pay social security contributions, etc. If business *licensing* is a serious obstacle to business operations, formal firms are further disadvantaged compared to informal competitors. The same reasoning applies to *courts*. The six obstacles are hence expected to be positively associated with the severity of informal competition. Controlling for the business environment reduces the possibility that firms report high financing obstacles because of costly regulations and procedures. Additional independent variables are considered in the robustness check section.

For the subsample of manufacturing firms, we include the *Rajan Zingales Index (RZI)*, a measure of industry-specific dependency on external financing (Rajan and Zingales, 1998). It gives the fraction of capital expenditures not financed with internal funds and is a proxy for capital intensity and entry costs. For our analysis, we adopt the estimates that Rajan and Zingales provide in their paper for U.S. firms in the 1980s.[29] Higher values denote a higher

[29] This approach is arguable as it rests on the very strong assumption that firms in developing and transition countries between 2006 and 2011 have the same financing needs as U.S. firms in the 1980s. It can be countered, however, that differences in financial dependencies between industries stem from technological differences which persist across countries (Rajan and Zingales, 1998: 563) and that the financial needs of U.S. sectors most likely reflect the sectors' "true" dependence on external financing given the fact that the financial system in the U.S. is the most developed one worldwide (Catão et al., 2009: 17). On average, the financial system in the majority of developing and transition countries in the first half of the 20th century is on par with the stage of development of the U.S. financial system in the 1990s. Backed with these arguments and following González and Lamanna (2007), we use the indices estimated in Rajan and Zingales (1998) for U.S. industries in the 1980s for our analysis.

dependency on external financing.[30] We expect firms in industries that are more heavily dependent on external financing to be less affected by informal competition, as entry costs to such industries are high and informal firms cannot bring up the capital required. However, if firms are constrained in accessing finance, the level of informal competition is expected to be relatively higher in these industries.

Note that we only consider registered firms in our analysis.[31] 763 firms reported that they had never registered and were excluded from the sample. Once we drop all observations for which one or more of the explanatory variables are missing, we are left with a sample of 42,038 firms in 114 countries.

Table 2 presents summary statistics for this sample.[32] More than half of the firms are small firms (54.15 percent), while 13.88 percent of the firms are classified as large. One fourth of the firms is located in the capital and more than half of the firms are located in cities with more than 250,000 inhabitants. Only 11.95 percent of firms export. Even a fewer share of firms is foreign-owned (7.68 percent). About 40 percent of the firms have at least one female owner. Both the average firm age and the experience of the average manager is 18 years but there is large variation. Most firms are concentrated in the retail and wholesale trade sector (24.03 percent), very few firms belong to the electronics industry (0.65 percent) and the leather industry (<1 percent).

3.5 Sampling Weights

As described in more detail in Appendix A, the sampling design of the World Bank ES is stratified random sampling. With stratified random sampling, the observations do not have

[30] See table F.2 in Appendix F for the Rajan Zingales Index per industry.

[31] For the purpose of the World Bank ES, a firm has been qualified as registered if it has completed at least one of the five steps: 1. Screening procedures (e.g. notarize company deeds, register company at Companies Registry); 2. Tax-related requirements (e.g. register for various taxes including VAT); 3. Labor/ social-security-related requirements (e.g. register with pension funds, register for social security, register for various insurances such as accident); 4. Safety and health requirements (e.g. pass inspections and obtain certificates related to work safety, building, fire, sanitation, and hygiene); 5. Environment-related requirements (e.g. obtain environment certificate, register with the water management and water discharge authorities). See World Bank (2007: 7f.). As noted above, some operations of such registered firms can still have informal character.

[32] Table 1 shows summary statistics for the sample, whereas table 2 shows the mean for all variables using STATA's *svy* command. The *svy* command controls for weighting, clustering and stratification, i.e. it takes the survey design into account when calculating statistics. It allows computing the values for the underlying population instead of the sample itself. Because of the sampling design of the World Bank ES, the observations have unequal probabilities of selection and some observations are oversampled based on specific characteristics. Specifically, large firms are overrepresented. The unweighted sample is therefore not representative for the population. For a discussion of weights as well as of clustering, see sections 3.5 and 3.6.

the same probability of being selected into the sample, i.e. each firm in the sample represents a different number of firms in the population. The unweighted sample is therefore not representative of the population. Consequently, the observations should be weighted by the inverse of the probability of selection, because observations with a low (high) sampling probability represent a large (small) number of observations in the population, i.e. those observations that are underrepresented should be weighted up and those observations that are overrepresented should be weighted down.[33] The weighted sample then allows correct inferences about the population (Deaton, 1997: 15, 44). Otherwise the estimates are biased and inconsistent unless sample sizes are proportional to the size of each stratum.

While the use of weights in purely descriptive analyses as in section 4 is widely accepted, there is no consensus on the use of weights in regressions.[34] Many papers that use the World Bank ES or their precursors do not weight their estimations. Most of them do not weight because they analyze surveys prior to 2005/06 for which weights were not reported. Others, such as González and Lamanna (2007), do not weight because they follow Winship and Radbill (1994) in their argumentation. However, the World Bank strongly recommends the use of weights for analyses of the ES. In order to verify the recommendation made by the World Bank, we conduct the test proposed by DuMouchel and Duncan (1983) which is also recommended by Deaton (1997: 72). To this end, we run a regression on the explanatory variables in their unweighted form, a weights variable and interactions between each independent variable and the weights variable and test for the joint significance of the weights variable and the interactions. Under the null hypothesis, the parameters of the weights and all interactions are zero, i.e. there is no significant difference between weighted and unweighted estimates and the unweighted estimator is preferred. If the null is rejected, weighted and unweighted estimates do differ, sampling design effects likely matter and the

[33] As Deaton (1997: 67) shows, weighting individual observations is equivalent to weighting each stratum with weights equal to the population share of each stratum.

[34] Taking an econometric view, Deaton (1997: 70) argues that weighted estimates are not preferred over unweighted estimates if the parameters vary per stratum. Both weighted and unweighted estimators will be biased and inconsistent under regular conditions. If the parameters are identical across strata, both estimators are unbiased and consistent but the unweighted estimator will be more efficient. So for behavioral or structural models, Deaton sees no reason for using weights. Yet, from a statistical view, Deaton agrees with Kish and Frankel (1974) in that weighted regressions are better suited for the purpose of describing and making general inferences about any population, not just a population identical to the sample. Winship and Radbill (1994) oppose the use of sampling weights once the variables of which the weights are a function enter the model as covariates. However, Alexander (1987: 188) warns that "no model will include all relevant variables, and few analysts will wish [or be able] to include in the model all the geographic and operational variables which determine sampling rates." For this reason, Pfeffermann (1993), who otherwise agrees with Winship and Radbill (1994), appreciates the use of weights because they take into account the sampling design and protect against serious model misspecification.

weighted estimator should be used. For the main specification which we present in the next sections, the test rejects the null at the one percent level of statistical significance, suggesting that we should follow the recommendation of the World Bank. We therefore use weights for our econometric analysis. Nevertheless, we also provide the same estimation results with unweighted data in Appendix D.

Note that the weights range from 0.3 to 10,592.85, i.e. the weights are very large and are therefore very likely to alter regression results substantially.[35]

3.6 Clustering

Another concern of the data is that survey responses of firms are correlated within the same country (so-called 'cluster') but uncorrelated across countries.[36] In this case, the assumption of independently and identically distributed (i.i.d.) errors is violated and the usual standard errors are incorrect. To obtain a robust variance estimate that adjusts for within-cluster correlation, we cluster the errors at the country-level (see Wooldridge, 2003; Wooldridge, 2010: 865ff).

Controlling for clustering typically increases standard errors, particularly for explanatory variables that are strongly correlated within the cluster (Cameron and Trivedi, 2009: 314; Wooldridge, 2010: 865). While we cluster at the country-level, we also provide results clustered at the country-industry level in Appendix C.[37] In general, clustering at more aggregate levels is preferred as it decreases intra-cluster correlation to a greater extent (Cameron and Trivedi, 2009: 832). This is confirmed by the empirical results in section 5. Our method of using the vce(cluster *clustvar*) option in STATA simultaneously controls for clustering and heteroskedasticity (Cameron and Trivedi, 2009: 83).

[35] See summary statistics in table 1.

[36] The included time dummies control for the easiest form of cross-country correlation, i.e. contemporaneous correlation.

[37] González and Lamanna (2007) cluster at the industry and regional level. They argue that informal competition is more likely a regional than a national phenomenon. While there is some truth to their argument, we found the definition of region arbitrary in the data set and clustering at the regional level thus not feasible. Besides, their argument loses persuasion when considering the fact that the great majority of firms surveyed are located in a country's largest economic centers where informal competition can be expected to be more likely determined by country than by regional aspects.

4 Stylized Facts

Which firms report competition by the informal sector? How big is the problem? Which firms are financially constrained? How are informal competition and lack of access to finance related to each other? Before econometrically analyzing the link between informal competition and financial constraints, we start with some descriptive statistics to get a first glance at the data. We think that such a descriptive summary deserves some space given the relative novelty of our approach which stresses the *competitive pressure* of informal firms on formal firms.[38]

Informal competition is considered an obstacle by the great majority of firms (67 percent), as can be seen from figure 3. It is 'no obstacle' for the operations of only one third of the firms. 16.14 percent rank informal competition as a 'major obstacle' and 12.07 percent as a 'very severe obstacle'. There are substantial differences in the severity of informal competition across regions. In Latin America and the Caribbean and the Middle East and North Africa, up to 75 percent of firms report competition by the informal sector to be an obstacle. 15.52 (19.56) percent of Latin American and Caribbean firms consider informal competition a 'very severe obstacle' ('major obstacle'). These figures rise to 21.23 (and 24.48) percent for the Middle East and North Africa. The problem of informal competition is less pronounced in Africa and South Asia. In these regions, informal competition is a 'very severe obstacle' for about 8 percent of firms and a 'major obstacle' for 11-14 percent of firms. East Asia and the Pacific is the region with the lowest share of firms perceiving informal competition as a 'very severe obstacle', only 3.40 percent. The figures for Eastern Europe and Central Asia reflect the world average. Despite regional differences informal competition is an obstacle for more than 50 percent of firms in all regions.

Within regions, there is great variation in the reported severity of informal competition.[39] While in Eritrea 87.39 percent of firms do not consider informal competition an obstacle and not a single firm in Eritrea regards informal competition as a 'very severe obstacle', only 8.50 percent of firms in Chad view informal competition as 'no obstacle' and 55.85 percent encounter 'very severe' informal competition. For 87.90 percent of Dominican firms informal competition is no problem and for 3.88 percent it is a 'very severe obstacle',

[38] Note that we use the *svy* command for the descriptive analysis, i.e. we calculate statistics for the population, not for the sample.

[39] Due to space issues, we do not report firm percentages per country here. They are, however, available on request.

while only 8.80 percent of Bolivian firms are not concerned by informal competition and 26.67 percent rank it as a 'very severe obstacle'. This cross-country variation also highlights the need of including country-fixed effects to consistently identify parameters of interest for our study.

Looking at sectors, informal competition tends to be less of an obstacle for firms in the leather, electronics, and chemicals and pharmaceuticals industry (figure 4). Firms in the textiles, garments, and wood and furniture sector, on the other hand, report being relatively more constrained by informal competition. The variations in the reported severity of informal competition across industries may reflect industry differences in entry costs, capital needs and skill requirements. Industries characterized by higher entry costs, higher financing needs and more skill-intensive tasks are relatively less concerned by informal competition. This also justifies our use of industry-fixed effects. Interestingly, there is great divergence in reported degrees of obstacle in the auto and auto components industry. While 51.69 percent of firms in this sector do not consider informal competition an obstacle, 20.96 percent rank it as a 'very severe obstacle'. The contrasting assessment presumably mirrors the great variety of tasks in the sector, ranging from low-skilled and labor intensive to high-skilled and capital intensive tasks.

70 percent of firms see themselves constrained in accessing finance, with 11.96 (18.07) percent considering access to finance a 'very severe obstacle' ('major obstacle'). The picture for the severity of lack of access to finance across regions looks similar to the one for informal competition (figure 5). The share of firms that are financially unconstrained is highest for Africa and East Asia and the Pacific. Latin America and the Caribbean stand out with the highest share of firms that report access to finance to be an obstacle. More than 80 percent of the Latin American and Caribbean firms regard access to finance as an obstacle of which 16.77 (21.60) percent rank it as a 'very severe obstacle' ('major obstacle'). In Eastern Europe and Central Asia and the Middle East and North Africa, access to finance is a problem for approximately 70 percent, of which about 10 percent consider it severely constraining. Again, more than 50 percent of firms report access to finance as an obstacle in all regions.

There is also large heterogeneity in the severity of financial constraints within regions. In Burkina Faso, 1.57 (41.28) percent of firms perceive access to finance as 'no obstacle' (a 'very severe obstacle') compared to 57.27 (0.39) percent of Eritrean firms. 50.77

(1.80) percent of Panamanian firms are not constrained (severely constrained) in accessing finance, whereas for Brazil the figures are 7.79 (27.86) percent.

The highest share of financially unconstrained firms is found in the electronics industry and the hotels and restaurants sector (figure 6). The leather industry and the auto and auto components industry have the highest share of firms that are severely constrained in accessing finance. Again, the auto and auto components industry is marked by great discrepancies with 2.92 and 27.42 percent of firms regarding access to finance as 'no obstacle' and a 'very severe obstacle' respectively.

What constrains firms in accessing finance? The World Bank ES - unlike their precursors - do not disaggregate the financing constraint into its components.[40] Yet, the reasons given for not applying for a loan can be taken as an indication of the particular constraints. **The most commonly cited constraints in accessing finance are high interest rates, complex application procedures and unattainable collateral requirements** (figure 7).

Are there differences in the reported severity of financial constraints depending on whether the firm has a loan or not? Access to finance is not only an obstacle for those firms that do not have a loan (for reasons other than not needing it). Firms that do have a loan find lack of access to finance also constraining but to slightly lower degrees than firms without a loan (figure 8). 22 percent of firms with a loan (blue bar) do not consider access to finance an obstacle compared to 20 percent of firms without a loan (red bar). The highest discrepancy is observed for the middle outcomes. While 19 percent of the firms with a loan have 'major obstacles' in accessing finance, 27 percent of firms without a loan report 'major obstacles'. The high share of firms without a loan that regards access to finance as a 'major obstacle' or a 'very severe obstacle' is mainly driven by those firms that applied for a loan but were rejected. Whereas the reported severity of lack of access to finance does not dramatically differ between firms with a loan and firms without a loan, the difference between these two groups and a third group of self-sufficient firms (green bar) is striking. Firms of this third group do not need a loan because they finance their operations with internal funds. Half of these self-sufficient firms do not consider access to finance an obstacle and only a tiny fraction (3 percent) perceive access to finance as a 'very severe obstacle'.

[40] In the World Business Environment Survey (WBES), for example, the financing constraint was further disaggregated into collateral requirements, high interest rates, need for special connections with banks, lack of access to foreign banks, lack of access to non-bank equity, lack of access to lease finance, lack of access to export finance, inadequate credit information and lack of access to long term bank loans. See Ayyagari et al. (2008) for a thorough analysis of the data.

It might be unexpected that firms with a loan and firms without a loan report similar levels of financial constraints. Taken together with the reasons for not applying for a loan, this suggests that the high costs associated with having a loan are the primary constraint.[41] They prevent some firms from applying for a loan and represent a burden for those having a loan. However, the responses may also be driven by other motives than the loan costs themselves. Firms without a loan may give reasons related to the terms of borrowing, while the true reason for not having a loan is personal negligence. Firms that were just rejected on their loan application might vent their anger and report higher financing obstacles, although incomplete applications or low expected returns in investment may have been the reason for rejection. Firms with a loan may report high financing obstacles because they made wrong investment decisions and now have difficulties to repay the loan. Also, self-sufficient firms might not perceive access to finance as an obstacle but reliance on internal finance may just be the consequence of limited access to finance. In section 6, we address concerns of such unobserved factors that potentially influence responses.

How constraining are informal competition and lack of access to finance compared to other business obstacles? To assess the relative severity of business constraints, firms were asked to choose the top three obstacles to their operations out of 15 business constraints (figure 9). **The most severe business obstacles are access to finance (16 percent), tax rates (15 percent), and practices of informal competitors (12 percent).** All other obstacles are listed by only a minor share of firms, not exceeding 8 percent. Clearly, competition by the informal sector and lack of access to finance are among the most serious obstacles to business.

Is there a link between lack of access to finance and competition by the informal sector? How many firms that consider access to finance an obstacle also report a high degree of informal competition? Figure 10 gives first answers to the question. Noticeable at first sight is that **with higher degrees of financial constraints, the share of firms regarding informal competition as 'no obstacle' decreases**, while the share of firms perceiving informal competition as a 'very severe obstacle' increases. Of those firms for which access to finance is 'no obstacle', 47.67 percent also consider informal competition 'no obstacle'. By contrast, informal competition is 'no obstacle' for only 18.92 percent of those firms that encounter 'very severe obstacles' in accessing finance. Even of those firms that perceive access to finance as a 'minor obstacle', only 29.86 percent consider informal competition as 'no

[41] This is in line with the findings in Beck et al. (2005).

obstacle'. While merely 7.56 percent of financially unconstrained firms rank informal competition as a 'very severe obstacle', almost four times as many firms, 30.40 percent, that are severely constrained in accessing finance consider informal competition as a 'very severe obstacle'. Figure 11 confirms the positive relationship between lack of access to finance and competition by the informal sector at the country-level and further illustrates differences across regions. While African countries are largely represented in the upper part on the right of the figure, Eastern Asian and Pacific countries tend to be located in the lower part on the left. Latin American and Caribbean countries as well as Eastern European and Central Asian countries account for the middle part.

Is lack of access to finance in fact explaining the degree of informal competition? Or is it firm size that explains both lack of access to finance and the severity of informal competition? Firm size is potentially a very strong determinant of both the degree of lack of access to finance and the severity of informal competition. Smaller firms are expected to face higher financing constraints and more intense competition by the informal sector than larger firms. Figures 12 and 13 shed light on the potentially strong effect of size on lack of access to finance and informal competition. A coherent pattern does not emerge: Whereas small and medium-sized firms report higher degrees of informal competition compared to large firms, it is larger firms reporting higher financing constraints.[42] This suggests that **size does not produce the positive relationship between lack of access to finance and informal competition** but that there might indeed be a causal relationship between lack of access to finance and informal competition. The correlation matrix in table 3 gives another indication that lack of access to finance, rather than size, has a powerful effect on informal competition. While the correlation between size and informal competition is very low, lack of access to finance and informal competition have a correlation coefficient of 0.22.

With respect to other firm characteristics, the figures are largely in line with the expectations stated in the preceding section. Exporting firms are less severely affected by informal competition and financial constraints than non-exporting firms. Female-owned firms are more severely concerned by informal competition and lack of access to finance than fully

[42] This stands in contrast to findings in the literature that small firms are more severely constrained in accessing finance than larger firms (see Beck et al. 2005, 2008). The finding is true for our *sample* but not once weighting and clustering is taken into account. In the sample, 27.28 percent of small firms have 'no obstacles' in accessing finance compared to 34.46 percent of large firms. 15.74 percent of small firms report 'very severe' financial constraints compared to only 7.78 percent of large firms. Beck et al. (2005), who use the World Business Environment Survey, do not take the sampling design into account, as weights were not provided. That *might* explain their findings.

male-owned firms. Contrary to ex-ante expectations, foreign firms report higher degrees of informal competition and lack of access to finance than domestic firms.

Since a descriptive analysis is not sufficient to establish a causal relationship between lack of access to finance and competition by the informal sector, we econometrically investigate the existence of such a causal link between the two variables in the following sections.

5 Empirical Results

Do financially constrained firms suffer from more intense competition by the informal sector? Section 4 has already hinted at a positive correlation between the two variables: Firms that ranked access to finance as an obstacle to their operations also tended to report competition by the informal sector to be an obstacle. In this section, we explore the relationship econometrically within the framework of an ordered logit model and provide a detailed interpretation of the regression output for the main specification in section 5.4.[43]

5.1 Baseline Regressions

Tables 4a and 4b report results from regressing *informal competition* on *lack of access to finance* and various firm characteristics. We start with a regression including only *lack of access to finance* as an explanatory variable. Column 1 of table 4a shows that the ordinal variable is statistically significant at conventional levels. The positive sign implies that a higher degree of financial constraints increases the probability of more severe competition by the informal sector. While many papers using the World Bank ES or their precursors include perception variables on business constraints as ordinal variables in their regressions without confirming the approach econometrically, it should be tested whether to include such variables as ordinal variables or as indicator variables. Using the variables on business constraints as ordinal variables rests on the strong assumption that the distances between the categories are the same (Long and Freese, 2006: 269), e.g. the step it takes from 'no obstacle' to 'minor obstacle' is equal to the step it takes from 'major obstacle' to 'very severe obstacle'. To test whether an ordinal explanatory variable can be used as if it were interval, we compute a Wald test for a regression that includes both the ordinal variable *lack of access*

[43] All results are calculated using STATA version 12.0.

to finance and all but two indicator variables constructed from this ordinal variable. Under the null hypothesis, the coefficients of the indicator variables are equal to zero. In the present case, the null can be rejected at the 5 percent significance level, i.e. the indicator variables do add information and should be used instead of the ordinal variable. We obtain the same result for the main specification and also for other ordinal variables added hereafter. We therefore use indicator variables rather than ordinal variables in our regressions. Using indicator variables has the advantage that they allow to trace the effect of each outcome and facilitate the interpretation of odds ratios and changes in predicted probabilities.

Using indicator variables for each degree of financial constraint (table 4a, column 2) yields statistically significant results at the one percent level for all four indicator variables. The reference category are firms that report access to finance to be 'no obstacle' to their firms operations. All four indicator variables enter positively, i.e. financially constrained firms are more likely to report higher levels of informal competition compared to financially unconstrained firms. The coefficient of the highest degree of obstacle is higher than the coefficients of the other degrees of obstacle, suggesting that firms that rank access to finance as a 'very severe obstacle' are more likely to be confronted with higher levels of informal competition than firms that report lower degrees of financial constraints.

Columns 3 to 5 of table 4a report regression results, adding firm size dummies, location dummies and firm age. The reference categories are medium-sized firms located in medium-sized cities. As expected, larger firms are less likely affected by higher levels of informal competition compared to medium-sized firms and this effect is statistically significant at conventional levels. Surprisingly, smaller firms have a lower propensity of facing informal competition than medium-sized firms but the effect is statistically insignificant. Firms in capitals and in small cities have a higher likelihood of perceiving informal competition as an obstacle than firms in medium-sized cities. However, the location dummies are not statistically significant. The estimated coefficient of *age* is positive and significant, indicating that older firms are more likely to be concerned by informal competition than younger firms. This result lends support to the hypothesis that younger firms are more innovative than traditional firms. It could also be that products of more traditional firms are more subject to imitation by informal firms. Alternatively, older firms may know their markets better and could more accurately identify informal competitors than younger firms.

Firms with foreign ownership have a higher likelihood of regarding informal competition as an obstacle but the effect is statistically insignificant (table 4a, column 6). This finding is

unexpected because foreign ownership is often associated with the use of advanced technology which is expected to give the foreign-owned firm a competitive edge over informal competitors. Unfortunately, the data set does not give any information about the background of the foreign owners to verify if they come from a more industrialized country or not. The positive relationship between foreign ownership and informal competition suggests that foreign-owned firms lack local expertise to successfully confront informal competition. Firms that are part of a larger firm have a higher probability of being confronted with informal competition and this effect is statistically significant at the 10 percent level (table 4b, column 7). A centralized organization structure which does not adopt to local circumstances might be a reason for the positive relationship. Furthermore, it might well be that foreign-owned firms and those which are part of a larger entity established brands with according reputation and hence face especially high levels of (informal) product imitation, similar to the above considerations for older firms. For *exporting* firms, informal competition is less likely to be a serious obstacle (table 4b, column 8). The effect is statistically significant at conventional levels and confirms the hypothesis that exporting firms have advanced production methods and high product quality that make them competitive abroad and domestically. The coefficient of *female* is positive but insignificant (table 4b, column 9). *Experience* and *labor productivity* enter the estimated model positively but only *experience* is statistically significant (table 4b, columns 10 and 11). This finding is unexpected. One explanation for this finding is that many years of experience imply an older age of the manager. Older managers might be less innovative and open for change to adapt to competitive challenges by the informal sector. Alternatively, more experienced managers have better knowledge of informal competitors than less experienced managers, or (informal) product imitation is again an issue.[44]

[44] Concerning labor productivity, we note that the estimated parameter is far from being statistically significant. Since a positive (but mostly insignificant) parameter estimate shows up in other specifications as well (e.g. tables 13, 15, 17, 19) and one may argue that this is at odds with our theoretical motivation, we looked at the issue more carefully. As stated in section 2, "productivity" A_{it} is very vaguely defined and can take on many different forms. When considering the probably most relevant concept of total factor productivity, as in robustness check 6.5, productivity significantly decreases informal competition (cp. table 19, column 2). The same is true for labor productivity, when only considering the subsample of firms which provide comprehensive information on production factors (table 19, column 1). When excluding small firms (table 18, column 4), the estimated parameter for labor productivity is also negative (but insignificant). This leads us to the conclusion that the positive correlation between labor productivity and informal competition in some estimations is mainly driven by small firms, for which employment data is probably less reliable. Especially small firms might temporarily use informal (family) labor but might not report it accordingly, either because of intractability or for fear of persecution by authorities. This would lead to downward biased employment figures and an according upward bias in our labor productivity measure log(sales/employees) and could explain why labor productivity is negatively correlated with firm size and positively correlated with informal competition in our sample.

5.2 The Impact of the Business Climate

We extend the baseline regressions to add various self-reported business constraints (table 5). Including business constraints other than finance is important to rule out the possibility that *lack of access to finance* takes up the influence of other business constraints. For example, high levels of corruption, burdensome tax rates, an inefficient tax administration, strict labor regulations, lengthy licensing procedures and partisan courts might impair a firm's financial situation and prompt firms to report higher degrees of financial constraints, while also potentially influencing the degree of informal competition faced. Hence, if the business climate is not controlled for, the effect of *lack of access to finance* cannot convincingly be singled out.

As expected, most of the business constraints are positively associated with the severity of informal competition. For each business constraint (except business licensing), the coefficients increase with the degree of obstacle, indicating that a more constraining business climate aggravates the problem of informal competition. The indicator variables for the different degrees of *corruption* enter positively and significantly but only the two highest outcomes remain statistically significant after adding more business constraints. The coefficients increase with higher degrees of corruption, suggesting that the likelihood of severe informal competition increases with the level of corruption. *Tax rates* also enter positively and significantly but the effect ceases to be significant once *tax administration* is controlled for (table 5, columns 2 and 3). *Labor regulations* only have a significant influence when these are reported to be a 'major obstacle' or a 'very severe obstacle' to firm operations (table 5, column 4). The difficulty of obtaining *business licenses* is in most cases statistically insignificant in explaining the degree of informal competition (table 4, column 5). An ill-functioning *court system* has a significant effect on the degree of informal competition for all but the moderate outcome. Note that in all regressions *large*, *export* and *age* are statistically significant. In line with the findings in Ayyagari et al. (2011), this indicates that larger, younger and exporting firms are more innovative and thus more likely to escape informal competitors. The regression reported in column 6 of table 5 will be our main specification of which we give a detailed interpretation in section 5.4.

It is worth mentioning that the coefficients of *lack of access to finance* remain fairly stable across the different specifications presented in tables 4 a-b and 5. The strongest decrease is noted once other business constraints are included. This highlights the importance of

controlling for the business climate in order to get closer to the "pure" effect of *lack of access to finance* on informal competition.

Note that we use country, industry and year dummies in all regressions. Most of them are individually significant. A Wald test confirms their joint significance at the one percent level.[45] We also conduct a Wald test for the joint significance of the four indicator variables of *lack of access to finance*. The indicator variables are jointly significant at conventional levels. The standard errors presented are clustered by country. Results for clustering at the country-industry level are provided in Appendix C. The estimates are consistent with the ones obtained with clustering by country. Standard errors tend to be higher when clustered by country-industry though. *Age* loses significance, while *small city* enters significantly. The indicator variables of *lack of access to finance* remain statistically significant at conventional levels, with coefficients equal to those obtained with clustering at the country-level.

We further present results of unweighted estimates in Appendix D. The unweighted and weighted estimates differ substantially. In the unweighted regressions, *small* has a positive and highly significant effect on the reported severity of informal competition. *Foreign* enters negatively and significantly. The effect of *female* and *experience* becomes statistically significant at the one percent level. *Small city* and *part of a larger firm* enter negatively but still insignificantly. Almost all business constraints are statistically significant at conventional levels. Despite these differences, the indicator variables of *lack of access to finance* remain statistically significant at conventional levels, although their coefficients are smaller. The difference between weighted and unweighted estimates is caused by the weights. The results of the weighted estimates are particularly driven by Brazil, Mexico, Colombia and Russia where some firms represent between 1,000 to 10,000 firms in the population. By contrast, many firms in Pakistan, Yemen and Lao stand proxy for less than one firm in the population. The debate on whether to use weights or not in econometric analyses has been outlined already and is far from being solved. Yet, irrespective of whether weights should be used or not, it is more than noteworthy that - of all variables included in the model - the indicator variables of *lack of access to finance* are the ones that remain highly significant in both

[45] We only conduct Wald tests in this paper, although the LR-test is preferred by many researchers. However, in models with clustering and/or probability weighting the LR-test is invalid because the likelihood function is no longer the "true" likelihood reflecting the distribution of the sample (see http://www.stata.com/support/faqs/statistics/likelihood-ratio-test/). It is therefore called the 'pseudo-likelihood' (see http://www.stata.com/support/faqs/statistics/maximum-likelihood-estimation/).

estimations. This underscores the existence of a relevant and robust relationship between access to finance and competition by the informal sector.

How well does our main specification 'fit' real data? The pseudo-R^2 of the main specification is 0.084. This seems low but compared to related papers it is not.[46] Gónzalez and Lamanna (2007) report pseudo-R^2s that average around 0.06. The pseudo-R^2 in Dabla-Norris et al. (2008) is 0.07, in Beck et al. (2010) it is 0.10 and in Caro et al. (2012) it is 0.05. Note that a higher 'goodness of fit' does not mean that the estimated model is preferred in all aspects, rather it is "better" in terms of the particular measure of fit and will necessarily increase by adding covariables.

5.3 The Role of Sector-Specific Dependence on External Financing

Are different industries differently affected by informal competition? Section 4 indicated that firms in the leather, electronics, and chemicals and pharmaceuticals industry report lower levels of informal competition than firms in the textiles, garments, and wood and furniture industry. The hypothesis for this descriptive finding was that the former industries are characterized by higher entry costs and capital requirements which informal firms cannot bear. In this section, we verify the hypothesis econometrically. We first examine industry fixed effects for the whole sample and then investigate the relationship between sector-specific dependence on external financing and informal competition for the manufacturing sample by using the Rajan Zingales Index (RZI) described above.

Table 6 reports industry-fixed effects for the main specification presented in the preceding section. The results largely confirm the descriptive findings. The textiles, garments, and wood and furniture industry have a significantly higher likelihood of being exposed to more severe informal competition. The leather, metals and machinery, chemicals and pharmaceuticals, and auto and auto components industry, on the other hand, are significantly less susceptible to informal competition. This is supportive to the hypothesis that industries with higher fixed costs face less competition by the informal sector.

To further test this hypothesis, we use the RZI as a proxy for industry-specific capital dependency and entry costs.[47] Table 7 shows regression results for 22,031 manufacturing firms in 85 countries. For comparison, column 1 reports regression results for the main

[46] Several papers do not report pseudo-R^2s.
[47] See table F.2 in Appendix F for the Rajan Zingales Index per industry.

specification based on the subsample of manufacturing firms. Results are very similar to the regression including all sectors. The four indicator variables of *lack of access to finance* are statistically significant but their coefficients are higher, pointing to a stronger effect of finance for manufacturing firms. *Small city* is now statistically significant at the 5 percent level. Column 2 substitutes industry dummies by the RZI and shows that a higher dependence on external financing is associated with a lower reported degree of informal competition. The effect is statistically significant at conventional levels and large in size. This finding supports the stated hypothesis: Firms in sectors that are more heavily dependent on external financing are to a certain degree "protected" from informal competition due to high entry costs and high financing needs that can hardly be afforded by informal firms. The finding is also in line with the considerations of section 2, which posited that informal competition is less fierce in high-productivity segments because of the fixed costs required for entering.

Are firms in financially more dependent sectors relatively more affected by informal competition when access to finance is a serious obstacle? To address this question, we interact the RZI with each of the four indicator variables of *lack of access to finance*. Column 3 of table 7 shows that the interactions are statistically significant.[48] The positive sign of all four interactions implies that the probability of being faced with higher levels of informal competition increases for firms in sectors with higher financing needs when these are constrained in their access to finance. A Wald test also confirms the joint significance of the interaction terms. The pseudo-R^2 of the model is comparatively high with 0.12. We also provide results for clustering at the country-industry level and for unweighted estimations in Appendices A and B. The same differences as discussed in the previous section are observed. The RZI enters negatively and significantly in all specifications but the interactions are insignificant in the unweighted estimation and when clustered by country-industry.

5.4 Interpretation of Results

We have seen that *lack of access to finance* is statistically significant in explaining the degree of informal competition. But is *lack of access to finance* also economically relevant?

[48] The interpretation of interaction terms in nonlinear models has been subject to some scrutiny. Ai and Norton (2003) argue that the statistical significance of interactions is not correctly calculated by statistical software and that the magnitude of the coefficient of an interaction term does not equal the marginal change of the interaction. However, Long and Freese (2006: 424) as well as Buis (2010: 2) derive statistical significance of interaction terms from t-statistics in STATA output, on which we rely as well. The command *inteff* written by Norton for computing interaction effects in nonlinear models does not allow for weights and the *vce(cluster clustvar)* option.

How are the coefficients of the explanatory variables to be interpreted? The aim of this section is to give a comprehensive interpretation of the results obtained in the main specification. We start with odds ratios as an intuitive first way of interpretation and then present predicted probabilities and changes thereof for ideal firm types.[49]

5.4.1 How Severe Is Informal Competition?

Table 8 presents percent changes in the odds for the main specification. The odds of reporting higher levels of informal competition are 174.4 percent higher for firms that rank access to finance as a 'very severe obstacle' compared to firms for which access to finance is 'no obstacle', holding all other variables constant. The odds are still 40.6 percent higher for firms that encounter 'major obstacles' in their access to finance than for firms that do not regard access to finance as an obstacle. For large firms, the odds are 36 percent lower than for medium-sized firms, while for small firms the odds are merely 0.5 percent lower. The odds of being concerned by informal competition are 29.5 percent lower for exporting firms than for non-exporting firms. For firms that perceive corruption or labor regulations as a 'very severe obstacle', the odds are 120.3 percent and 160.6 percent higher than for firms not constrained by corruption or labor regulations. In terms of percent changes in the odds, the largest increase is denoted for firms that rank access to finance and labor regulations as a 'very severe obstacle'.

How much of an obstacle is competition by the informal sector for the firms in the sample? To answer this question, we compute predicted probabilities of the five different degrees of informal competition for the observations in the sample, given the values of the explanatory variables for the observations. Figure 14 illustrates the predicted probabilities of suffering from informal competition. The x-axis gives the five degrees of informal competition, the y-axis denotes the predicted probability of the outcomes, the length of the bars stands for the number of firms. The predicted probabilities of the extreme outcomes 'no obstacle' and 'very severe obstacle' are very dispersed, ranging from 0 to 90 percent. However, very few firms have probabilities of above 40 percent for the two outcomes. The predicted probabilities of the three middle outcomes are more concentrated and do not exceed 30 percent. The average predicted probability for the first outcome is 29.90 percent for the

[49] Lamentably, very few papers report odds ratios, predicted probabilities or changes thereof. Most papers only show regression output, demonstrating the statistical significance of results without assessing their economic relevance.

firms in the sample (table 9). It is 13.74 percent for the fifth outcome and ranges between 16 and 22 percent for the middle outcomes. How do the predicted probabilities calculated from the main model compare to real data? Comparing columns 1 and 2 in table 9 reveals that the average predicted probabilities fit real data very well. The largest deviation is 3 percentage points for the first outcome. The high congruency between average predicted probabilities and observed degrees of informal competition indicates that the main model is well specified.

The average predicted probabilities are instructive for the first sight. However, we are particularly interested in the predicted probabilities for firms with specific characteristics. How much of an obstacle is informal competition for firms that rank access to finance as a 'very severe obstacle'? By how much would the predicted probabilities change for the same firms if access to finance was easier? How big is the influence of size, gender, export status, the business climate? As explained in subsection 3.3, these questions cannot be answered by simply looking at the coefficients of the explanatory variables, as in linear models. In nonlinear models, the effect of a change in a variable is not solely given by its coefficient and is not independent of the other explanatory variables but has to be calculated by assuming values for all explanatory variables included. We choose values for the explanatory variables based on two ideal firm types for which we calculate predicted probabilities and discrete changes in predicted probabilities. The first ideal firm is small, owned by a female national, non-exporting, not part of a larger firm, located in the capital and faced with a business climate that is a 'moderate obstacle' to its operations, while setting *age*, *experience* and *labor productivity* to their means. The second ideal firm is different from the first in that it is large, fully male-owned and exporting.

How much of an obstacle is competition by the informal sector for both firm types and different degrees of financial constraints? Figures 15 and 16 show the predicted probabilities for each degree of informal competition as a function of the degree of lack of access to finance. What immediately catches one's eye is that for both ideal firm types the probability of perceiving higher (lower) levels of informal competition increases (decreases) with the degree of lack of access to finance. More specifically, the probability that informal competition presents a 'moderate', 'major' or 'very severe obstacle' increases with the degree of financial constraints, while the probability that informal competition is a 'minor' or 'no obstacle' decreases. For a firm of type I, the probability that informal competition is 'no obstacle' (blue line) is 33.80 percent when the firm has unrestricted access to finance but shrinks to 15.65 percent when the firm encounters 'very severe obstacles' in accessing

finance (figure 15). At the other end of the spectrum, the probability of perceiving informal competition as a ‘very severe obstacle’ (cyan line) is 7.24 percent when the firm is financially unconstrained but more than doubles to 17.68 percent when the firm ranks access to finance as a ‘very severe obstacle’. For a firm of type II, the respective probabilities of regarding informal competition as ‘no obstacle’ (blue line) is 53.46 percent when the firm does not consider access to finance an obstacle and 29.45 percent when it faces ‘very severe obstacles’ in accessing finance (figure 16). Conversely, the probability of reporting ‘very severe’ levels of informal competition (cyan line) is only 3.35 percent when the firm is financially unconstrained but rises to 8.71 percent when the firm is concerned by ‘very severe obstacles’ in its access to finance.

Note that the absolute difference in probabilities of the same degree of informal competition between a firm for which access to finance is ‘no obstacle’ and a firm for which access to finance is a ‘very severe obstacle’ is higher for the first firm type than for the second firm type. In the example presented, the probability of informal competition being a ‘very severe obstacle’ increases by 10.44 percentage points when access to finance is a ‘very severe obstacle’ for the first firm type, whereas it increases by only 5.36 percentage points for the second firm type. This difference hints at the effect that size, gender, and export status have.

For a firm of type I that encounters ‘no obstacles’ or ‘minor obstacles’ in accessing finance, the most likely outcome is that informal competition is ‘no obstacle’ to that firm either (probability of 33.80 and 27.88 percent respectively). For all other degrees of financial constraints, a firm of type I is most likely to be confronted by a ‘moderate’ degree of informal competition (probability of about 26-27 percent). However, when a firm of type I ranks access to finance as a ‘very severe obstacle’, the probability that informal competition is a ‘major obstacle’ to that firm is also very high (24.73 percent). For a firm of type II, the most likely outcome is that competition by the informal sector is ‘no obstacle’ for all five degrees of lack of access to finance. However, the probability is greatly reduced by more than 20 percentage points, when the firm perceives access to finance as a ‘very severe obstacle’ compared to a firm for which access to finance is ‘no obstacle’. In the former case, the probability that informal competition is a ‘moderate obstacle’ is similarly high. Again, it becomes evident that the effect of the independent variables, such as size and export, contribute to the different results for the two ideal firm types.

To what extent does the sector of activity matter for predicted probabilities? Figures 17 and 18 illustrate predicted probabilities for both ideal firm types in four different industries when access to finance is a 'very severe obstacle'. A similar pattern for the chemicals and pharmaceuticals and the auto and auto components industry, on the one hand, and for the textiles and wood and furniture industry, on the other hand, arises. A firm of type I that operates in the textiles or wood and furniture sector has a much higher probability of suffering from 'very severe' informal competition than a firm with the same characteristics that operates in the chemicals and pharmaceuticals or the auto and auto components industry. Whereas a firm in the auto and auto components industry has a 7.45 percent likelihood of reporting 'very severe' competition by the informal sector, the probability for a firm in the textiles sector more than triples to 23.23 percent. The inter-industry differences in probabilities are also observed for ideal firm type II. The likelihood that a firm of type II faces 'very severe' competition by the informal sector is 3.45 percent when it operates in the auto and auto components industry but rises to 11.86 percent when it operates in the textiles sector. However, the probability of being concerned by higher levels of informal competition is generally lower for ideal firm type II than for ideal firm type I. Again, this points to the effect of firm size and export.

5.4.2 How Important Is the Effect of Financial Constraints?

Which variable is the most influential in changing predicted probabilities? Is *lack of access to finance* the variable with the largest effect on the severity of informal competition? Or are other variables more powerful in altering probabilities? In order to assess the economic relevance of the explanatory variables, we compute discrete changes in predicted probabilities for both ideal firm types in tables 10 and 11, respectively. We calculate discrete changes for two scenarios: One in which all business constraints present a 'very severe obstacle' (Panel A) and another in which all business constraints are a 'moderate obstacle' (Panel B). We set all business constraints to the same degree of obstacle to be able to compare the magnitude of the discrete changes across the different business constraints, e.g. to investigate whether the effect of *lack of access to finance* is larger than the effect of *tax rates* given the same degree of obstacle. Additionally, we present in table 12 discrete changes for the example used for the calculation of predicted probabilities above in which for both ideal firm types all business constraints are set to 'moderate obstacle' (as in Panel B) but

access to finance is a 'very severe' obstacle (as in Panel A). This allows assessing the impact of *finance as a very severe obstacle* in a less constraining business environment. Note that discrete changes for dummy variables are shown, as they change from 0 to 1.

As can be seen from Panel A in table 10, the average change[50] in predicted probabilities is highest for *finance as a very severe obstacle*, followed by *labor regulations as a very severe obstacle* and *corruption as a severe obstacle*.[51] The probability of suffering from 'very severe' informal competition is 24.53 percentage points higher if a firm of type I faces 'very severe' financial constraints compared to a financially unconstrained firm, given the firm characteristics of ideal type I and a severely constraining business environment. The respective change is 23.31 (20.03) percentage points when labor regulations (corruption) are a 'very severe obstacle'. The average change of all other explanatory variables is below 5 percentage points. Becoming a large firm or an exporting firm decreases the probability of being confronted with 'very severe' informal competition by 11.09 and 8.59 percentage points respectively, while the increase in probability of the other degrees of informal competition is between 1-5 percentage points. The results presented in Panel A of table 10 clearly indicate that *finance as a very severe obstacle* has the largest effect on the predicted probabilities, followed by *labor regulations*. Remember though from section 5.2 that *lack of access to finance* was statistically significant for each degree of obstacle, whereas *labor regulations* was only statistically significant for the two highest degrees of obstacle.

Panel B of table 10 gives a slightly different picture. *Finance as a moderate obstacle* is still among the variables with the highest average change but the magnitude of the average change of 3.69 percentage points is relatively modest. The probability of perceiving informal competition as a 'very severe obstacle' is now only 2.91 percentage points higher when a firm of type I encounters 'moderate obstacles' in accessing finance compared to a firm with unrestricted access to finance, given the firm characteristics of the ideal type I and a moderate degree of obstacle for all other business constraints. The largest average change is denoted for *large*. A notable difference between the results in Panel A and B is that in Panel A the change in any of the business constraints (except business licensing) from 'no obstacle' to 'very severe obstacle' increases the probability of 'very severe' informal competition solely and decreases the probability of all other degrees of informal competition, whereas in Panel B

[50] The average change is calculated as the average of the absolute values of the discrete changes across all outcomes.

[51] We only display discrete changes for the main variables of interest. The average change of the variables omitted from tables 10, 11 and 12 is about 0.01.

the change in any of the business constraints from ‘no obstacle’ to ‘moderate obstacle’ increases the probability of ‘very severe’, ‘major’ and ‘moderate’ informal competition and decreases the probability of ‘minor’ and ‘no’ informal competition. The same direction of influence is true for *female* and the reverse direction is observed for *large* and *export*. Moreover, in Panel A the largest changes for the business constraints are denoted for the highest degree of informal competition whereas in Panel B the largest changes are observed for the lowest degree of informal competition.

The results presented in table 11 for ideal firm type II largely resemble those for ideal firm type I. In Panel A, *finance as a very severe obstacle* and *labor regulations as a very severe obstacle* produce the highest average change in predicted probabilities. The probability that informal competition is a ‘very severe obstacle’ is 19.56 percentage points higher for a firm of type II that encounters ‘very severe obstacles’ in its access to finance compared to a firm that reports ‘no obstacles’, given the firm characteristics of ideal type II and a severely constraining business environment. In Panel B, the respective change is 1.43 percentage points in a moderately constraining business climate. As for ideal firm type I, the largest changes of the business constraints are denoted for the highest degree of informal competition in Panel A of table 11 and for the lowest degree of informal competition in Panel B of table 11. The strong reaction in the extreme categories is reflected by the high predicted probability of being confronted with ‘very severe’ informal competition in both Panel A’s and the high predicted probability of being confronted with ‘no’ informal competition in both Panel B’s of tables 10 and 11. This demonstrates the large influence of the business climate on predicted probabilities. The more constraining the business environment the larger is its impact on the intensity of informal competition. By contrast, the effect of firm characteristics such as *large*, *export* or *female* remains stable irrespective of the business climate. In difference to the results in table 10, a change in any of the business constraints (except business licensing) from ‘no obstacle’ to ‘very severe obstacle’ produces an increase in the predicted probability of both ‘very severe’ and ‘major’ informal competition in Panel A of table 11 and of all degrees from ‘minor’ to ‘very severe’ informal competition in Panel B of table 11. The magnitude of the average changes is similar in the corresponding Panels of both tables.

To complete the example used for the calculation of predicted probabilities in the preceding section, we present discrete changes for both ideal firm types in a business environment that is moderately constraining but severely constraining in terms of access to

finance. The results presented in table 12 are in line with results of table 10 and 11. It is noteworthy that the effect of *finance as a very severe obstacle* remains large even in a moderately constraining business environment.

Finally, we explore the effect of sector-specific financial dependency on the reported severity of informal competition. How much do industry-specific capital requirements matter for the level of informal competition? The average change of the Rajan Zingales Index is 0.036 to 0.040 for both ideal firm types and in both a moderately and a severely constraining business climate.[52] For both ideal firm types, a unit increase in the ratio of financial dependency reduces the probability of suffering from 'very severe' informal competition by 9 percentage points given a severely constraining business environment, and by 3.15 (1.18) percentage points for a firm of type I (of type II) in a moderately constraining business environment. The effect of the sector-specific financial dependency is thus similar in size and with regard to the direction of influence as the effect of *export*. This finding supports the proposition of section 2 that formal firms need to ascend to higher-productivity segments to escape informal competition and that access to finance enables them to do so.

5.5 Summary of Empirical Results

Our empirical analysis has shown that:

1. Financial constraints are positively and significantly related to the severity of informal competition, i.e. financially constrained firms report higher levels of informal competition than financially unconstrained ones.
2. Firms in industries with high entry costs and capital requirements are less susceptible to informal competition. However, once access to finance is an obstacle to these firms, they face relatively more informal competition.
3. Lack of access to finance is the most influential variable in determining the level of informal competition. Other influential variables are labor regulations, corruption and firm size. Firm size becomes more important than access to finance, once the latter ceases to be seriously constraining. Export and industry-specific dependence on external finance are also important determinants of the reported severity of informal competition.

[52] Results are available upon request.

4. The more severe the financial constraint, the higher its impact, e.g. the effect of *finance as a very severe obstacle* is larger than the effect of *finance as a moderate obstacle*, holding all else equal. Put differently, the reported severity of informal competition increases with the degree of financial constraint.
5. The impact of *finance as a very severe obstacle* remains high even in less constraining environments.

6 Robustness Checks

How robust are our findings? A particular concern in the model is endogeneity since the data are cross-sectional and many variables are subjective measures. This section addresses such concerns and presents alternative specifications to ensure the robustness of results.

6.1 Using an Objective Measure of Credit Constrained Status

The measure of financial constraints used in the preceding sections is a subjective measure based on the opinion of the firm manager or firm owner. As such, it runs the risk of not correctly reflecting real circumstances. To address the concern of measurement bias, we replace the subjective measure by an objective measure of credit constrained status, developed by Kuntchev et al. (2012) on the basis of the questions in the World Bank ES. Their measure uses hard data instead of perceptions data and classifies firms into four categories: Fully credit constrained (FCC), partially credit constrained (PCC), maybe credit constrained (MCC), and not credit constrained (NCC).[53] Figure 19 gives the percentages of firms falling into each category of credit constrained status. The figures largely correspond to those for the subjective measure of financial constraints (cp. figure 5). Note that the measure of credit constrained status has four categories, while *lack of access to finance* has five. Table 13 shows that the credit constrained measure enters the estimated model positively and significantly, confirming that financial constraints are a significant determinant of the reported degree of informal competition. Predicted probabilities (table 14) are similar to those

[53] A detailed definition of the four categories, complemented by an illustrative figure, is provided in Appendix E. The percentages of firms belonging to each group of credit constrained status for all country-year combinations are available upon request. Note that we constructed the measures ourselves, we did not adopt them from Kuntchev et al. (2012), as they only provide the measures at the country-level and our sample size differs from theirs. To our knowledge, this is the first paper that uses this credit constrained measure.

for the subjective measure but more skewed towards lower outcomes of informal competition. Discrete changes are lower for *fully credit constrained status* (table 14) than for *finance as a very severe obstacle* (cp. table 10, Panel A), while for all other variables the discrete changes are close to identical. The magnitude of the effect of *fully credit constrained status* holds in less constraining business environments.[54]

The finding that the objective measure of credit constrained status has a smaller effect than the subjective measure of financial constraints might be taken as an indication that responses on the latter are exaggerated. Yet, caution is warranted when drawing such conclusions. The objective measure - based on hard data but still subject to arbitrary definition - assesses only information on external sources of financing and loan applications and makes conclusions about the credit constrained status based on this information. However, the fact that a firm uses external financing does not imply that access to finance is not an obstacle to the firm. It might still find borrowing conditions or loan application procedures constraining. Also, firms might find financial institutions dissatisfying for their needs. Hallward-Driemeier and Aterido (2009) find that both expanding and contracting firms report higher financing obstacles, although both do use outside financing. Yet, in both business conditions they have higher financing needs which are not adequately met by the available financing options. Even if firm perceptions are overstated compared to objective conditions, this does not mean that firms give exaggerated ratings on purpose. Their perceptions can still be honest and if so, they should be taken seriously because these perceptions bring about real actions.

6.2 Additional Control Variables

One of the potential flaws of the main specification is omitted variable bias, i.e. relevant variables for explaining the degree of informal competition are not included in the model. The problem of omitted variable bias is all the more serious in logit or probit models since, contrary to OLS, the parameters will even be biased when the omitted variables are uncorrelated with the included explanatory variables (Wooldridge, 2010: 583). However, as Wooldridge shows, the partial effects are unaffected by omitted variable bias. We extend the list of covariates by including *political instability, crime, customs and trade regulations,*

[54] To avoid an overload of tables, discrete changes for FCC in a moderately constraining business environment are not shown but are available upon request.

access to land and *electricity* as additional variables.[55] All variables are opinion-based data ranging from 'no obstacle' (0) to 'very severe obstacle' (4). Each variable is expected to impair the competitiveness of formal firms and increase the probability of reported informal competition. For this augmented model, *lack of access to finance* is still statistically significant, and the coefficients are of similar size (table 15).[56] The average change of *finance as a very severe obstacle* is almost as high as in the main specification (table 16). The most notable difference is the reduced average change of *labor regulations* and *corruption* and the high average change of *crime*. Most probably, *corruption* took up part of the effect of *crime* in the regression without *crime*. The predicted probabilities are larger for higher levels of informal competition.[57]

6.3 Considering Only 'Truthful' Answers

As mentioned in footnote 21, one of the potential shortcomings of survey data is the possibility of untruthful responses. Particularly questions that ask for perceptions on delicate issues are prone to untruthful answers that manifest themselves in underreporting or over-reporting once repercussions are feared or embarrassment is associated with the truthful response. Also, a firm may not give honest answers so as to keep its cards close to its chest. This possibility is minimal in the case of the World Bank ES though, since participation takes place on a voluntary basis. In order to address the concern of untruthful answers, we make use of an additional information provided in the World Bank ES that gives the interviewer's perception about the truthfulness of the firms' responses. While the perception of the interviewer might itself be susceptible to misjudgment, it is the interviewer who is in the best position of all staff involved in the survey process to evaluate the respondents' answers. In the sample, 2.3 percent of the answers to opinion-based questions are marked as untruthful and 27.36 percent as somewhat truthful.[58] Column 1 in table 17 presents results for a regression including only truthful and somewhat truthful answers. All indicator variables of *lack of access to finance* are statistically significant at conventional levels, with the expected

[55] See table F.4 in Appendix F for a detailed description of the variables.
[56] Note that the sample size of the augmented model differs from the original sample in section 5. Estimations based on different sample sizes cannot be properly compared, as any changes in the estimates might be due to either changes in the model specification or to the different sample size. In order to compare the augmented model with the original model, we run the main specification for the reduced sample of the augmented model (see table 15, column 1). Results are very similar to those obtained under the original, larger sample.
[57] Results are available upon request.
[58] Note that the interviewers' perception was not consulted in the 2010 survey for Latin America. This reduces the sample size by 9,500 observations.

sign and coefficients equal to those in the main specification. All other variables behave similarly as in the main specification. Reducing the sample further to include only truthful answers yields statistically significant results for *lack of access to finance* (table 17, column 2). For this sample, the coefficient for *finance as a very severe obstacle* is slightly smaller than in the main specification. In conclusion, when considering only (somewhat) truthful answers, the findings remain stable.

6.4 Addressing Unobserved Firm Traits

The correlation between financial constraints and informal competition could still reflect the presence of unobserved firm traits linked to both lack of access to finance and informal competition. If unobserved factors are correlated with both variables, the estimates erroneously attribute the effect to lack of access to finance. Using an objective measure of credit constrained status, adding more explanatory variables and considering only truthful answers attenuates the problem. Another approach to dealing with unobserved effects is to run the main specification for different samples that exclude firms with certain (observed) characteristics. Although this does not rule out endogeneity, it reduces endogeneity concerns.

One possibility is that firms blame informal competition for their unsuccessful attempt to get finance. Firms might have problems in accessing finance because of personal negligence, e.g. they might behave unprofessionally in loan negotiations or their business plan might be poorly developed with the consequence that banks do not grant them loans. When answering the questions in the World Bank ES, such firms might put the blame on informal competitors. To control for such unobserved effects, we only include firms that are at least ten years in business or whose top manager has at least ten years of experience in the sector. If firms are indeed unsuccessful in seeking credit and the reason is personal negligence, such firms are expected to perform badly and quit business after some time. In both regressions, *lack of access to finance* remains statistically significant, with a positive sign and with coefficients that are nearly identical to those in the main specification for the original sample (table 18, columns 1 and 2). Alternatively, we exclude firms that were rejected on their loan application, as these firms might vent their anger on informal competitors. To minimize the possibility that results are driven by firms that are more similar to informal firms, we further estimate the main specification for the sample of medium-sized and large firms. We also run

the main specification for male-owned firms only. Table 18 shows that financial constraints continue to be statistically significant and in line with previous results in all specifications.

6.5 Controlling for Unobserved Heterogeneity in Firms' Productivity

A justified concern is that firm responses on business obstacles reflect their own business performance rather than features of the business environment. For example, firms might report a high degree of lack of access to finance to blame financial institutions for their low business performance. Alternatively, firms that just experienced a sudden increase in sales might respond more generously to opinion-based questions on business constraints than it would in the absence of such a positive shock. Furthermore, firms recently experiencing a streak of success might objectively have easier access to finance. To mitigate this concern, we control for unobserved heterogeneity in firms' productivity that might impact a firm's responses on both access to finance and informal competition. To this end, we estimate a production function that takes the following form:

$$\ln(sale_{jt}) = \alpha \ln(sale_{j,t-3}) + \beta_1 \ln(L_{jt}) + \beta_2 \ln(K_{jt}) + \beta_3 \ln(H_{jt}) + u_{jt} \quad (8)$$

where logged total annual sales of firm *j* in the fiscal year preceding the survey year is the dependent variable, logged sales three fiscal years ago is included as an explanatory variable along with production factors labor *L*, capital *K* and human capital *H*.[59] *L* is represented by the number of employees[60], *K* is proxied by capacity utilization[61] and *H* by the share of skilled workers in the total number of (full-time) production workers.[62] We plug the residual *u* of this estimation into the main specification to gauge the effect of unobserved productivity shocks. The residual enters negatively, supporting the assumption that a positive shock, i.e. higher actual sales than predicted sales, decreases the likelihood that the firm reports higher degrees of obstacle of informal competition (table 19). The indicator variables of *lack of access to finance* remain statistically significant and have coefficients of similar size to those

[59] The regression output is provided in table F.3 in Appendix F.

[60] Permanent and temporary workers are included, with temporary workers being weighted by the average length of temporary employment.

[61] As in Dabla-Norris et al. (2010).

[62] Note that the variables for *K* and *H* are only available for the manufacturing subsample. For the sample covering all sectors, similar variables were available but only for a tiny fraction of firms. We ran the estimation for this smaller sample as well and obtained the same results. Results are available upon request. All variables are described in detail in table F.4 in Appendix F.

of the main specification. This strongly enhances the credibility of the link between financial constraints and competition by the informal sector.[63]

A typical comment on enterprise surveys is that badly performing firms are less likely to participate in the survey. If low performing firms systematically refuse participation, this sample selection leads to biased estimates. Information on the number of survey non-responses in the ES is not available and researchers have to rely on the World Bank for ensuring random samples. Even if there was some truth to the concern that low performing firms refrain from participating, such a selection should not cast doubts on the relationship between access to finance and competition by the informal sector. On the contrary, the results would be down-biased as access to finance and informal competition are most likely greater obstacles for low performing firms.[64] The fact that the World Bank ES do not include firms with less than five employees further suggests that the results are likely down-biased.

6.6 Controlling for the 'Kvetch' Factor

Another potential concern is that firms have an inclination to constantly "nudge" or complain louder than appropriate given the actual state of the business environment. This behavior is called the 'kvetch' factor after the Yiddish word for complaining (Batra et al., 2003: 73; importantly see Hallward-Driemeier and Aterido, 2009). If firms exceedingly and systematically complain, their assessment of business obstacles is not very meaningful. It is then not surprising that firms that rank access to finance as a serious obstacle also rank informal competition as one. To alleviate the 'kvetch' concern, we take each firm's average of all reported constraints and subtract it from each individual constraint. We generate a dummy variable that equals one if the difference between the reported level of a particular business obstacle and the average level of all obstacles is positive. A positive difference indicates that the particular business obstacle is disproportionally constraining to the firm. We replace the absolute obstacles by the dummies and run a binary logit model (table 20). Financial constraints are statistically significant at the 5 percent level and enter positively, i.e. a firm that ranks finance above its average reported level of constraints has an increased probability that it also ranks informal competition above average. Interestingly, other

[63] The finding that it is not simply firm performance that explains a firm's ranking of obstacles in the World Bank ES is supported by Hallward-Driemeier and Aterido (2009).
[64] Whether higher obstacles are the cause or the consequence of low business performance would need to be disentangled.

business obstacles lose their significance or enter negatively. This finding convincingly corroborates the link between lack of access to finance and competition by the informal sector.

6.7 Instrumenting for Individual Financing Constraints

Despite the preceding robustness checks, skeptics might still suspect unobserved firm traits that are linked to both access to finance and competition by the informal sector. As a final approach to tackle endogeneity, we instrument self-reported financing obstacles by using country-industry-location-size averages of financial constraints. This has been done by Fisman and Svensson (2007) and Gatti and Honorati (2008) for the same kind of data. Using grouped averages does not only mitigate concerns of unobserved heterogeneity but also helps to overcome measurement error (Angrist and Krueger, 2001), which might be an issue given the sensitive questions.

Country-industry-location-size averages qualify as good instrumental variables (IV). They are highly correlated with individual financing constraints because country, industry, location and size are important determinants of a firm's access to financing. Countries with well-developed financial sectors provide better access to finance than countries lacking sound financial institutions and regulations. Within countries, some industries are privileged in receiving credit compared to others and some industries have higher financing needs than others. Location and size matter in that firms in remote areas have less options in accessing finance than firms in urban areas and smaller firms face more difficulties in attracting finance than larger firms. While country-industry-location-size averages are highly correlated with individual financing constraints (correlation: 0.49), they are exogenous to the firm and hence uncorrelated with unobservable firm traits. They thus meet both conditions for valid instruments, i.e. being highly correlated with the variable to be instrumented and uncorrelated with the error term.

We adopt a linear IV approach and a binary and ordered probit IV approach.[65] The probit IV has the drawback that it suffers from the incidental parameters problem: An increasing

[65] STATA commands for IV logit models are not available, neither for the binary nor the ordered case. We therefore use the *ivregress* and *ivprobit* command. Additionally, we use the more advanced *cmp* (conditional [recursive] mixed-process estimator) command, which contains an option for IV estimation in an ordered probit model (for both stages). We refrain from conducting IV estimation manually, because these either produce incorrect standard errors or are "forbidden" (see Angrist and Pischke, 2009: 189ff.). As an example of a

number of dummies, while the time period is fixed, translates into inconsistent parameter estimates of both the dummies and all other explanatory variables (see Greene, 2003: 690). Angrist and Pischke (2009: 189) as well as Cameron and Trivedi (2009: 192, 485) propose to use linear IV, even for discrete (dependent and independent) variables, because of its simplicity. In a first stage, we regress the self-reported financing obstacles on the grouped averages and all explanatory variables from the previously used ordered logit model. The first stage regression has a high adjusted R^2 of 0.48. With a partial R^2 of 0.24, [66] the grouped averages contribute much to the overall fit and they are statistically significant at conventional levels, suggesting that they are very strong instruments. Table 21 shows the result of the second stage where the individual financing constraints are replaced by the fitted financial constraints from the first stage. *Lack of access to finance* enters the estimated model positively and significantly. In another linear IV regression, we also instrument the other business obstacles by country-industry-location-size averages (table 21, column 2). Grouped averages are again good predictors of self-reported obstacles, with high partial R^2s ranging from 0.26 to 0.32. Regression results are unchanged. Additionally, we follow the IV approach for a binary probit model. For the probit IV, we recode informal competition as a binary variable that is equal to one if informal competition is a 'very severe obstacle' and zero otherwise.[67] Because of the incidental parameters problem in probit models, we omit the industry and country dummies.[68] Column 3 shows that financing constraints continue to be positively and significantly related to the severity of informal competition. This finding is further supported by the ordered probit IV model (column 4).

The three IV approaches coherently confirm the positive and significant association between financial constraints and informal competition. This should mitigate endogeneity concerns to the best extent possible. Concerns are further alleviated when testing for endogeneity. The robust Durbin-Wu-Hausman (DWH) test of endogeneity does not reject the null hypothesis that individual financing constraints are exogenous. This is further corroborated when comparing the coefficients of finance in the simple ordered logit model

"forbidden regression", Angrist and Pischke refer to the case where one manually runs a nonlinear first stage and then includes the fitted values into a linear or nonlinear second stage.

[66] The partial R^2 is the R^2 between the potentially endogenous regressor (here individual financing constraints) and the instruments (here grouped averages) after controlling for the other exogenous variables from the previously used ordered logit model (Cameron and Trivedi, 2009: 198).

[67] Estimating a binary probit model without IVs yields statistically significant results for *lack of access to finance*.

[68] Including country and industry dummies does not alter results.

and the IV model for the linear, the binary and the ordered probit cases: The coefficients are similar. This suggests that endogeneity is not a striking issue.

Note that other studies using perceptions data on business constraints from the World Bank ES or their precursors are not overly concerned with unobserved heterogeneity, although they also use cross-sectional data and include the absolute level of self-reported obstacles in their regressions. Beck et al. (2005: 142ff.) argue that accounting data in developing countries are not less biased than self-reported financing obstacles. On the contrary, the incentive to manipulate accounting data is likely to be much higher than the incentive to give false survey responses. The potential bias in firm responses is further reduced by the primary purpose of the World Bank ES which is to assess the overall business environment and by the fact that it is the World Bank - not national governments or local interest groups - that implements the survey.

6.8 Including Only the Latest Survey

For our analysis in section 5, we used both surveys of 19 countries that were surveyed twice in order to maximize the number of observations. It might be objected that including two surveys for those 19 countries manipulates results. To alleviate this concern, we estimate the main specification for a sample that includes only the latest surveys and consists of 32,163 firms. The results correspond to the findings for the original, larger sample of 42,038 firms.[69] The indicator variables of *lack of access to finance* enter positively and significantly, while all other variables behave as in the original sample. The only exception is *age* which is no longer statistically significant. The results underline the significant effect of *lack of access to finance*.

6.9 Exploring Regional Differences

Are results driven by regional differences? The figures presented in the descriptive part (section 4) give reason to assume differences across regions. To investigate regional differences econometrically, we run the main specification individually for Africa, Latin America and the Caribbean, and Eastern Europe and Central Asia - the three regions with the largest number of observations. In the regression based on the African sample (table 22,

[69] Results are available upon request.

column 1), the indicator variables of *lack of access to finance* are statistically significant at the one percent level. However, their coefficients are smaller than in the main specification, suggesting that the effect of finance is smaller for **African** firms. Instead, other variables constitute important determinants of the degree of informal competition. *Small* and *large* are both statistically significant at conventional levels, while small (large) firms have a higher (lower) probability of being confronted with more severe competition by the informal sector compared to middle-sized firms. *Female* enters positively and significantly. *Part of a larger firm* and *labor productivity* significantly decrease the probability of suffering from informal competition. Likewise, *foreign* and *experience* have a negative effect on the degree of informal competition but are statistically insignificant. Most of the business constraints are statistically significant in explaining the degree of informal competition. More variables enter significantly in the African sample than in the whole sample and the signs of the variables are more intuitive. The pseudo-R^2 of 0.13 is quite high.

The results for the **Latin American and Caribbean** sample differ from those for the African sample (column 2). *Finance as a moderate obstacle* and *finance as a very severe obstacle* are statistically significant at conventional levels, while *finance as a minor obstacle* and *finance as a major obstacle* are insignificant. The coefficient of *finance as a very severe obstacle* is almost twice as large as in the African sample, implying a stronger effect of severe financial constraints on the degree of informal competition. Only *large*, *small city*, *export*, *experience* and some business obstacles enter significantly. The results for the **Eastern European and Central Asian** sample give a similar picture (column 3). The indicator variables of *lack of access to finance* are statistically significant at higher levels than in the Latin American and Caribbean regression but at lower levels than in the African regression. The coefficients for the two higher outcomes of financial constraints lie between the coefficients of the other regions, while they are higher for the two lower outcomes. *Large*, *export* and some business constraints are the only variables that have a significant effect on the severity of informal competition in Eastern Europe and Central Asia.

Table 23 shows that *finance as a very severe obstacle* has the highest average impact on informal competition in Latin America and the Caribbean for both ideal firm types, while the effect is only half in size in Africa. Corruption and business licensing have the largest effect on informal competition in Africa, whereas in Latin America and the Caribbean it is finance and tax rates and in Eastern Europe and Central Asia it is corruption, labor regulations and finance. In a severely constraining business climate, both ideal firm types have a higher

likelihood of reporting 'very severe' informal competition in Africa (blue line) than in the two other regions (figures 20 and 21). This points to the large impact of corruption on the intensity of informal competition in the African region.

The region-specific estimations demonstrate notable differences across regions. The effect of financial constraints on the degree of informal competition is larger in Latin America and the Caribbean and Eastern Europe and Central Asia, while in Africa other variables play a more important role. Yet, *lack of access to finance* consistently proves to be a significant determinant of the degree of informal competition in all three regions.

6.10 Comparing Logit and Probit Estimates

As outlined in subsection 3.2, there is no clear guidance on whether to use the logit or probit model. Results of both models should be very similar. If results differ substantially, the model should better not be confided in. We estimate the main specification in the framework of an ordered probit model to compare the results with those obtained by the ordered logit model. Multiplying the coefficients of the ordered probit model by a factor of 1.7 yields the same estimates as those of the ordered logit model. We proceed by computing predicted probabilities for the observations in the sample and construct a correlation matrix for the probabilities obtained in the logit and probit model. The correlations between the predicted probabilities consistently exceed 0.99.[70] The results of the logit and probit model are thus nearly identical, highlighting again the robustness of our findings.

7 Discussion and Conclusion

This paper empirically investigated the relationship between access to finance and competition by the informal sector across firms in developing and transition countries. It uniquely integrated two strands of the literature: The large body of work that places access to finance at the heart of firm growth and the growing research on the determinants of informality. It is one of the first to study *competition* by the informal sector and the first to link the severity of informal competition to financial constraints.

[70] Results are available upon request.

We argued that it is competition by the informal sector and not the mere existence of an informal sector that is economically relevant from a welfare perspective and motivated our investigation via the consideration that access to finance would boost a firm's productivity and hence allow it to escape market segments where informal competition is fierce. To test this hypothesis, we used qualitative firm responses on financial constraints and informal competition from the World Bank Enterprise Surveys (ES). We found that financially constrained firms suffer from significantly more intense competition by the informal sector. Above all, financial constraints are the most influential determinant of the severity of informal competition, together with labor regulations, corruption and firm size. Moreover, we provided evidence that firms in financially more dependent industries are less concerned by informal competition, highlighting that finance is needed to grow out of markets where informal competition is traditionally fierce. Our results are robust to using an objective measure of credit constraints, controlling for unobserved heterogeneity in firms' productivity and taking country-industry-location-size averages of financing obstacles as IVs for individual financing constraints. Critically, the results hold when firm responses on business obstacles are demeaned, i.e. firms that rank access to finance above their average level of business obstacles also tend to perceive informal competition as disproportionately constraining.

The findings underscore the importance of promoting financial sector development, e.g. by reducing (geographic, bureaucratic, and social) barriers to financial services and providing accommodative monetary policy, well-designed financial openness, and financial sector reforms. This could help lifting the economy from a 'bad equilibrium' characterized by a large informal sector and accordingly weak incentives for formal firms to expand (cf. Johnson et al., 1997) to a 'good equilibrium', where informal firms might still exist but do not act as substitutes and competitors to formal firms. The potential policy space for improvement via this channel is highlighted by the fact that 70 percent of firms in our sample see themselves constrained in accessing finance (cp. section 4).

However, improving access to finance is not necessarily sufficient to reach a 'good equilibrium'. What is needed is a comprehensive package of policies that improves the business environment on several fronts. In line with our results, such a package should especially reduce over-regulation in input and product markets, increase efficiency of bureaucracy, simplify tax systems, and convincingly fight corruption. This is generally in line with previous findings in the literature (e.g. Claessens and Luc, 2003; Fisman and Svensson,

2005; González and Lamanna, 2007; Ayyagari et al., 2010a). Other potential measures include export-promotion, which would make markets accessible to formal firms which are nearly free of informal competition, and a thoughtful strategy of attracting foreign direct investment. Although being part of a foreign corporation or a larger firm in general does not lower the probability of being confronted with informal competition according to our results, those firms might be an immediate threat to domestic informal firms, might possibly bring access to finance via international capital markets, can create incentives to formalize[71] and might thus create externalities that could alter the "rules of the game" in favor of formal firms.

These considerations suggest that policy actions should be undertaken on various fronts simultaneously. This is underscored by the consistently large effect that business constraints exercise in our econometric model. It hence requires a great amount of policy effort at the beginning but once such policies have been implemented, they are likely to mutually reinforce each other, pushing the economy towards a 'good equilibrium', where formal firms expand and informal firms potentially serve as their complements, not their competitors. Bold action is needed in a 'bad-equilibrium' trap to alter expectations of firms and convince them that today's investments will pay off in the future. Only if entrepreneurs can be sure that their profits will not be taxed away in the future (either by corrupt officials, ill-defined property rights or discretionary tax systems) and that business regulation allows them to adapt to arising challenges, they will be willing to invest and expand, and hence the benefits of access to finance might prosper. This interaction between informality, access to finance, institutional quality, and business environment is also highlighted by D'Erasmo and Moscoso Boedo (2012). Even though such a "big push" might seem costly, it could be revenue neutral even in the short to medium run if the government announcement is credible since incentives to formalize will widen the tax base in the short run and spur growth in the medium run. Countries with more fiscal space could accelerate the transition to the 'good equilibrium' by measures such as tax exemptions for investing firms in an initial phase. Given that pay-offs might quickly materialize, it essentially remains an issue of political will and feasibility. In any case, our general findings do not absolve policy makers from identifying the country-specific constraints to doing and financing business.

[71] The potential of spill-overs of foreign direct investment to domestic firms are well documented in the literature, see e.g. Javorcik (2004), Girma et al. (2008), Blalock and Gertler (2008). It is very likely that these spill-overs mainly apply to formal firms since multinational corporations will generally have more incentives to cooperate with formal firms (tax reasons, risks to global reputation).

In this context it should also be noted that while our paper establishes a strong and robust relationship between access to finance and the degree of informal competition, it does not show the exact firm channel through which this effect operates. Our policy conclusions on the macro level, however, are largely unaffected by this shortcoming since a government that provides wide access to finance and a supportive business environment should not necessarily worry *how* firms turn them into competitive advantages as long as they *do*. Nevertheless it would be interesting for future research to illuminate the 'black box' of the link between access to finance and informal competition and to identify the specific mechanisms that produce the relationship. Our findings that firms in financially more dependent industries are to a certain degree spared by informal competition and that large and exporting firms are less affected by informal competition suggest that access to finance enables firms to ascend to more profitable high-quality product segments through investments in innovation and technology.

Further future research building on our contribution might substantiate the welfare implications of the mere existence of an informal sector vis-à-vis its competitive pressure for the formal economy, tackle the related issue of substitution effects vs. complementarities between the informal and formal sector (cf. e.g. Stark, 1982; Chauduri, 1989; Ghate, 1992), and investigate how the relation between the two changes in the transition from the 'bad' to the 'good equilibrium'. As more survey rounds of the World Bank ES become available, more advanced panel data techniques might provide further insights to our empirical analysis.

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Figures

Figure 1: Distribution of Firms by Productivity Level

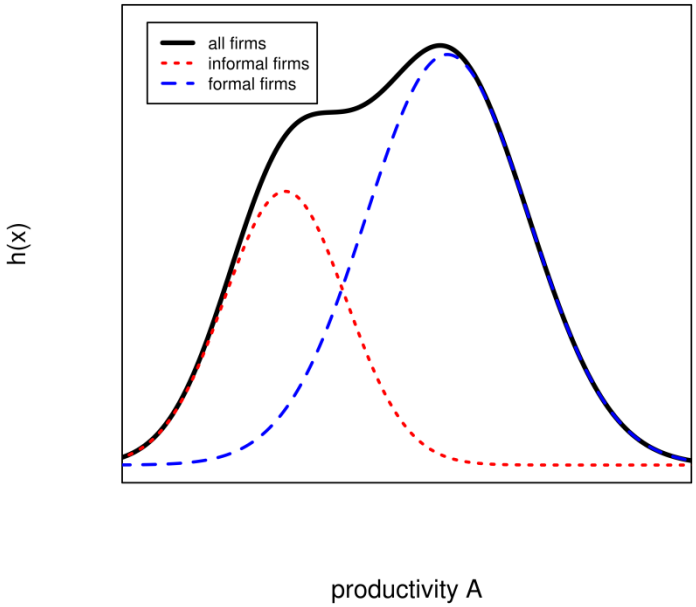


Figure 2: Informal Competition by Productivity Level

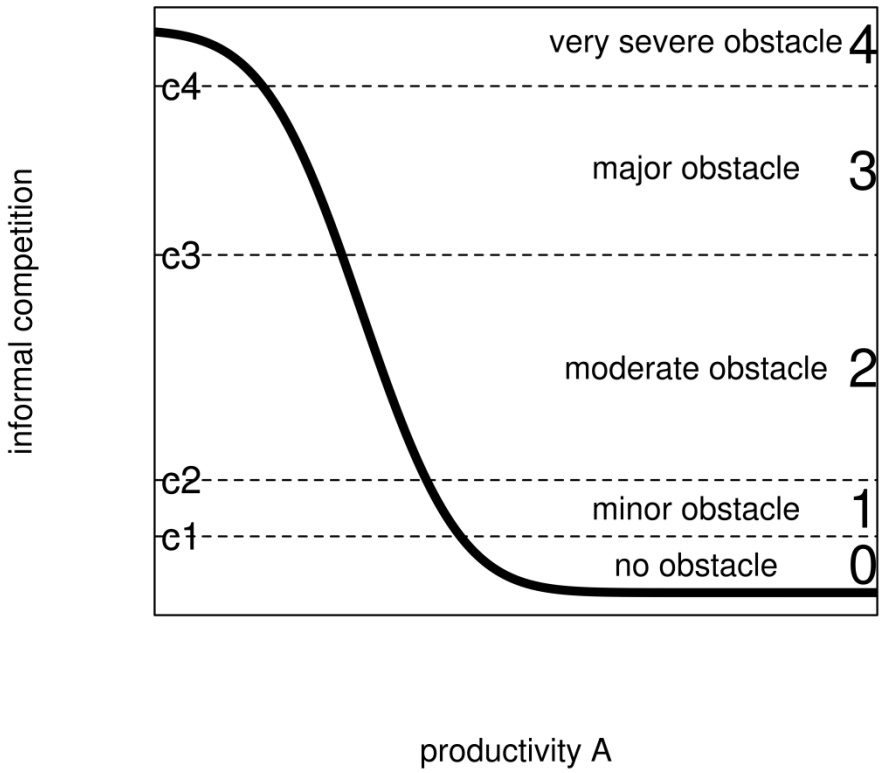
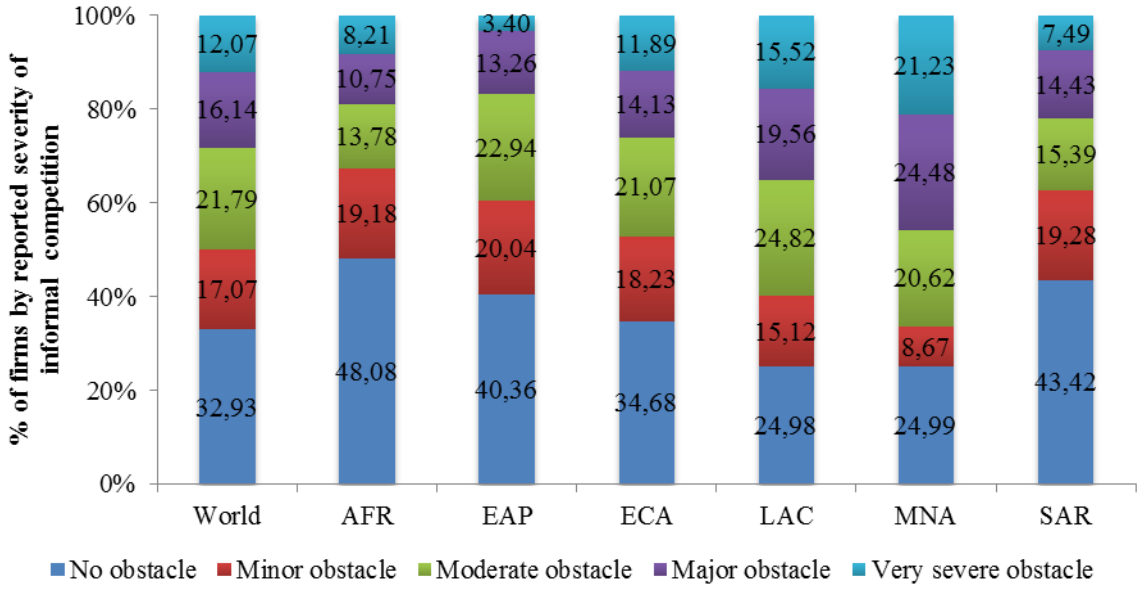
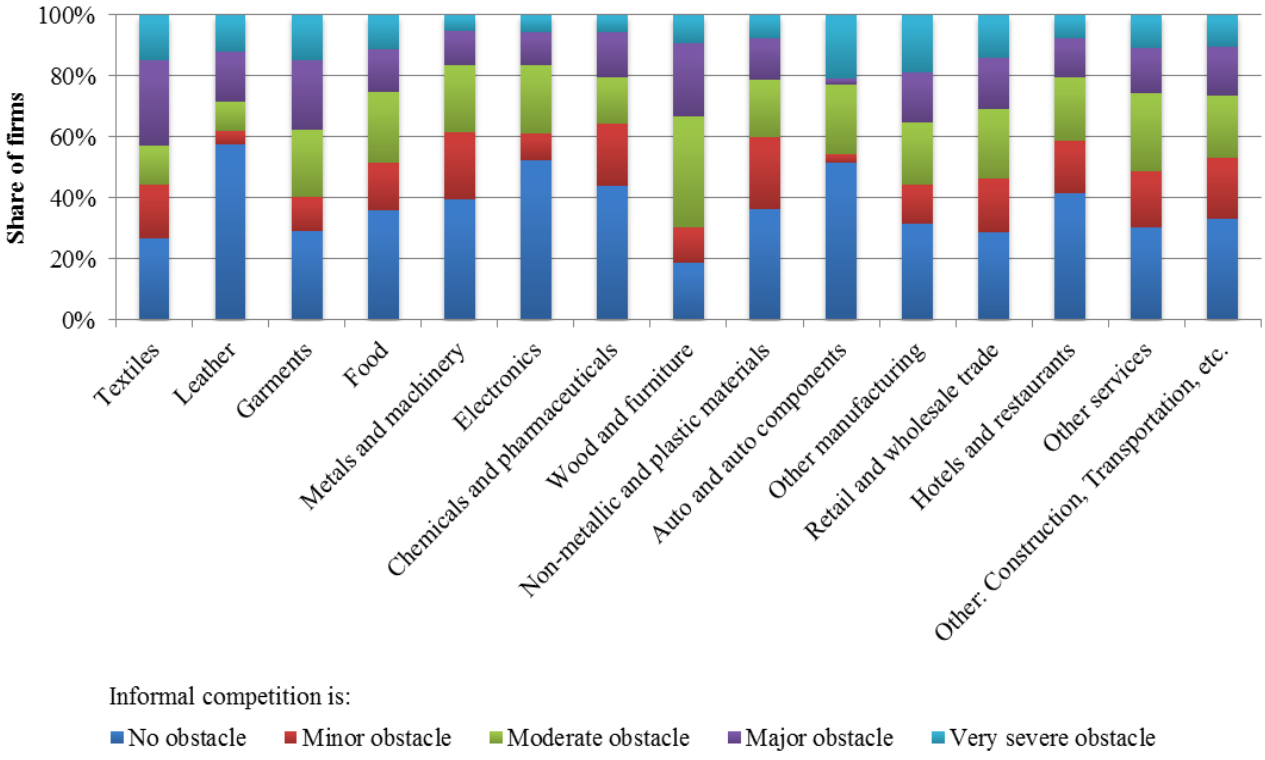


Figure 3: Severity of Informal Competition per Region



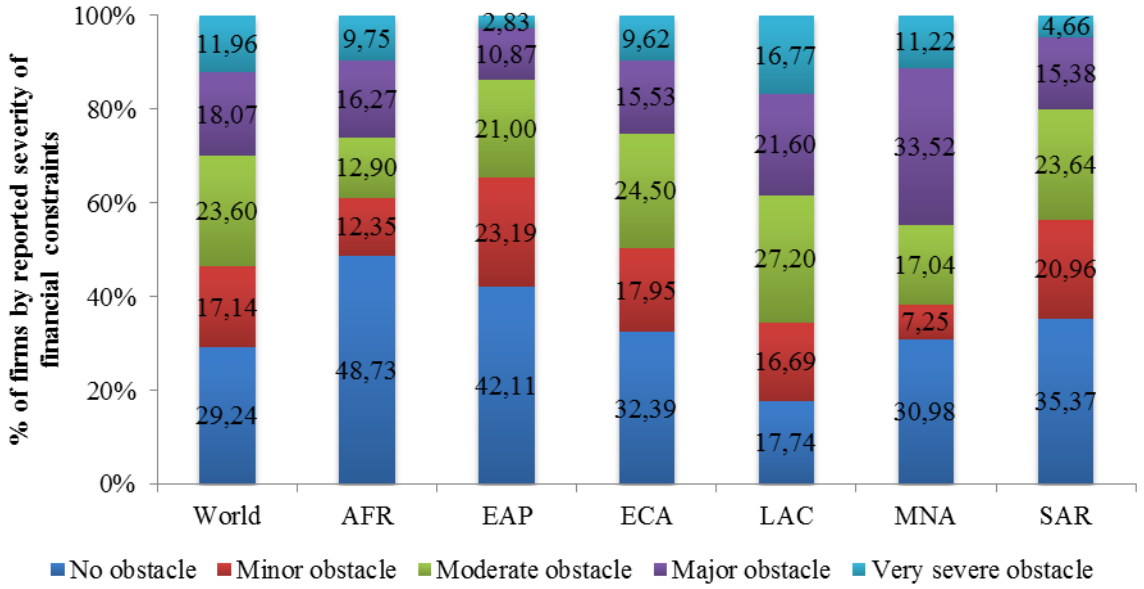
Note: Based on a sample of 42,038 firms. AFR: Africa, EAP: East Asia and Pacific; ECA: Eastern Europe and Central Asia, LAC: Latin America and the Caribbean, MNA: Middle East and North Africa, SAR: South Asia.

Figure 4: Severity of Informal Competition per Sector



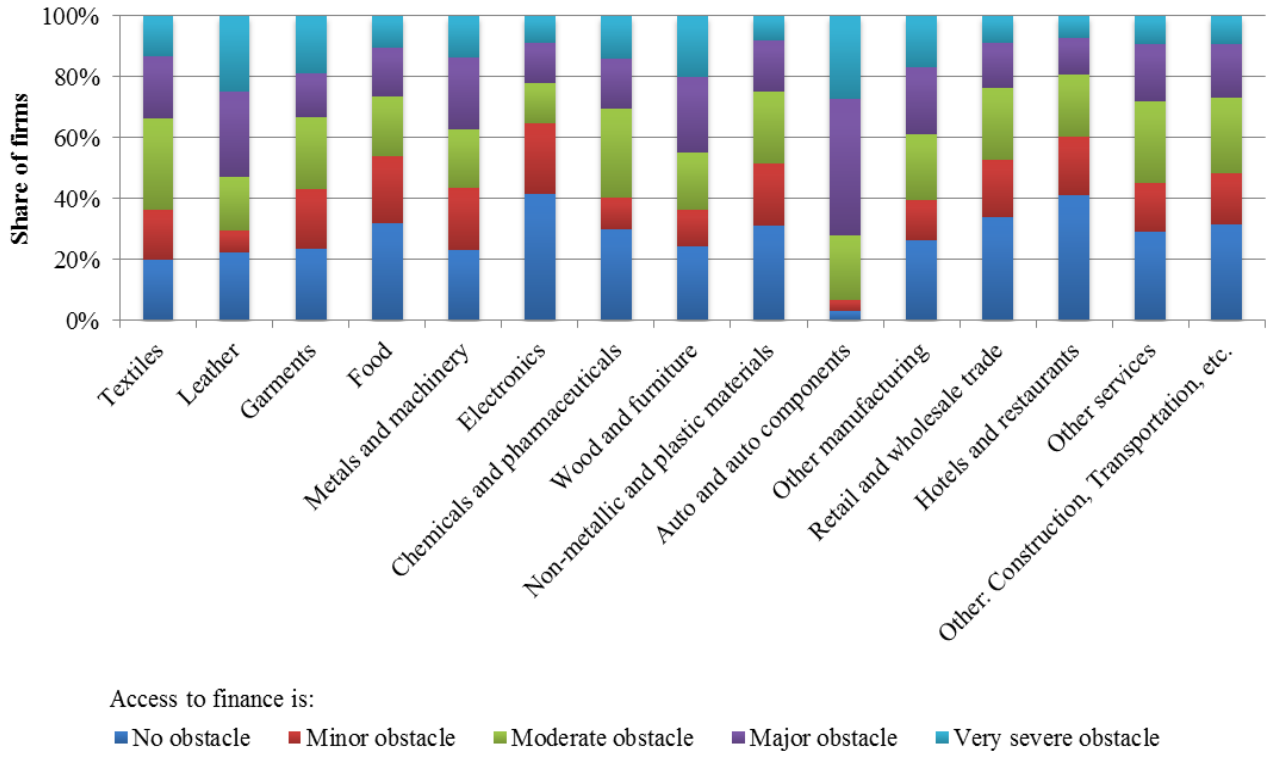
Note: Based on a sample of 42,038 firms.

Figure 5: Severity of Financial Constraints per Region



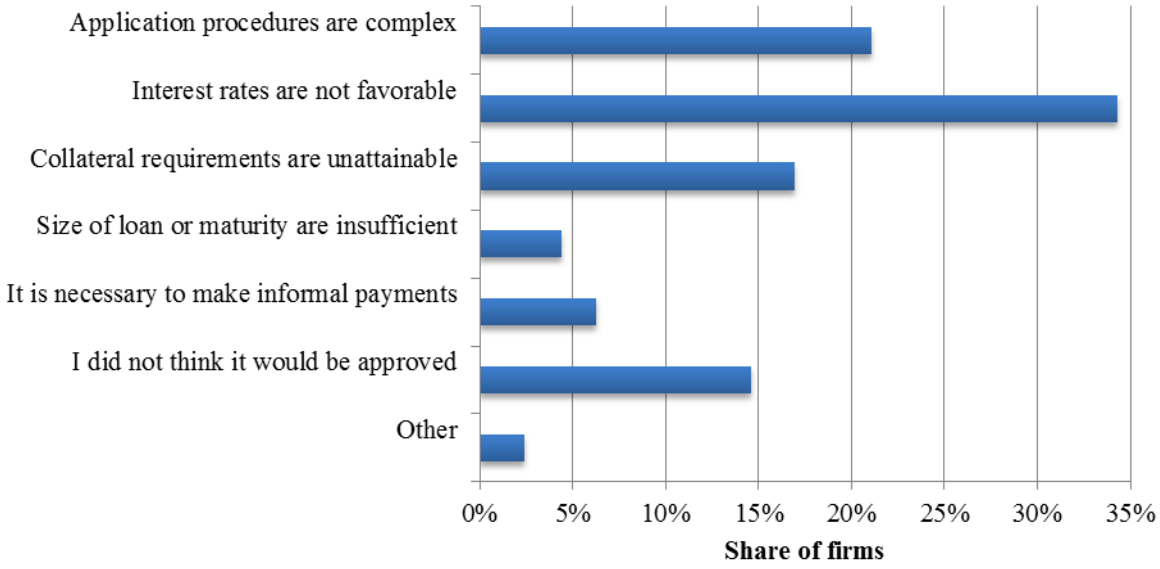
Note: Based on a sample of 42,038 firms. AFR: Africa, EAP: East Asia and Pacific; ECA: Eastern Europe and Central Asia, LAC: Latin America and the Caribbean, MNA: Middle East and North Africa, SAR: South Asia.

Figure 6: Severity of Financial Constraints per Sector



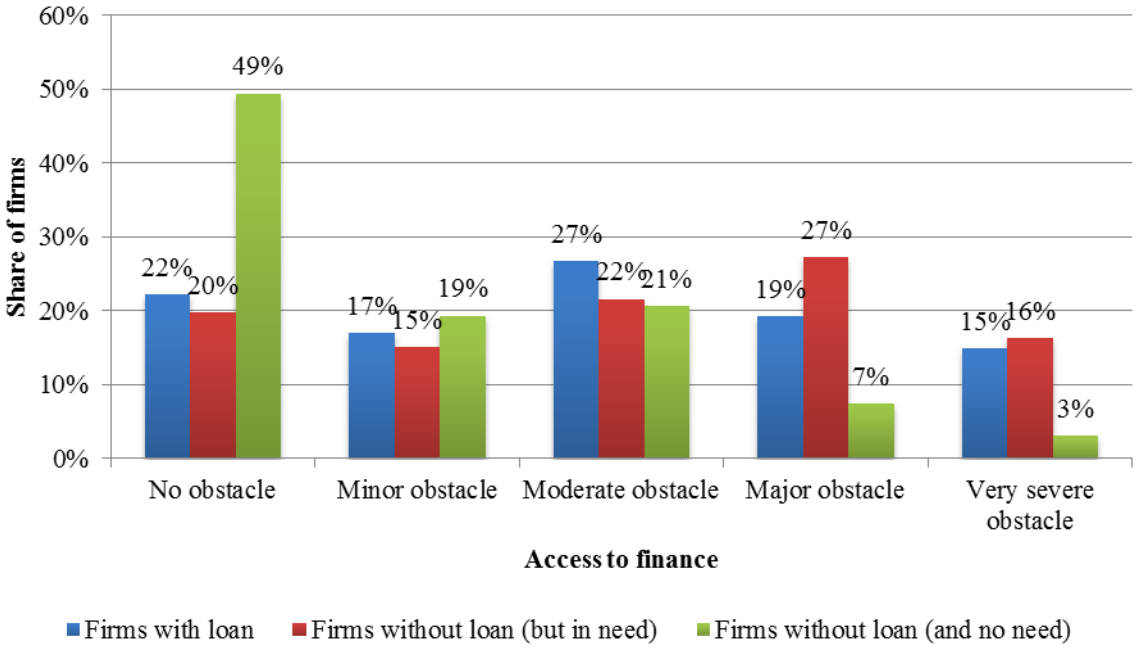
Note: Based on a sample of 42,038 firms.

Figure 7: Reasons for not Applying for a Loan



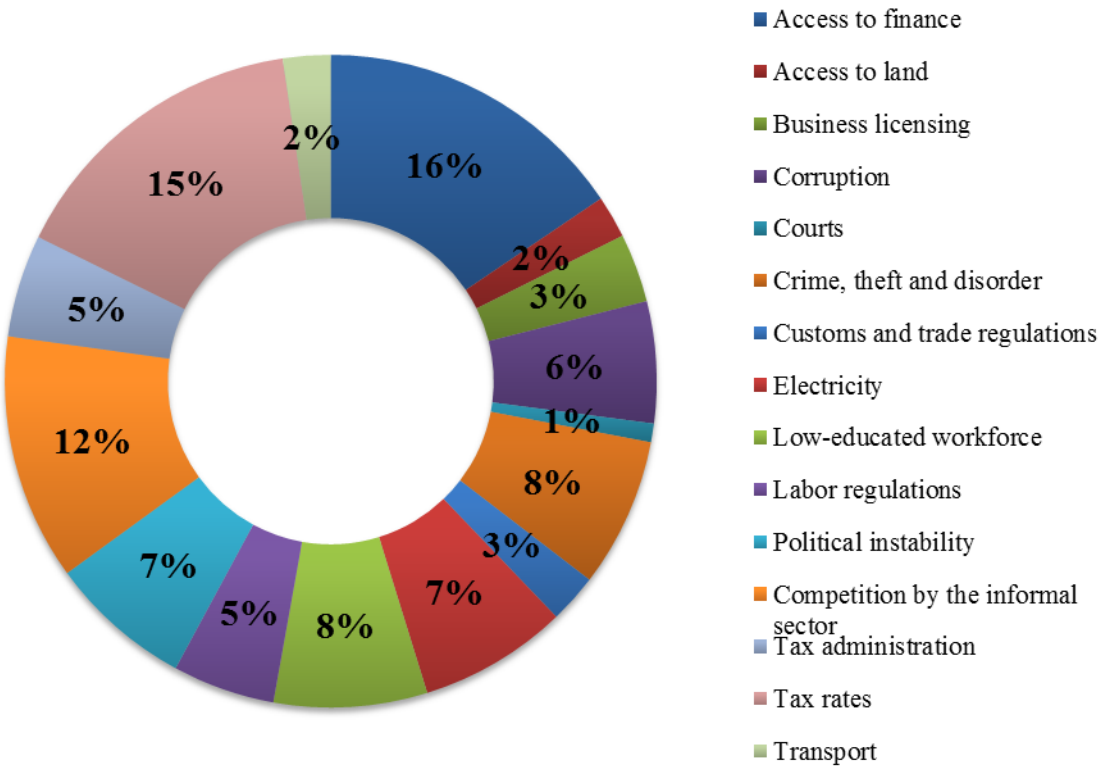
Note: Based on a sample of 11,529 firms.

Figure 8: Severity of Financial Constraints by Firms with and without Loans



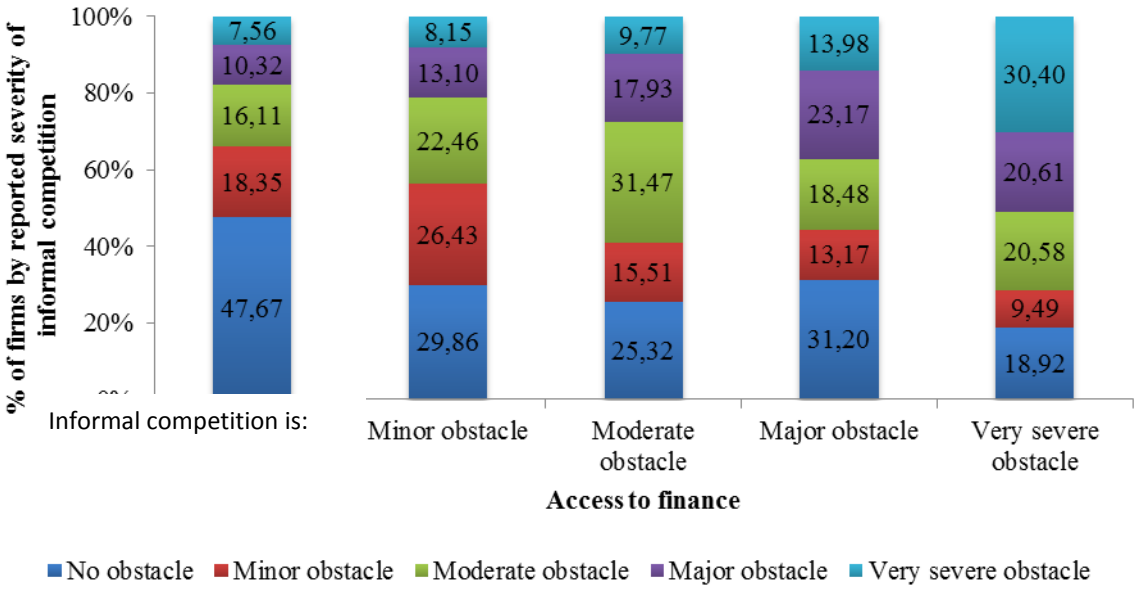
Note: Based on a on a sample of 18,829 firms with a loan, 12,489 firms without a loan (but in need) and 10,720 firms without a loan and no need for it. The 12,489 firms in need comprise 9,432 firms that have no loan but did not apply for a loan for reasons other than not needing it and 3,057 firms that have no loan but applied for a loan and were rejected.

Figure 9: The Relative Importance of Business Obstacles



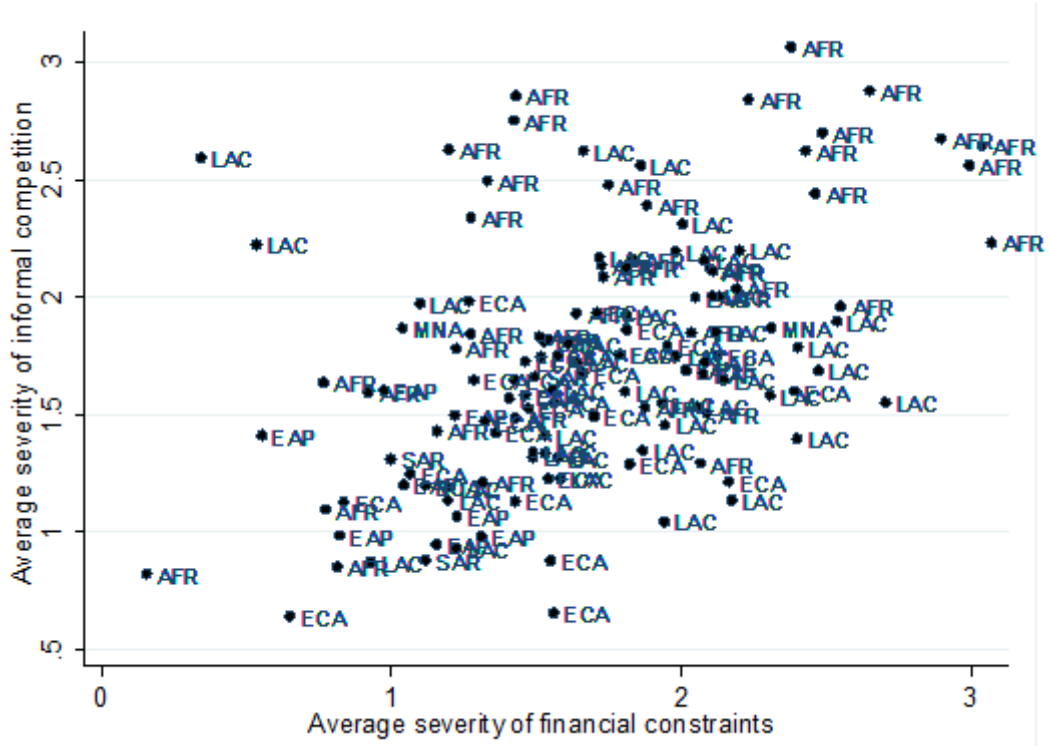
Note: Based on a sample of 40,757 firms.

Figure 10: Severity of Informal Competition according to Financial Constraint



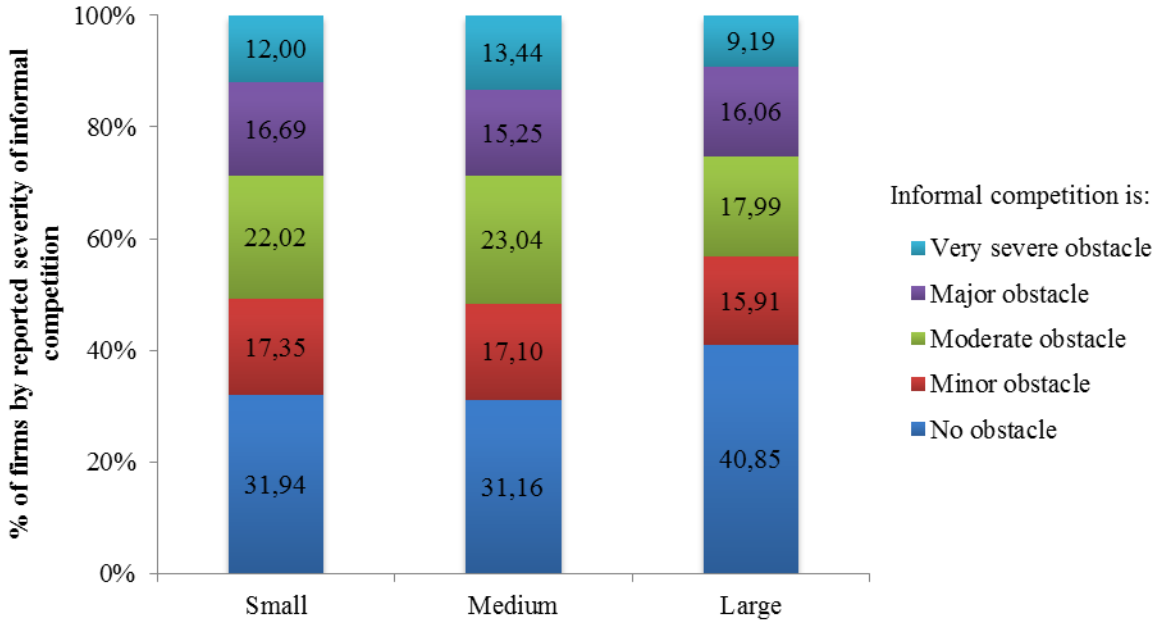
Note: Based on a sample of 42,038 firms.

Figure 11: The Link Between Financial Constraints and Informal Competition



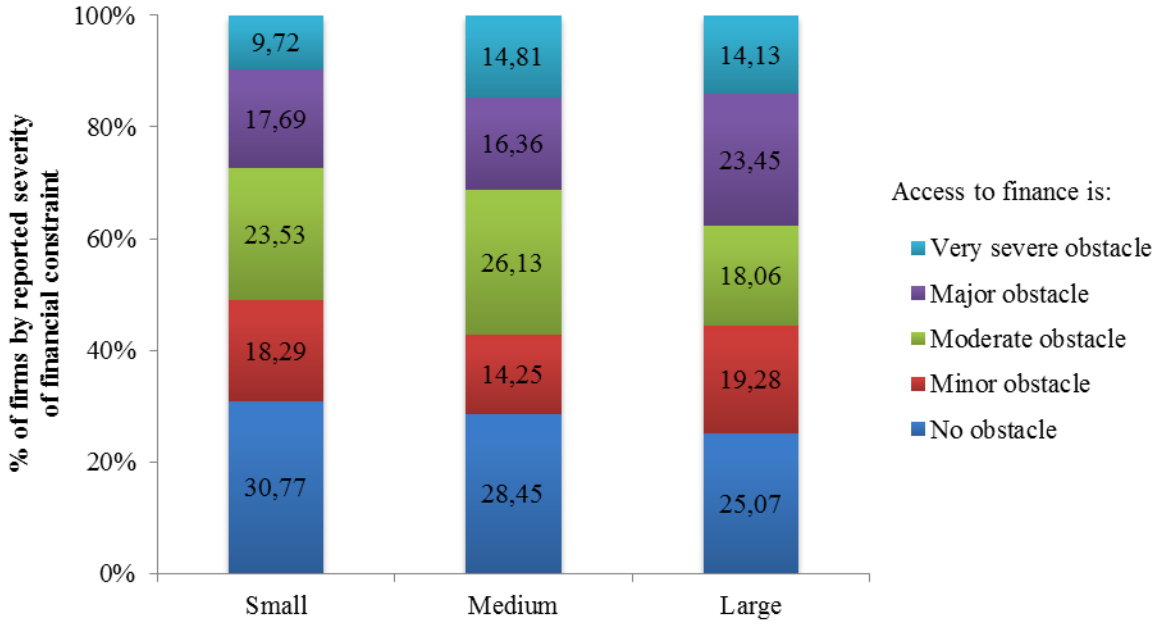
Note: Average values displayed at the country-level for 114 countries covering 42,038 firms. AFR: Africa, EAP: East Asia and Pacific; ECA: Eastern Europe and Central Asia, LAC: Latin America and the Caribbean, MNA: Middle East and North Africa, SAR: South Asia.

Figure 12: Severity of Informal Competition by Firm Size



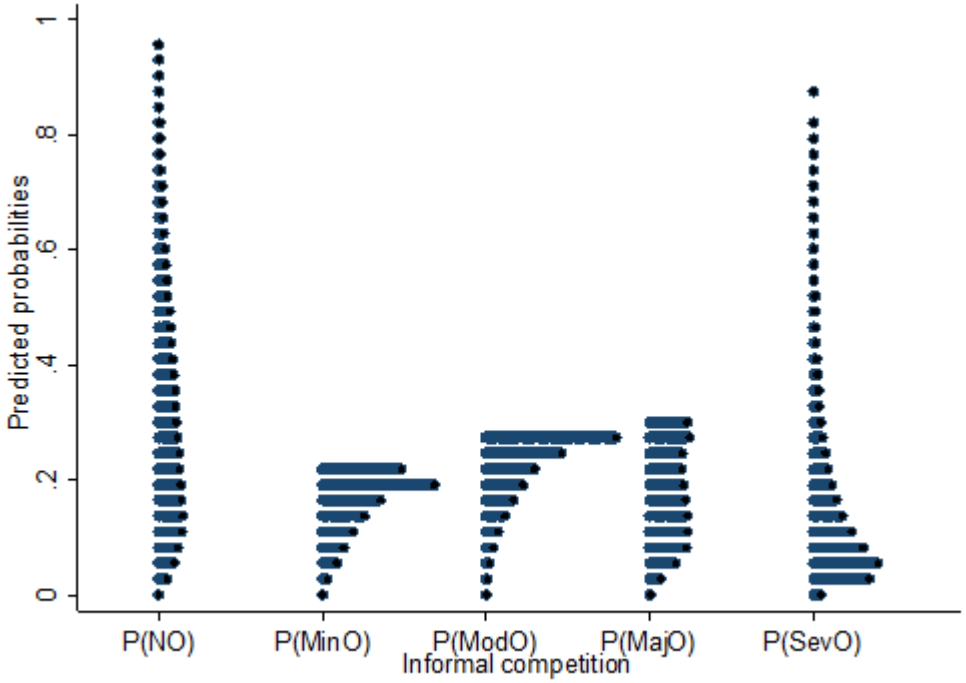
Note: Based on a sample of 42,038 firms.

Figure 13: Severity of Financial Constraints by Firm Size



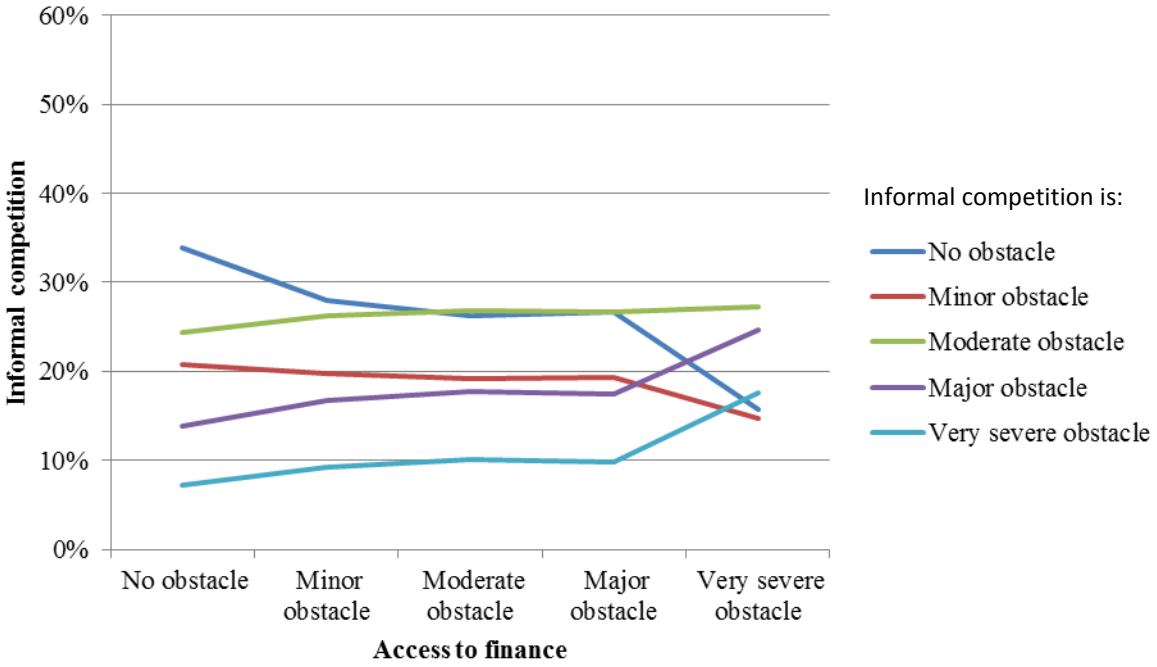
Note: Based on a sample of 42,038 firms.

Figure 14: Predicted Probabilities for the Sample



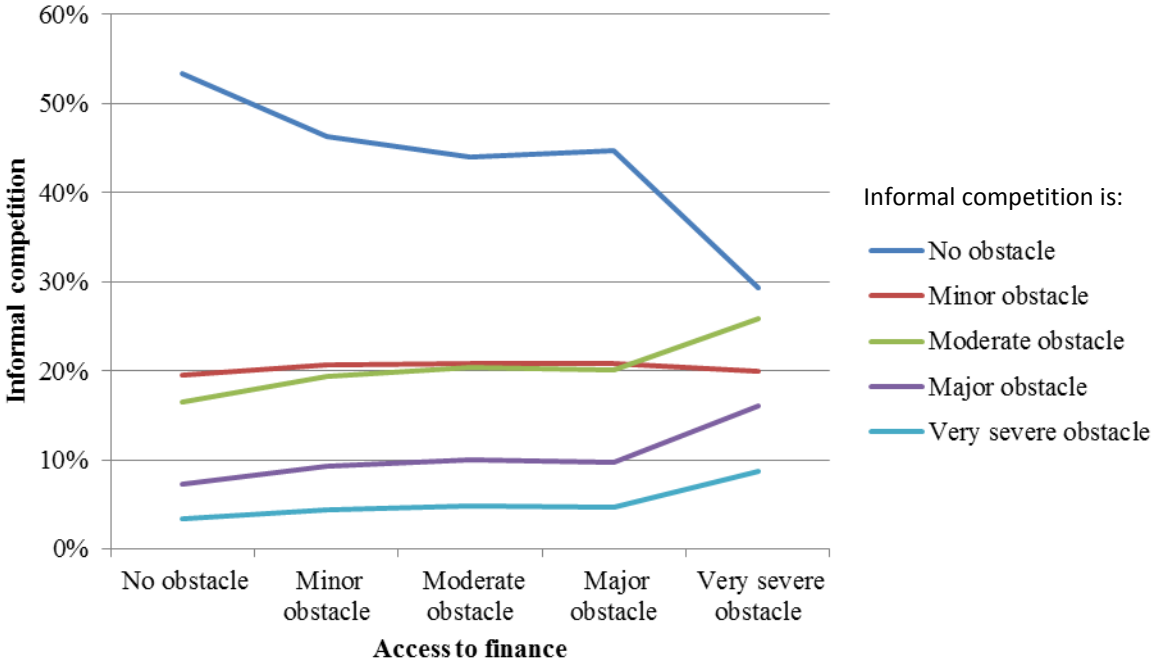
Note: Based on main specification in table 5, column 6.

Figure 15: Predicted Probabilities for Ideal Firm Type I



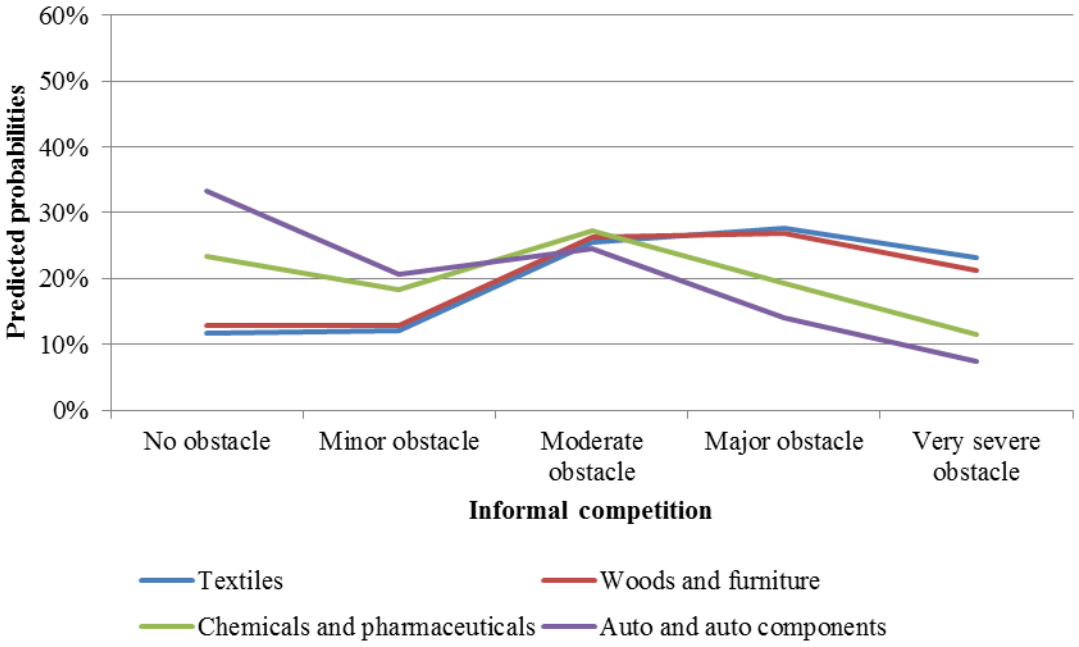
Note: Predicted probabilities are calculated for a small, non-exporting, female-owned, domestic firm that is not part of a larger firm, is located in the capital and faces a moderately constraining business environment. All other variables are set to their mean.

Figure 16: Predicted Probabilities for Ideal Firm Type II



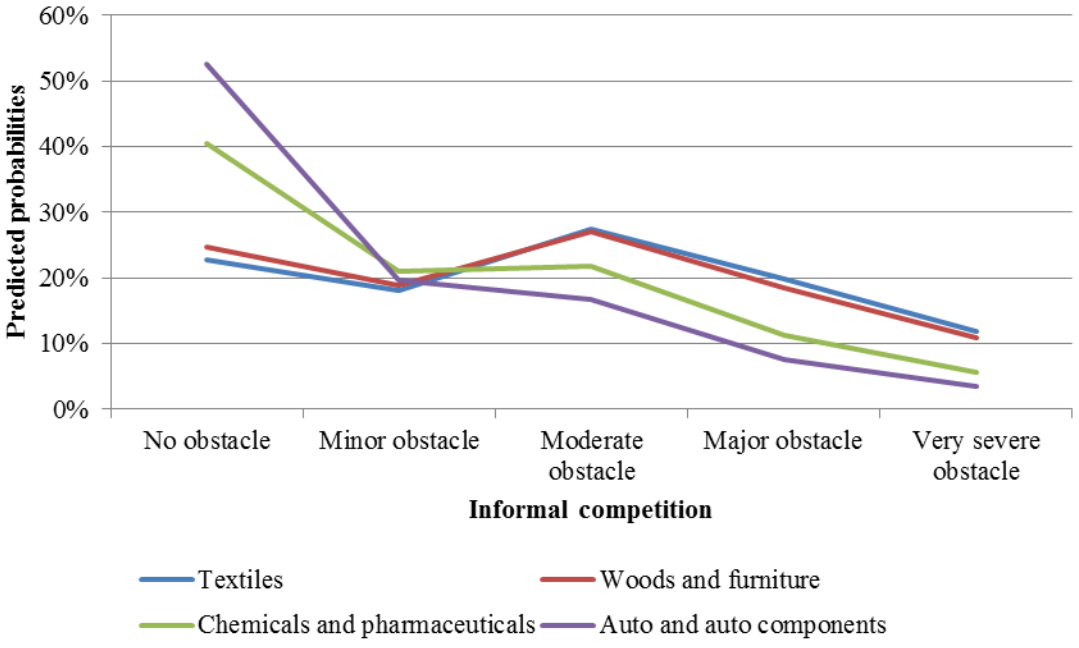
Note: Predicted probabilities are calculated for a large, exporting, male-owned, domestic firm that is not part of a larger firm, is located in the capital and faces a moderately constraining business environment. All other variables are set to their mean.

Figure 17: Industry Differences in Predicted Probabilities for Ideal Firm Type I



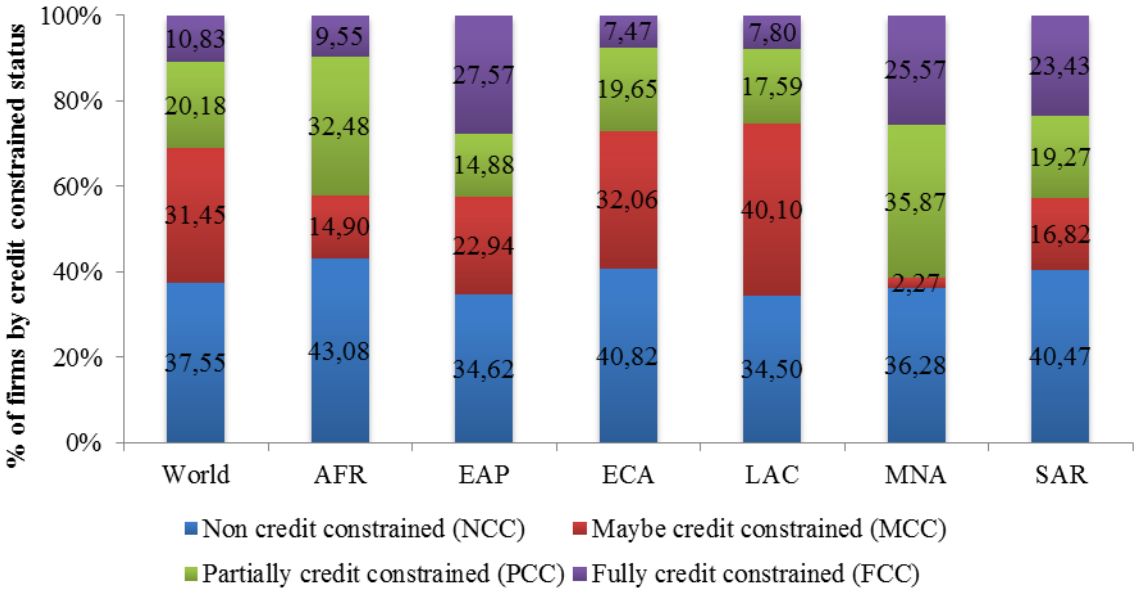
Note: Predicted probabilities are calculated for a small, non-exporting, female-owned, domestic firm that is not part of a larger firm, is located in the capital, considers access to finance 'a very severe obstacle' and faces a moderately constraining business environment. All other variables are set to their mean.

Figure 18: Industry Differences in Predicted Probabilities for Ideal Firm Type II



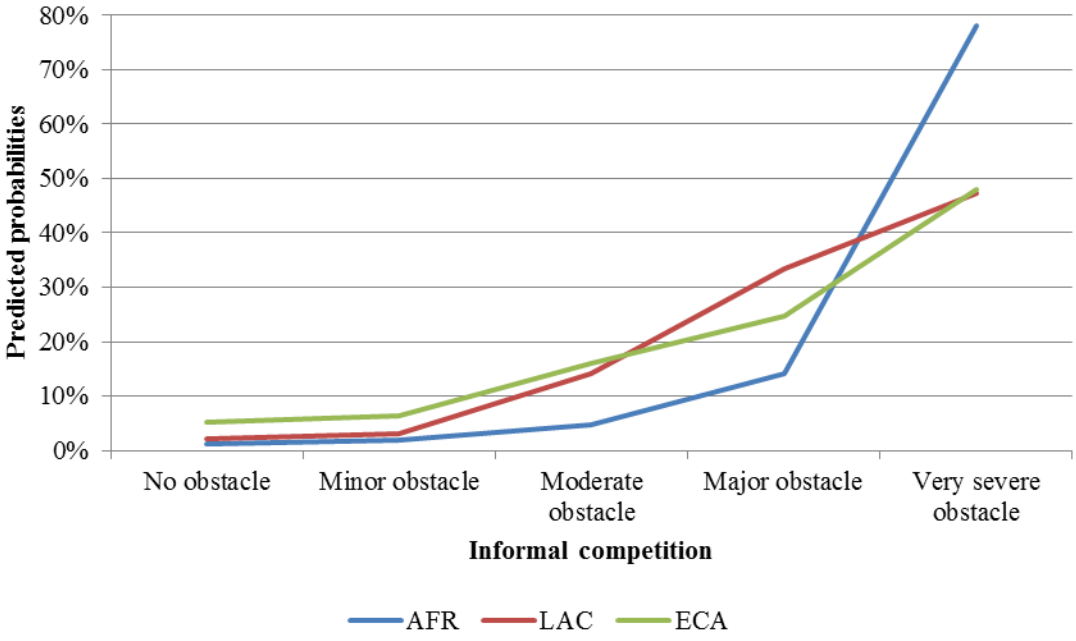
Note: Predicted probabilities are calculated for a large, exporting, male-owned, domestic firm that is not part of a larger firm, is located in the capital, considers access to finance 'a very severe obstacle' and faces a moderately constraining business environment. All other variables are set to their mean.

Figure 19: Credit Constrained Status (CC) per Region



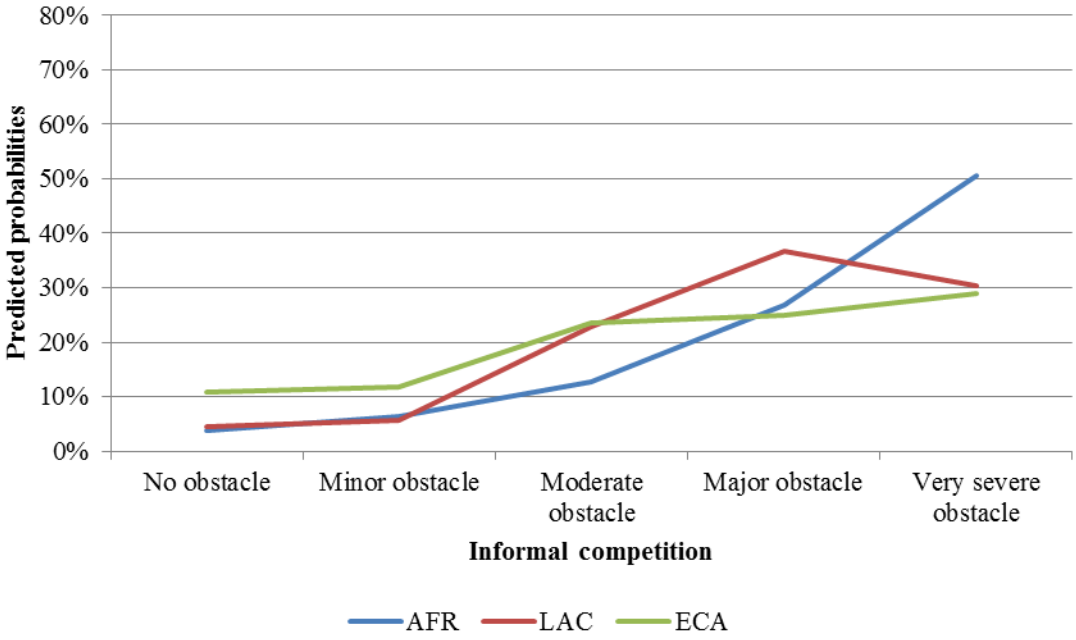
Note: Based on a sample of 42,038 firms. See Appendix E for a detailed description of the measure. AFR: Africa, EAP: East Asia and Pacific; ECA: Eastern Europe and Central Asia, LAC: Latin America and the Caribbean, MNA: Middle East and North Africa, SAR: South Asia.

Figure 20: Regional Differences in Predicted Probabilities for Ideal Firm Type I



Note: Predicted probabilities are calculated for a small, non-exporting, female-owned, domestic firm that is not part of a larger firm, is located in the capital, considers access to finance 'a very severe obstacle' and faces a severely constraining business environment. All other variables are set to their mean. AFR: Africa, LAC: Latin America and the Caribbean, ECA: Eastern Europe and Central Asia.

Figure 21: Regional Differences in Predicted Probabilities for Ideal Firm Type II



Note: Predicted probabilities are calculated for a large, exporting, male-owned, domestic firm that is not part of a larger firm, is located in the capital, considers access to finance 'a very severe obstacle' and faces a severely constraining business environment. All other variables are set to their mean. AFR: Africa, LAC: Latin America and the Caribbean, ECA: Eastern Europe and Central Asia.

Tables

Table 1: Summary Statistics (Sample)

	Obs.	Mean	Std. Dev.	Min	Max
Firm characteristics					
Small (5-19 employees)	42038	0.4628	0.4986	0	1
Medium (20-99 employees)	42038	0.3394	0.4735	0	1
Large (>99 employees)	42038	0.1978	0.3984	0	1
Small city (<250,000 pop)	42038	0.2092	0.4068	0	1
Medium city (>250,000 pop)	42038	0.3548	0.4785	0	1
Capital	42038	0.4360	0.4959	0	1
Age	42038	19.0755	17.2914	0	225
Foreign ownership	42038	0.1261	0.3319	0	1
Part of larger firm	42038	0.1481	0.3552	0	1
Exporter	42038	0.1904	0.3926	0	1
Female	42038	0.3588	0.4797	0	1
Experience	42038	17.9388	11.4448	0	70
Labor productivity	42038	0.8689	0.8588	0.0002	17.0752
Business obstacles					
Informal competition	42038	1.7417	1.4353	0	4
Access to finance	42038	1.6733	1.3839	0	4
Corruption	42038	1.8254	1.5089	0	4
Tax rates	42038	1.8832	1.3219	0	4
Tax administration	42038	1.5165	1.2799	0	4
Labor regulations	42038	1.1365	1.2043	0	4
Business licensing	42038	1.1789	1.2282	0	4
Courts	42038	1.1297	1.3020	0	4
Other					
Credit constrained (CC)	42038	1.1112	1.0161	0	3
Rajan Zingales index (RZI)	22031	0.3176	0.4201	-0.45	1.49
Weights	42038	30.3263	158.6638	0.2987	10592.9

Table 2: Mean (Population)

	Mean
Firm characteristics	
Small (5-19 employees)	0.5415
Medium (20-99 employees)	0.3197
Large (>99 employees)	0.1388
Small city (<250,000 pop)	0.1886
Medium city (>250,000 pop)	0.5622
Capital	0.2492
Age	17.5721
Foreign ownership	0.0768
Part of larger firm	0.1700
Exporter	0.1195
Female	0.3922
Experience	17.8855
Labor productivity	1.0016
Business obstacles	
Informal competition	1.5736
Access to finance	1.6637
Corruption	1.8942
Tax rates	1.9954
Tax administration	1.6542
Labor regulations	1.3076
Business licensing	1.3504
Courts	1.2663
Other	
Credit constrained (CC)	1.0428
Rajan Zingales Index (RZI)	0.3708
Sector of activity	
Textiles	0.0458
Leather	0.0006
Garments	0.0676
Food	0.0633
Metals and machinery	0.0750
Electronics	0.0065
Chemicals and pharmaceuticals	0.0586
Wood and furniture	0.0207
Non-metallic and plastic materials	0.0367
Auto and components	0.0182
Other manufacturing	0.1090
Retail and wholesale trade	0.2403
Hotels and restaurants	0.0470
Other services	0.1425
Other: Construction, transportation, etc.	0.0681

Note: Based on a sample of 42,038 firms.

Table 3: Correlation Matrix

	Size	Location	Age	Foreign	Part of larger firm	Export	Female	Exper.	Labor prod.	Informal comp.	Lack of access to finance	Corrupt	Tax rates	Tax admin.	Labor regu-lations	Business licensing	Courts	CC	RZ
Size	1																		
Location	0.00	1																	
Age	0.30	-0.01	1																
Foreign	0.21	-0.04	0.02	1															
Part of larger firm	0.22	-0.02	0.11	0.19	1														
Export	0.30	0.02	0.11	0.17	0.05	1													
Female	0.01	0.05	0.05	-0.05	-0.02	0.01	1												
Experience	0.14	-0.03	0.37	-0.05	0.00	0.07	0.03	1											
Labor productivity	-0.71	0.00	-0.23	-0.15	-0.16	-0.23	-0.01	-0.14	1										
Informal competition	-0.06	-0.06	0.05	-0.07	-0.02	-0.07	0.03	0.06	0.04	1									
Lack of access to finance	-0.11	-0.04	-0.05	-0.08	-0.07	-0.05	0.01	-0.05	0.11	0.22	1								
Corruption	0.02	-0.06	0.05	-0.02	0.01	0.01	0.00	0.09	-0.06	0.31	0.21	1							
Tax rates	0.01	-0.02	0.04	-0.05	-0.01	0.00	0.03	0.04	-0.03	0.24	0.29	0.35	1						
Tax administration	0.04	-0.05	0.05	-0.02	0.01	0.02	0.01	0.06	-0.05	0.26	0.27	0.42	0.64	1					
Labor regulations	0.16	-0.03	0.14	0.00	0.06	0.08	0.00	0.13	-0.17	0.23	0.20	0.31	0.31	0.38	1				
Business licensing	0.04	-0.03	0.03	0.00	0.03	0.00	-0.02	0.01	-0.05	0.22	0.27	0.39	0.37	0.46	0.34	1			
Courts	0.12	-0.02	0.10	0.01	0.04	0.05	0.00	0.10	-0.13	0.23	0.19	0.53	0.33	0.41	0.40	0.39	1		
Credit constrained (CC)	-0.16	-0.03	-0.07	-0.07	-0.08	-0.07	-0.01	-0.07	0.18	0.10	0.33	0.03	0.08	0.06	-0.01	0.06	0.01	1	
Rajan Zingales (RZ)	0.07	-0.06	0.08	0.06	0.04	0.04	-0.01	0.07	-0.06	-0.02	-0.04	0.04	0.00	0.03	0.03	0.06	0.05	-0.06	1

Note: Correlations are calculated for the sample of 42,038 firms.

Table 4a: Baseline Regressions

Dep. variable: INFORMAL COMPETITION	(1)	(2)	(3)	(4)	(5)	(6)
Finance (ordinal)	0.3142***					
	(0.0409)					
Finance - MinO		0.3664***	0.3809***	0.3870***	0.4082***	0.4092***
		(0.0985)	(0.0874)	(0.0854)	(0.0818)	(0.0805)
Finance - ModO		0.6635***	0.6431***	0.6407***	0.6526***	0.6511***
		(0.0994)	(0.0943)	(0.0923)	(0.0945)	(0.0947)
Finance - MajO		0.7195***	0.7152***	0.7190***	0.7242***	0.7281***
		(0.1690)	(0.1606)	(0.1571)	(0.1603)	(0.1581)
Finance - SevO		1.4764***	1.4694***	1.4786***	1.4852***	1.4797***
		(0.2032)	(0.2042)	(0.2124)	(0.2141)	(0.2040)
Small			-0.0290	-0.0297	-0.0048	0.0089
			(0.0710)	(0.0727)	(0.0698)	(0.0595)
Large			-0.3802***	-0.3844***	-0.4207***	-0.4414***
			(0.0378)	(0.0379)	(0.0397)	(0.0401)
Small city				0.1670	0.1668	0.1687
				(0.1397)	(0.1428)	(0.1439)
Capital				0.0252	0.0209	0.0114
				(0.1630)	(0.1693)	(0.1648)
Age					0.0054***	0.0055***
					(0.0012)	(0.0013)
Foreign						0.2523
						(0.2839)
Cut1	-0.8184***	-0.7990***	-0.8766***	-0.8603***	-0.6910***	-0.6671***
	(0.1578)	(0.1488)	(0.1468)	(0.1439)	(0.1540)	(0.1598)
Cut2	-0.0142	0.0075	-0.0671	-0.0503	0.1194	0.1433
	(0.1458)	(0.1428)	(0.1419)	(0.1384)	(0.1474)	(0.1510)
Cut3	1.0491***	1.0724***	0.9999***	1.0174***	1.1888***	1.2132***
	(0.1480)	(0.1392)	(0.1349)	(0.1324)	(0.1472)	(0.1560)
Cut4	2.2022***	2.2302***	2.1590***	2.1769***	2.3500***	2.3765***
	(0.1574)	(0.1453)	(0.1431)	(0.1431)	(0.1596)	(0.1712)
Country dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y
No. of countries	114	114	114	114	114	114
Observations	42,038	42,038	42,038	42,038	42,038	42,038
Pseudo R2	0.0537	0.0551	0.0565	0.0567	0.0573	0.0577

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are medium-sized, domestic firms that are located in medium-sized cities and that rank access to finance as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. The omitted industry, country and year dummies are: Construction and transportation industry, Zimbabwe, 2011. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4b: Baseline Regressions (ctd.)

Dep. variable: INFORMAL COMPETITION	(7)	(8)	(9)	(10)	(11)
Finance - MinO	0.4153***	0.4086***	0.4085***	0.4144***	0.4167***
	(0.0802)	(0.0806)	(0.0806)	(0.0791)	(0.0775)
Finance - ModO	0.6601***	0.6538***	0.6529***	0.6562***	0.6566***
	(0.0952)	(0.0944)	(0.0950)	(0.0958)	(0.0959)
Finance - MajO	0.7349***	0.7283***	0.7287***	0.7313***	0.7311***
	(0.1575)	(0.1595)	(0.1597)	(0.1594)	(0.1592)
Finance - SevO	1.4842***	1.4762***	1.4755***	1.4719***	1.4712***
	(0.2045)	(0.2023)	(0.2035)	(0.2045)	(0.2035)
Small	0.0174	-0.0030	-0.0033	-0.0011	-0.0303
	(0.0550)	(0.0565)	(0.0563)	(0.0563)	(0.0799)
Large	-0.4507***	-0.4232***	-0.4230***	-0.4246***	-0.4181***
	(0.0400)	(0.0418)	(0.0417)	(0.0425)	(0.0433)
Small city	0.1681	0.1698	0.1698	0.1666	0.1679
	(0.1438)	(0.1452)	(0.1452)	(0.1440)	(0.1451)
Capital	0.0128	0.0174	0.0173	0.0144	0.0153
	(0.1653)	(0.1701)	(0.1702)	(0.1695)	(0.1697)
Age	0.0055***	0.0055***	0.0055***	0.0045***	0.0045***
	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)
Foreign	0.2297	0.2710	0.2735	0.2825	0.2850
	(0.2771)	(0.2909)	(0.2845)	(0.2870)	(0.2898)
Part of larger firm	0.1006*	0.0975*	0.0986*	0.1026*	0.1041*
	(0.0571)	(0.0565)	(0.0561)	(0.0578)	(0.0575)
Export		-0.2953**	-0.2961**	-0.2962**	-0.2942**
		(0.1310)	(0.1295)	(0.1278)	(0.1259)
Female			0.0147	0.0133	0.0142
			(0.0578)	(0.0590)	(0.0587)
Experience				0.0036*	0.0036**
				(0.0018)	(0.0018)
Labor productivity					0.0269
					(0.0423)
Cut1	-0.6379***	-0.6457***	-0.6385***	-0.5977***	-0.5898***
	(0.1624)	(0.1598)	(0.1611)	(0.1605)	(0.1597)
Cut2	0.1726	0.1655	0.1728	0.2139	0.2219
	(0.1525)	(0.1508)	(0.1539)	(0.1523)	(0.1507)
Cut3	1.2425***	1.2371***	1.2444***	1.2861***	1.2942***
	(0.1585)	(0.1557)	(0.1550)	(0.1531)	(0.1520)
Cut4	2.4064***	2.4029***	2.4102***	2.4518***	2.4599***
	(0.1729)	(0.1707)	(0.1709)	(0.1666)	(0.1677)
Country dummies	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y
No. of countries	114	114	114	114	114
Observations	42,038	42,038	42,038	42,038	42,038
Pseudo R2	0.0578	0.0585	0.0585	0.0586	0.0587

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance as 'no obstacle'. The omitted industry, country and year dummies are: Construction and transportation industry, Zimbabwe, 2011. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5: The Impact of the Business Climate

Dep. variable: INFORMAL COMPETITION	(1)	(2)	(3)	(4)	(5)	**(6) Main specification**
Finance - MinO	0.3532***	0.3260***	0.3132***	0.2899***	0.2833***	**0.2855*** **
	(0.0751)	(0.0744)	(0.0770)	(0.0781)	(0.0770)	**(0.0771)**
Finance - ModO	0.4910***	0.4494***	0.4262***	0.4076***	0.3835***	**0.3727*** **
	(0.0894)	(0.0908)	(0.0894)	(0.1010)	(0.0974)	**(0.0922)**
Finance - MajO	0.5040***	0.4430***	0.4027**	0.3614**	0.3447**	**0.3405** **
	(0.1619)	(0.1700)	(0.1717)	(0.1661)	(0.1625)	**(0.1630)**
Finance - SevO	1.2679***	1.1697***	1.1189***	1.0266***	1.0027***	**1.0095*** **
	(0.2449)	(0.2162)	(0.2105)	(0.2095)	(0.2095)	**(0.2309)**
Small	-0.0233	-0.0276	-0.0123	-0.0228	-0.0117	**-0.0055**
	(0.0843)	(0.0985)	(0.0960)	(0.1184)	(0.1140)	**(0.1222)**
Large	-0.4549***	-0.4734***	-0.4774***	-0.4672***	-0.4706***	**-0.4463*** **
	(0.0590)	(0.0667)	(0.0659)	(0.0631)	(0.0706)	**(0.0478)**
Small city	0.1477	0.1638	0.1720	0.1802	0.1793	**0.1735**
	(0.1433)	(0.1568)	(0.1618)	(0.1559)	(0.1529)	**(0.1472)**
Capital	-0.0426	-0.0426	-0.0542	-0.0468	-0.0536	**-0.0494**
	(0.1647)	(0.1675)	(0.1642)	(0.1519)	(0.1531)	**(0.1416)**
Age	0.0047***	0.0043***	0.0044***	0.0036**	0.0035**	**0.0034** *
	(0.0015)	(0.0015)	(0.0015)	(0.0016)	(0.0017)	**(0.0018)**
Foreign	0.2082	0.2168	0.2156	0.1558	0.1462	**0.1541**
	(0.2717)	(0.2724)	(0.2721)	(0.2526)	(0.2528)	**(0.2697)**
Part of larger firm	0.1561*	0.1742*	0.1576*	0.1582*	0.1559	**0.1489**
	(0.0897)	(0.0931)	(0.0896)	(0.0951)	(0.0951)	**(0.0953)**
Export	-0.3283**	-0.3102**	-0.3224***	-0.3485***	-0.3402***	**-0.3496*** **
	(0.1286)	(0.1206)	(0.1176)	(0.1160)	(0.1138)	**(0.1159)**
Female	0.0386	0.0333	0.0264	0.0152	0.0166	**0.0257**
	(0.0546)	(0.0554)	(0.0554)	(0.0683)	(0.0700)	**(0.0607)**
Experience	0.0037*	0.0035	0.0032	0.0035	0.0040	**0.0048**
	(0.0022)	(0.0022)	(0.0021)	(0.0026)	(0.0027)	**(0.0030)**
Labor productivity	0.0281	0.0268	0.0214	0.0326	0.0319	**0.0338**
	(0.0374)	(0.0406)	(0.0397)	(0.0368)	(0.0364)	**(0.0376)**
Corruption - MinO	0.1953*	0.1748*	0.1602	0.1422	0.1173	**0.0535**
	(0.1057)	(0.1053)	(0.1003)	(0.1017)	(0.1002)	**(0.1279)**
Corruption - ModO	0.3756**	0.3056*	0.2621	0.2445	0.2324	**0.2145**
	(0.1497)	(0.1617)	(0.1706)	(0.1550)	(0.1471)	**(0.1345)**
Corruption - MajO	0.8641***	0.7824***	0.6948***	0.6332***	0.6153***	**0.5158*** **
	(0.0749)	(0.0874)	(0.1032)	(0.1002)	(0.0972)	**(0.1160)**
Corruption - SevO	1.2310***	1.0938***	0.9929***	0.9733***	0.9543***	**0.7897*** **
	(0.1033)	(0.1187)	(0.1369)	(0.1173)	(0.1147)	**(0.1492)**
Tax rates - MinO		0.1945*	0.1610	0.1289	0.1160	**0.1111**
		(0.1055)	(0.1163)	(0.1198)	(0.1162)	**(0.1151)**
Tax rates - ModO		0.2147**	0.0661	0.0322	0.0160	**0.0200**
		(0.0878)	(0.1210)	(0.1274)	(0.1251)	**(0.1270)**
Tax rates - MajO		0.3304***	0.0989	0.0740	0.0624	**0.0592**
		(0.0935)	(0.1223)	(0.1277)	(0.1260)	**(0.1228)**
Tax rates - SevO		0.5700***	0.3071	0.2385	0.2468	**0.2692**
		(0.1637)	(0.1869)	(0.1957)	(0.1921)	**(0.1928)**
Tax admin - MinO			0.0037	-0.0157	-0.0551	**-0.0632**
			(0.0875)	(0.0856)	(0.0980)	**(0.0876)**
Tax admin - ModO			0.2591**	0.2091*	0.1727	**0.1648**
			(0.1156)	(0.1154)	(0.1220)	**(0.1204)**
Tax admin - MajO			0.5035***	0.4538***	0.4230**	**0.3921** **
			(0.1399)	(0.1566)	(0.1770)	**(0.1899)**
Tax admin - SevO			0.4525***	0.2645**	0.2747*	**0.2014**
			(0.1314)	(0.1279)	(0.1601)	**(0.1475)**

Labor - MinO				0.1409	0.1207	**0.0963**
				(0.0903)	(0.0949)	**(0.0930)**
Labor - ModO				0.2232	0.2196	**0.1920**
				(0.1424)	(0.1392)	**(0.1225)**
Labor - MajO				0.2612*	0.2476*	**0.2138***
				(0.1467)	(0.1400)	**(0.1292)**
Labor - SevO				0.9923***	0.9811***	**0.9578*****
				(0.1604)	(0.1524)	**(0.1316)**
Licensing - MinO					0.1986**	**0.1722***
					(0.0880)	**(0.0906)**
Licensing - ModO					0.1023	**0.0815**
					(0.0934)	**(0.1037)**
Licensing - MajO					0.1612	**0.0956**
					(0.1320)	**(0.1412)**
Licensing - SevO					-0.0783	**-0.1322**
					(0.2100)	**(0.2156)**
Courts - MinO						**0.2349***
						(0.1400)
Courts - ModO						**0.0130**
						(0.2882)
Courts - MajO						**0.3934*****
						(0.1283)
Courts - SevO						**0.4255*****
						(0.0955)
Cut1	-0.2867	-0.1981	-0.3330	-0.3585	-0.2953	**-0.2574**
	(0.1975)	(0.2235)	(0.2422)	(0.2464)	(0.2439)	**(0.2529)**
Cut2	0.5525***	0.6430***	0.5115**	0.4909**	0.5548**	**0.5957****
	(0.1925)	(0.2216)	(0.2442)	(0.2492)	(0.2460)	**(0.2545)**
Cut3	1.6676***	1.7621***	1.6355***	1.6248***	1.6902***	**1.7358*****
	(0.1931)	(0.2210)	(0.2377)	(0.2382)	(0.2381)	**(0.2477)**
Cut4	2.8691***	2.9701***	2.8469***	2.8523***	2.9197***	**2.9695*****
	(0.2059)	(0.2321)	(0.2453)	(0.2418)	(0.2441)	**(0.2548)**
Country dummies	Y	Y	Y	Y	Y	**Y**
Industry dummies	Y	Y	Y	Y	Y	**Y**
Year dummies	Y	Y	Y	Y	Y	**Y**
No. of countries	114	114	114	114	114	**114**
Observations	42,038	42,038	42,038	42,038	42,038	**42,038**
Pseudo R2	0.0740	0.0756	0.0773	0.0815	0.0822	**0.0839**

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. The omitted industry, country and year dummies are: Construction and transportation industry, Zimbabwe, 2011. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6: Industry Fixed Effects

Dependent variable: INFORMAL COMPETITION	For main specification
Textiles	0.4582**
	(0.2157)
Leather	-0.3607**
	(0.1820)
Garments	0.4243***
	(0.1452)
Food	0.1060
	(0.1373)
Metals and machinery	-0.3476**
	(0.1667)
Electronics	-0.3064
	(0.2456)
Chemicals and pharmaceuticals	-0.3746***
	(0.1303)
Wood and furniture	0.3477**
	(0.1382)
Non-metallic and plastic materials	-0.0183
	(0.1524)
Auto and auto components	-0.8579***
	(0.1220)
Other manufacturing	0.3765
	(0.2469)
Retail and wholesale trade	0.2201
	(0.1390)
Hotels and restaurants	-0.1064
	(0.2459)
Other services	-0.0393
	(0.1141)

Note: Industry fixed effects are shown for the main specification presented in table 5 column 6. The omitted industry is the construction and transportation industry. The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7: The Role of Sector-Specific Dependence on External Financing

Dependent variable: INFORMAL COMPETITION	(1) Main specification for this sample	(2) RZI	(3) RZI and interactions
Finance - MinO	0.2507***	0.2378***	0.1372
	(0.0941)	(0.0892)	(0.0887)
Finance - ModO	0.4502***	0.4573***	0.2327*
	(0.0926)	(0.0923)	(0.1383)
Finance - MajO	0.4605***	0.4741***	0.3457*
	(0.1730)	(0.1628)	(0.1865)
Finance - SevO	1.3818***	1.4225***	1.3109***
	(0.2616)	(0.2716)	(0.3513)
Small	-0.0862	-0.0735	-0.0892
	(0.2984)	(0.2822)	(0.2912)
Large	-0.5816***	-0.5937***	-0.5928***
	(0.1467)	(0.1538)	(0.1638)
Small city	0.5470**	0.5248**	0.5129**
	(0.2304)	(0.2280)	(0.2115)
Capital	0.0984	0.1135	0.1053
	(0.1751)	(0.1712)	(0.1643)
Age	0.0050***	0.0051***	0.0046***
	(0.0014)	(0.0016)	(0.0012)
Foreign	0.2535	0.3439	0.3330
	(0.5042)	(0.5265)	(0.5539)
Part of larger firm	0.1279	0.1866**	0.1910**
	(0.0858)	(0.0796)	(0.0784)
Export	-0.5473**	-0.5413**	-0.5308**
	(0.2218)	(0.2222)	(0.2234)
Female	0.0470	0.0338	0.0302
	(0.0887)	(0.0845)	(0.0873)
Experience	0.0049	0.0044	0.0049
	(0.0038)	(0.0035)	(0.0039)
Labor productivity	-0.0297	-0.0440	-0.0335
	(0.0975)	(0.0887)	(0.0933)
Corruption - MinO	0.1091	0.1551	0.1628
	(0.1449)	(0.1556)	(0.1533)
Corruption - ModO	0.5338**	0.5377**	0.5537**
	(0.2266)	(0.2341)	(0.2370)
Corruption - MajO	0.6599***	0.6379***	0.6288***
	(0.1339)	(0.1377)	(0.1364)
Corruption - SevO	0.9656***	0.9238***	0.9437***
	(0.2011)	(0.2205)	(0.2123)
Tax rates - MinO	0.2258*	0.2389**	0.2307**
	(0.1193)	(0.1088)	(0.1166)
Tax rates - ModO	0.4583*	0.4937*	0.4868*
	(0.2454)	(0.2592)	(0.2634)
Tax rates - MajO	0.4992*	0.4906*	0.4567*
	(0.2717)	(0.2607)	(0.2385)
Tax rates - SevO	0.7713**	0.8183**	0.7797**
	(0.3419)	(0.3574)	(0.3234)
Tax admin - MinO	-0.0918	-0.0631	-0.0623
	(0.2053)	(0.1913)	(0.1963)
Tax admin - ModO	0.0364	0.0164	0.0534
	(0.1243)	(0.1368)	(0.1170)
Tax admin - MajO	0.3387*	0.3109*	0.3404*
	(0.2031)	(0.1879)	(0.2000)
Tax admin - SevO	0.2654*	0.2347	0.2737
	(0.1569)	(0.1557)	(0.1785)

Labor - MinO	-0.0998	-0.1219	-0.1201
	(0.1860)	(0.2100)	(0.2107)
Labor - ModO	-0.1992	-0.2101	-0.2220
	(0.1974)	(0.2173)	(0.2263)
Labor - MajO	-0.1783	-0.2316	-0.2259
	(0.2991)	(0.3380)	(0.3562)
Labor - SevO	0.9204***	0.7916***	0.8167***
	(0.1433)	(0.2015)	(0.2176)
Licensing - MinO	0.4418**	0.4308**	0.4266**
	(0.1979)	(0.1898)	(0.1829)
Licensing - ModO	0.0322	0.0714	0.0681
	(0.1926)	(0.1919)	(0.1835)
Licensing - MajO	-0.0423	0.0086	-0.0150
	(0.3117)	(0.2983)	(0.3087)
Licensing - SevO	-0.6707*	-0.6592*	-0.6861*
	(0.3648)	(0.3700)	(0.3931)
Courts - MinO	-0.0573	-0.0109	-0.0187
	(0.2407)	(0.2183)	(0.2146)
Courts - ModO	-0.4094	-0.3998	-0.4134
	(0.4277)	(0.4103)	(0.4214)
Courts - MajO	0.4549***	0.4976***	0.4908***
	(0.1441)	(0.1721)	(0.1780)
Courts - SevO	0.4275***	0.4567***	0.4839***
	(0.0795)	(0.0910)	(0.1277)
RZI (Rajan Zingales)		-0.4011***	-0.8098***
		(0.0597)	(0.1425)
Finance MinO*RZI			0.3375**
			(0.1526)
Finance ModO*RZI			0.6940**
			(0.2706)
Finance MajO*RZI			0.4502*
			(0.2402)
Finance SevO*RZI			0.3855**
			(0.1866)
Cut1	0.0323	-0.0331	-0.1789
	(0.3425)	(0.3307)	(0.3427)
Cut2	0.8845**	0.8255**	0.6807*
	(0.3607)	(0.3469)	(0.3623)
Cut3	2.0730***	2.0193***	1.8751***
	(0.3202)	(0.3094)	(0.3143)
Cut4	3.3966***	3.3441***	3.2023***
	(0.3177)	(0.3118)	(0.3025)
Country dummies	Y	Y	Y
Industry dummies	Y	N	N
Year dummies	Y	Y	Y
No. of countries	85	85	85
Observations	22,031	22,031	22,031
Pseudo R2	0.112	0.114	0.115

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The estimation is based on cross-sectional data of manufacturing firms and includes a full set of country and year dummies. The pooled sample period is 2006 to 2011. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. For the Rajan Zingales Index (RZI), see table F.2 in Appendix F. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 8: Percent Changes in the Odds

Variable	Percent changes in the odds (%)
Finance - MinO	33.0
Finance - ModO	45.2
Finance - MajO	40.6
Finance - SevO	174.4
Small	-0.5
Large	-36.0
Small city	18.9
Capital	-4.8
Age	0.3
Foreign	16.7
Part of larger firm	16.1
Export	-29.5
Female	2.6
Experience	0.5
Labor productivity	3.4
Corruption - MinO	5.5
Corruption - ModO	23.9
Corruption - Majo	67.5
Corruption - SevO	120.3
Tax rates - MinO	11.7
Tax rates - ModO	2.0
Tax rates - MajO	6.1
Tax rates - SevO	30.9
Tax administration - MinO	-6.1
Tax administration - ModO	17.9
Tax administration - MajO	48.0
Tax administration - SevO	22.3
Labor regulations - MinO	10.1
Labor regulations - ModO	21.2
Labor regulations - MajO	23.8
Labor regulations - SevO	160.6
Business licensing - MinO	18.8
Business licensing - ModO	8.5
Business licensing - MajO	10.0
Business licensing - SevO	-12.4
Courts - MinO	26.5
Courts - ModO	1.3
Courts - MajO	48.2
Courts - SevO	53.0

Note: Based on main specification in table 5, column 6.

Table 9: 'Fit' of Main Specification

Severity of informal competition	Average predicted probabilities from main specification	Observed severity of informal competition
No obstacle	0.2989	0.3293
Minor obstacle	0.1645	0.1707
Moderate obstacle	0.2242	0.2179
Major obstacle	0.1750	0.1614
Very severe obstacle	0.1374	0.1207

Table 10: Discrete Changes for Ideal Firm Type I

		Informal competition				
	Average change	NoO	MinO	ModO	MajO	SevO
Panel A: All business constraints set to 'very severe obstacle'						
Finance - SevO	0.0981	-0.0467	-0.0490	-0.1000	-0.0496	0.2453
Large	0.0444	0.0155	0.0175	0.0419	0.0360	-0.1109
Export	0.0343	0.0114	0.0130	0.0319	0.0295	-0.0859
Female	0.0019	-0.0006	-0.0006	-0.0017	-0.0019	0.0048
Corruption - SevO	0.0801	-0.0340	-0.0368	-0.0800	-0.0496	0.2003
Tax rates as - SevO	0.0270	-0.0086	-0.0098	-0.0245	-0.0239	0.0668
Tax admin. - SevO	0.0192	-0.0060	-0.0069	-0.0174	-0.0180	0.0481
Labor regulation - SevO	0.0932	-0.0429	-0.0455	-0.0946	-0.0501	0.2331
Licensing - SevO	0.0112	0.0031	0.0036	0.0097	0.0117	-0.0281
Courts - SevO	0.0413	-0.0142	-0.0161	-0.0387	-0.0341	0.1032
Predicted probabilities		0.0288	0.0362	0.1134	0.2484	0.5732
Panel B: All business constraints set to 'moderate obstacle'						
Finance - ModO	0.0369	-0.0773	-0.0150	0.0241	0.0390	0.0291
Large	0.0444	0.0945	0.0165	-0.0305	-0.0464	-0.0341
Export	0.0345	0.0718	0.0143	-0.0222	-0.0366	-0.0275
Female	0.0019	-0.0038	-0.0011	0.0009	0.0022	0.0018
Corruption - ModO	0.0220	-0.0447	-0.0103	0.0128	0.0237	0.0184
Tax rates - ModO	0.0020	-0.0040	-0.0011	0.0010	0.0022	0.0018
Tax admin. - ModO	0.0160	-0.0321	-0.0079	0.0088	0.0174	0.0137
Labor regulation - ModO	0.0197	-0.0397	-0.0094	0.0112	0.0213	0.0166
Licensing - ModO	0.0084	-0.0165	-0.0044	0.0043	0.0092	0.0074
Courts - ModO	0.0019	-0.0037	-0.0010	0.0009	0.0021	0.0017
Predicted probabilities		0.2607	0.1920	0.2681	0.1777	0.1015

Note: Based on main specification in table 5, column 6. Ideal firm type I is small, non-exporting, owned by a female national, not part of a larger firm, located in the capital. All other variables are set to their mean.

Table 11: Discrete Changes for Ideal Firm Type II

		Informal competition				
	Average change	NoO	MinO	ModO	MajO	SevO
Panel A: All business constraints set to 'very severe obstacle'						
Finance - SevO	0.0981	-0.0926	-0.0731	-0.0795	0.0497	0.1956
Large	0.0434	0.0216	0.0227	0.0457	0.0187	-0.1087
Export	0.0335	0.0175	0.0181	0.0357	0.0124	-0.0837
Female	0.0018	-0.0011	-0.0011	-0.0020	-0.0003	0.0046
Corruption - SevO	0.0786	-0.0684	-0.0574	-0.0705	0.0316	0.1647
Tax rates - SevO	0.0247	-0.0178	-0.0169	-0.0271	0.0013	0.0606
Tax admin. - SevO	0.0177	-0.0124	-0.0120	-0.0120	-0.0001	0.0443
Labor regulation - SevO	0.0928	-0.0856	-0.0688	-0.0775	0.0445	0.1874
Licensing - SevO	0.0110	0.0065	0.0065	0.0120	0.0025	-0.0275
Courts - SevO	0.0388	-0.0292	-0.0270	-0.0407	0.0060	0.0910
Predicted probabilities		0.0626	0.0728	0.1929	0.2980	0.3738
Panel B: All business constraints set to 'moderate obstacle'						
Finance - ModO	0.0369	-0.0922	0.0134	0.0382	0.0263	0.0143
Large	0.0427	0.1056	0.0012	-0.0417	-0.0401	-0.0250
Export	0.0331	0.0828	-0.0008	-0.0333	-0.0303	-0.0184
Female	0.0019	-0.0048	0.0004	0.0020	0.0016	0.0009
Corruption - ModO	0.0220	-0.0549	0.0065	0.0228	0.0165	0.0091
Tax rates - ModO	0.0023	-0.0057	0.0005	0.0023	0.0018	0.0010
Tax admin. - ModO	0.0159	-0.0398	0.0043	0.0165	0.0122	0.0068
Labor regulation - ModO	0.0196	0.0490	0.0056	0.0204	0.0148	0.0082
Licensing - ModO	0.0083	-0.0208	0.0020	0.0086	0.0065	0.0037
Courts - ModO	0.0019	-0.0047	0.0004	0.0020	0.0015	0.0009
Predicted probabilities		0.4425	0.2080	0.2027	0.0991	0.0478

Note: Based on main specification in table 5, column 6. Ideal firm type II is large, exporting, owned by a male national, not part of a larger firm, located in the capital. All other variables are set to their mean.

Table 12: Discrete Changes in a Moderately Constraining Environment

		Informal competition				
	Average change	NoO	MinO	ModO	MajO	SevO
Ideal firm type I						
Finance - SevO	0.0967	-0.1815	-0.0602	0.0287	0.1086	0.1044
Large	0.0415	0.0682	0.0333	0.0023	-0.0478	-0.0559
Export	0.0326	0.0512	0.0263	0.0039	-0.0366	-0.0448
Female	0.0019	-0.0026	-0.0016	-0.0006	0.0019	0.0028
Corruption - ModO	0.0211	-0.0314	-0.0171	-0.0043	0.0229	0.0299
Tax rates - ModO	0.0020	-0.0027	-0.0016	-0.0006	0.0020	0.0030
Tax admin. - ModO	0.0154	-0.0223	-0.0125	-0.0037	0.0165	0.0221
Labor regulation - ModO	0.0189	-0.0278	-0.0154	-0.0041	0.0204	0.0269
Licensing - ModO	0.0082	-0.0114	-0.0066	-0.0023	0.0085	0.0119
Courts - ModO	0.0412	-0.0473	-0.0326	-0.0231	0.0345	0.0686
Predicted probabilities		0.1565	0.1467	0.2728	0.2473	0.1768
Ideal firm type II						
Finance - SevO	0.0961	-0.2401	0.0055	0.0943	0.0867	0.0536
Large	0.0438	0.0836	0.0258	-0.0177	-0.0491	-0.0426
Export	0.0342	0.0664	0.0190	-0.0158	-0.0379	-0.0317
Female	0.0020	-0.0041	-0.0008	0.0012	0.0021	0.0016
Corruption - ModO	0.0220	-0.0478	-0.0072	0.0163	0.0226	0.0160
Tax rates - ModO	0.0020	-0.0043	-0.0008	0.0013	0.0022	0.0016
Tax admin. - ModO	0.0160	-0.0344	-0.0057	0.0115	0.0166	0.0119
Labor regulation - ModO	0.0197	-0.0428	-0.0066	0.0144	0.0203	0.0144
Licensing - ModO	0.0084	-0.0178	-0.0032	0.0057	0.0088	0.0065
Courts - ModO	0.0019	-0.0040	-0.0008	0.0013	0.0020	0.0015
Predicted probabilities		0.2944	0.2002	0.2587	0.1594	0.0871

Note: Based on main specification in table 5, column 6. Ideal firm type I is small, non-exporting, owned by a female national, not part of a larger firm, located in the capital. Ideal firm type II is large, exporting, owned by a male national, not part of a larger firm, located in the capital. All other variables are set to their mean.

Table 13: Robustness Check 1 - Objective Measure of Credit Constraints (CC)

Dependent variable: INFORMAL COMPETITION	
CC	0.0656**
	(0.0279)
Small	-0.0212
	(0.1503)
Large	-0.4582***
	(0.0584)
Small city	0.1406
	(0.1321)
Capital	-0.0720
	(0.1381)
Age	0.0026
	(0.0019)
Foreign	0.1734
	(0.2811)
Part	0.1485
	(0.1080)
Export	-0.3605***
	(0.1085)
Female	0.0427
	(0.0531)
Experience	0.0056
	(0.0038)
Labor productivity	0.0370
	(0.0414)
Corruption - MinO	0.0941
	(0.1232)
Corruption - ModO	0.2503*
	(0.1364)
Corruption - MajO	0.5358***
	(0.1202)
Corruption - SevO	0.8097***
	(0.1587)
Tax rates - MinO	0.1617
	(0.1214)
Tax rates - ModO	0.0503
	(0.1318)
Tax rates - MajO	0.0709
	(0.1253)
Tax rates - SevO	0.3749*
	(0.2263)
Tax admin - MinO	-0.0777
	(0.0966)
Tax admin - ModO	0.1954
	(0.1221)
Tax admin - MajO	0.4222**
	(0.1999)
Tax admin - SevO	0.2828*
	(0.1461)
Labor - MinO	0.1098
	(0.1142)
Labor - ModO	0.2004
	(0.1536)
Labor - MajO	0.2297
	(0.1623)
Labor - SevO	1.0522***

	(0.1226)
Licensing - MinO	0.2257**
	(0.1021)
Licensing - ModO	0.1396
	(0.1160)
Licensing - MajO	0.2195*
	(0.1178)
Licensing - SevO	-0.0540
	(0.2150)
Courts - MinO	0.2496*
	(0.1286)
Courts - ModO	0.0546
	(0.2721)
Courts - MajO	0.4008***
	(0.1169)
Courts - SevO	0.4398***
	(0.1023)
Cut1	-0.5449**
	(0.2542)
Cut2	0.2985
	(0.2577)
Cut3	1.4239***
	(0.2459)
Cut4	2.6401***
	(0.2462)
Country dummies	Y
Industry dummies	Y
Year dummies	Y
No. of countries	114
Observations	42,038
Pseudo R2	0.0783

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are non-credit constrained, medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. The omitted industry, country and year dummies are: Construction and transportation industry, Zimbabwe, 2011. The credit constrained measure is an ordinal variable that - based on hard data - groups firms into four categories: Non credit constrained, maybe credit constrained, partially credit constrained and fully credit constrained (see Appendix E). Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 14: Robustness Check 1 - Discrete Changes in Predicted Probabilities

		Informal competition				
	Average change	NoO	MinO	ModO	MajO	SevO
Ideal firm type I						
Fully credit constrained	0.0264	-0.0106	-0.0115	-0.0258	-0.0183	0.0661
Large	0.0464	0.0206	0.0218	0.0465	0.0271	-0.1160
Export	0.0351	0.0147	0.0158	0.0347	0.0227	-0.0879
Female	0.0040	-0.0014	-0.0016	-0.0038	-0.0032	0.0100
Corruption - SevO	0.0806	-0.0441	-0.0442	-0.0838	-0.0293	0.2015
Tax rates - SevO	0.0373	-0.0157	-0.0169	-0.0369	-0.0237	0.0932
Tax administration - SevO	0.0267	-0.0107	-0.0116	-0.0260	-0.0185	0.0667
Labor regulation - SevO	0.0990	-0.0621	-0.0596	-0.1039	-0.0220	0.2476
Business licensing - SevO	0.0035	0.0012	0.0014	0.0033	0.0030	-0.0088
Courts - SevO	0.0421	-0.0183	-0.0195	-0.0420	-0.0256	0.1053
Predicted probabilities		0.0365	0.0444	0.1322	0.2642	0.5226
Ideal firm type II						
Fully credit constrained	0.0258	-0.0222	-0.0187	-0.0236	0.0099	0.0545
Large	0.0436	0.0289	0.0278	0.0473	0.0050	-0.1090
Export	0.0324	0.0229	0.0216	0.0354	0.0011	-0.0810
Female	0.0038	-0.0030	-0.0027	-0.0039	0.0007	0.0088
Corruption - SevO	0.0827	-0.0890	-0.0632	-0.0545	0.0563	0.1504
Tax rates - SevO	0.0367	-0.0329	-0.0270	-0.0320	0.0165	0.0753
Tax administration - SevO	0.0260	-0.0224	-0.0189	-0.0237	0.0100	0.0550
Labor regulation - SevO	0.1034	-0.1225	-0.0797	-0.0564	0.0795	0.1791
Business licensing - SevO	0.0034	0.0026	0.0024	0.0034	-0.0006	-0.0078
Courts - SevO	0.0417	-0.0380	-0.0308	-0.0354	0.0199	0.0843
Predicted probabilities		0.0816	0.0895	0.2173	0.2933	0.3183

Note: Based on regression in table 13. Ideal firm type I is small, non-exporting, owned by a female national, not part of a larger firm, located in the capital. Ideal firm type II is large, exporting, owned by a male national, not part of a larger firm, located in the capital. All other variables are set to their mean.

Table 15: Robustness Check 2 - Adding More Variables

Dependent variable: INFORMAL COMPETITION	(1) Main specification for this sample	(2)
Finance - MinO	0.3107***	0.2231**
	(0.0963)	(0.0981)
Finance - ModO	0.3952***	0.2711**
	(0.0910)	(0.1133)
Finance - MajO	0.4551***	0.3045**
	(0.1382)	(0.1408)
Finance - SevO	1.0519***	0.9175***
	(0.2463)	(0.2723)
Small	-0.0557	-0.0332
	(0.1551)	(0.1439)
Large	-0.4659***	-0.4511***
	(0.0584)	(0.0494)
Small city	0.2089	0.1674
	(0.1523)	(0.1731)
Capital	-0.0639	-0.0989
	(0.1541)	(0.1385)
Age	0.0044***	0.0029
	(0.0013)	(0.0022)
Foreign	0.2086	0.1401
	(0.2741)	(0.2152)
Part	0.0558	0.0402
	(0.1134)	(0.1030)
Export	-0.3962***	-0.4400***
	(0.1240)	(0.1395)
Female	-0.0030	-0.0086
	(0.0798)	(0.0873)
Experience	0.0056*	0.0066
	(0.0032)	(0.0044)
Labor productivity	0.0445	0.0279
	(0.0410)	(0.0369)
Corruption - MinO	0.0934	-0.0254
	(0.1178)	(0.1344)
Corruption - ModO	0.2801*	0.0893
	(0.1452)	(0.1699)
Corruption - MajO	0.6158***	0.3400**
	(0.1292)	(0.1592)
Corruption - SevO	0.9102***	0.6034***
	(0.1444)	(0.1585)
Tax rates - MinO	0.1756	0.1104
	(0.1144)	(0.1229)
Tax rates - ModO	0.0897	0.0094
	(0.1198)	(0.1289)
Tax rates - MajO	0.0147	-0.0825
	(0.1248)	(0.1142)
Tax rates - SevO	0.1638	0.0266
	(0.1613)	(0.1558)
Tax admin - MinO	-0.0765	-0.0687
	(0.0954)	(0.1013)
Tax admin - ModO	0.1409	0.1011
	(0.1175)	(0.1224)
Tax admin - MajO	0.4801*	0.3998
	(0.2761)	(0.2540)
Tax admin - SevO	0.2241	0.0799
	(0.1868)	(0.1628)

Labor - MinO	0.0207	-0.0641
	(0.0978)	(0.0935)
Labor - ModO	0.1196	0.0184
	(0.1386)	(0.1177)
Labor - MajO	0.1375	0.0023
	(0.1927)	(0.1902)
Labor - SevO	0.9023***	0.6116***
	(0.1201)	(0.1673)
Licensing - MinO	0.1230	0.0814
	(0.0863)	(0.1099)
Licensing - ModO	0.0418	-0.0501
	(0.1190)	(0.1186)
Licensing - MajO	0.1216	-0.0589
	(0.1254)	(0.1468)
Licensing - SevO	-0.0645	-0.1255
	(0.1974)	(0.1809)
Courts - MinO	0.2519*	0.1741
	(0.1481)	(0.1335)
Courts - ModO	0.0445	-0.0223
	(0.2621)	(0.2332)
Courts - MajO	0.4324**	0.3444*
	(0.1699)	(0.1905)
Courts - SevO	0.5075***	0.4082**
	(0.1368)	(0.1767)
Political instability - MinO		0.1849*
		(0.1093)
Political instability - ModO		0.4737***
		(0.1695)
Political instability - MajO		0.1555
		(0.1528)
Political instability - SevO		0.3518***
		(0.1322)
Crime - MinO		0.3449***
		(0.0738)
Crime - ModO		0.4993***
		(0.0900)
Crime - MajO		0.5775***
		(0.0767)
Crime - SevO		0.9475***
		(0.1565)
Customs and trade regulations - MinO		-0.0391
		(0.1351)
Customs and trade regulations - ModO		0.1988
		(0.1544)
Customs and trade regulations - MajO		0.4373**
		(0.2048)
Customs and trade regulations - SevO		0.5331*
		(0.2780)
Access to land - MinO		0.0993
		(0.1429)
Access to land - ModO		0.1770
		(0.1161)
Access to land - MajO		0.4890***
		(0.0974)
Access to land - SevO		0.2254*
		(0.1207)

Electricity - MinO		0.1870*
		(0.1104)
Electricity - ModO		0.2489**
		(0.1230)
Electricity - MajO		0.1063
		(0.1788)
Electricity - SevO		0.2024
		(0.1775)
Cut1	-0.2346	0.0575
	(0.2728)	(0.3812)
Cut2	0.6278**	0.9468**
	(0.2772)	(0.3961)
Cut3	1.7851***	2.1404***
	(0.2643)	(0.3735)
Cut4	3.0542***	3.4448***
	(0.2641)	(0.3451)
Country dummies	Y	Y
Industry dummies	Y	Y
Year dummies	Y	Y
No. of countries	114	114
Observations	38,052	38,052
Pseudo R2	0.0925	0.106

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing, courts, political instability, crime, customs and trade regulations, access to land and electricity as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. The omitted industry, country and year dummies are: Construction and transportation industry, Zimbabwe, 2011. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 16: Robustness Check 2 - Average Change in Predicted Probabilities

	Ideal Firm Type I	*Ideal Firm Type II*
Finance - SevO	0.0848	0.0886
Large	0.0391	0.0436
Export	0.0377	0.0422
Female	0.0012	0.0015
Corruption - SevO	0.0546	0.0608
Tax rates - SevO	0.0018	0.0022
Tax administration - SevO	0.0053	0.0066
Labor regulation - SevO	0.0541	0.0603
Business licensing - SevO	0.0084	0.0108
Courts - SevO	0.0333	0.0389
Political instability - SevO	0.0333	0.0388
Crime - SevO	0.0863	0.0899
Customs and trade regulations - SevO	0.0479	0.0541
Access to land - SevO	0.0198	0.0238
Electricity - SevO	0.0170	0.0206

Note: Based on regression in table 15, column 2. Ideal firm type I is small, non-exporting, owned by a female national, not part of a larger firm, located in the capital. Ideal firm type II is large, exporting, owned by a male national, not part of a larger firm, located in the capital. All other variables are set to their mean.

Table 17: Robustness Check 3 - Considering Only 'Truthful' Answers

Dependent variable: INFORMAL COMPETITION	(1) (Somewhat) truthful answers	(2) Truthful answers
Finance - MinO	0.3286***	0.2758***
	(0.0812)	(0.1026)
Finance - ModO	0.4263***	0.3986***
	(0.1038)	(0.0782)
Finance - MajO	0.3908**	0.3660***
	(0.1702)	(0.1344)
Finance - SevO	1.0657***	0.8316***
	(0.2643)	(0.1901)
Small	-0.0379	-0.1474
	(0.1519)	(0.1553)
Large	-0.4307***	-0.3895***
	(0.0468)	(0.0443)
Small city	0.1583	0.0790
	(0.1596)	(0.1405)
Capital	-0.0388	-0.1543
	(0.1575)	(0.2020)
Age	0.0050***	0.0061***
	(0.0014)	(0.0019)
Foreign	0.3820	0.4669*
	(0.2754)	(0.2827)
Part of larger firm	0.1772	0.0896
	(0.1155)	(0.0834)
Export	-0.3690***	-0.4060***
	(0.1383)	(0.1269)
Female	0.0158	-0.0347
	(0.0621)	(0.0601)
Experience	0.0041	0.0100
	(0.0047)	(0.0072)
Labor productivity	0.0362	0.0694*
	(0.0349)	(0.0390)
Corruption - MinO	0.1089	0.1948
	(0.1258)	(0.1346)
Corruption - ModO	0.2284	0.2617**
	(0.1539)	(0.1091)
Corruption - MajO	0.5556***	0.6355***
	(0.1253)	(0.1225)
Corruption - SevO	0.8501***	0.9877***
	(0.1768)	(0.1489)
Tax rates - MinO	0.1208	0.0856
	(0.1427)	(0.1311)
Tax rates - ModO	0.0365	0.0929
	(0.1554)	(0.1900)
Tax rates - MajO	0.0528	0.0675
	(0.1599)	(0.1628)
Tax rates - SevO	0.3108	0.3902*
	(0.2110)	(0.2367)
Tax admin - MinO	-0.0333	-0.1239
	(0.1064)	(0.1477)
Tax admin - ModO	0.1840	0.2239
	(0.1387)	(0.1589)
Tax admin - MajO	0.4131*	0.4547**
	(0.2173)	(0.2306)
Tax admin - SevO	0.1701	0.3156
	(0.1739)	(0.2614)

Labor - MinO	0.1533	0.1626
	(0.0971)	(0.1361)
Labor - ModO	0.1548	0.0111
	(0.1292)	(0.1821)
Labor - MajO	0.2296*	0.1517
	(0.1374)	(0.1950)
Labor - SevO	0.9015***	0.9968***
	(0.1138)	(0.1672)
Licensing - MinO	0.1636	0.1238
	(0.1165)	(0.1220)
Licensing - ModO	0.0806	0.0527
	(0.1135)	(0.0976)
Licensing - MajO	0.1170	0.2280*
	(0.1588)	(0.1313)
Licensing - SevO	0.0107	-0.1255
	(0.1542)	(0.1804)
Courts - MinO	0.2396	0.1548
	(0.1695)	(0.1510)
Courts - ModO	-0.0781	-0.3791
	(0.3410)	(0.4072)
Courts - MajO	0.4117***	0.4375***
	(0.1466)	(0.1578)
Courts - SevO	0.4177***	0.3247***
	(0.1038)	(0.1252)
Cut1	-0.0816	-0.2591
	(0.3027)	(0.3493)
Cut2	0.7793***	0.6001*
	(0.3001)	(0.3343)
Cut3	1.8438***	1.6605***
	(0.2966)	(0.3540)
Cut4	2.9972***	2.9016***
	(0.3176)	(0.4170)
Country dummies	Y	Y
Industry dummies	Y	Y
Year dummies	Y	Y
No. of countries	98	98
Observations	31,572	22,729
Pseudo R2	0.0890	0.105

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 98 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The first specification includes only 'somewhat truthful' and 'truthful' data and the second one only 'truthful' data, while the truthfulness was judged by the interviewer. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 18: Robustness Check 4 - Addressing Unobserved Firm Traits

Dep. variable: INFORMAL COMPETITION	(1) Firm >10 years	(2) Firm manager's experience >10 years	(3) Excl. firms that were rejected for loan	(4) Excl. small firms	(5) Excl. female-owned firms
Finance - MinO	0.2199*	0.2389***	0.2422***	0.4456***	0.3792***
	(0.1190)	(0.0812)	(0.0869)	(0.1208)	(0.0968)
Finance - ModO	0.4485***	0.3495***	0.3393***	0.4872***	0.4915***
	(0.1009)	(0.0933)	(0.0876)	(0.0998)	(0.1050)
Finance - MajO	0.3108*	0.2970*	0.2927	0.3177**	0.4802***
	(0.1771)	(0.1667)	(0.1967)	(0.1502)	(0.1573)
Finance - SevO	0.9158***	1.0203***	0.8955***	1.2017***	0.8082***
	(0.1382)	(0.2511)	(0.1848)	(0.3358)	(0.1311)
Small	0.0104	-0.0744	0.0463		0.1365
	(0.1275)	(0.1148)	(0.1017)		(0.0930)
Large	-0.4910***	-0.3973***	-0.3631***	-0.5892***	-0.6974***
	(0.0805)	(0.0407)	(0.0494)	(0.2196)	(0.1769)
Small city	0.2026	0.2013	0.2158	0.4829*	0.3194*
	(0.1754)	(0.1815)	(0.1508)	(0.2723)	(0.1767)
Capital	-0.0974	-0.0407	-0.0339	-0.0643	0.0204
	(0.1339)	(0.1761)	(0.1750)	(0.0715)	(0.1491)
Age	-0.0004	0.0031	0.0035	0.0047***	0.0057**
	(0.0028)	(0.0019)	(0.0022)	(0.0014)	(0.0023)
Foreign	0.3925	0.2798	0.0269	0.1209	0.1775
	(0.3285)	(0.3311)	(0.1945)	(0.3423)	(0.3220)
Part of larger firm	0.2748***	0.1297*	0.0121	0.1353**	0.1734
	(0.0929)	(0.0684)	(0.1124)	(0.0564)	(0.1250)
Export	-0.4176**	-0.4284***	-0.3187***	-0.3988***	-0.4603***
	(0.1717)	(0.1281)	(0.1145)	(0.0837)	(0.1555)
Female	0.0311	0.0535	0.0939*	0.0035	
	(0.0508)	(0.0571)	(0.0535)	(0.0924)	
Experience	0.0089	0.0049	0.0068*	0.0064	-0.0001
	(0.0065)	(0.0032)	(0.0038)	(0.0052)	(0.0025)
Labor productivity	-0.0004	0.0457	0.0377	-0.3076	-0.0066
	(0.0463)	(0.0333)	(0.0385)	(0.4324)	(0.0369)
Corruption - MinO	0.3057***	0.1329	0.0776	0.3138**	0.0230
	(0.0967)	(0.1259)	(0.1243)	(0.1384)	(0.1334)
Corruption - ModO	0.3140**	0.2110	0.2725**	0.5443***	0.2571
	(0.1372)	(0.1462)	(0.1378)	(0.1519)	(0.1753)
Corruption - MajO	0.6677***	0.5247***	0.5435***	0.5729***	0.5748***
	(0.0948)	(0.1513)	(0.1094)	(0.2097)	(0.1398)
Corruption - SevO	0.8488***	0.7929***	0.8162***	0.6870**	0.7521***
	(0.1905)	(0.1538)	(0.1455)	(0.2820)	(0.2455)
Tax rates - MinO	0.0974	0.1942	0.1399	0.1094	0.1957
	(0.1013)	(0.1688)	(0.1123)	(0.1236)	(0.1328)
Tax rates - ModO	0.0393	0.0705	0.0939	0.0767	0.0452
	(0.1623)	(0.1523)	(0.1360)	(0.1596)	(0.1421)
Tax rates - MajO	-0.0534	0.1014	0.0767	0.4095**	0.0776
	(0.1512)	(0.1396)	(0.1427)	(0.1819)	(0.1772)
Tax rates - SevO	0.5249*	0.4310*	0.3757**	0.3488***	-0.0006
	(0.2890)	(0.2412)	(0.1806)	(0.1298)	(0.2226)
Tax admin - MinO	-0.2205*	-0.1348	-0.0472	0.1624*	-0.0463
	(0.1316)	(0.1050)	(0.0877)	(0.0903)	(0.0792)
Tax admin - ModO	0.0611	0.1195	0.1307	0.3536***	0.1411
	(0.1228)	(0.1242)	(0.1175)	(0.1175)	(0.1314)
Tax admin - MajO	0.4015	0.3781	0.3415*	0.6731*	0.2995
	(0.2783)	(0.2473)	(0.1786)	(0.3545)	(0.2378)

Tax admin - SevO	0.0621	-0.0063	0.1019	0.3723	0.3303
	(0.1542)	(0.1735)	(0.1539)	(0.2791)	(0.2301)
Labor - MinO	0.0893	0.1553	0.1296*	0.0202	0.2323**
	(0.1180)	(0.1250)	(0.0664)	(0.1523)	(0.1074)
Labor - ModO	0.2281**	0.2133	0.2387***	-0.1042	0.3613***
	(0.1058)	(0.1563)	(0.0803)	(0.2184)	(0.1066)
Labor - MajO	0.1032	0.2856**	0.3767***	0.0187	0.3270
	(0.1543)	(0.1364)	(0.0883)	(0.2452)	(0.2516)
Labor - SevO	0.9504***	1.0010***	0.9630***	1.5505***	1.2490***
	(0.1477)	(0.1649)	(0.1285)	(0.1552)	(0.1591)
Licensing - MinO	0.2905**	0.2125*	0.2074**	0.1508	0.1185
	(0.1202)	(0.1277)	(0.0916)	(0.1320)	(0.0872)
Licensing - ModO	0.2179*	0.0949	0.1107	0.1282	0.0351
	(0.1162)	(0.1307)	(0.0868)	(0.1225)	(0.1361)
Licensing - MajO	0.1584	0.0939	0.0507	-0.1221	0.1764
	(0.1224)	(0.1610)	(0.1465)	(0.2186)	(0.1463)
Licensing - SevO	-0.0816	-0.1089	-0.1368	0.1316	0.0418
	(0.1803)	(0.2087)	(0.2162)	(0.2829)	(0.2348)
Courts - MinO	0.1744	0.1538	0.1938	0.1118	0.3561***
	(0.1349)	(0.1788)	(0.1242)	(0.1026)	(0.1363)
Courts - ModO	-0.1123	-0.0815	-0.0198	-0.2646	0.0651
	(0.2639)	(0.3411)	(0.2956)	(0.2810)	(0.2672)
Courts - MajO	0.3802**	0.4020**	0.4388***	0.5910***	0.2768
	(0.1822)	(0.1795)	(0.1496)	(0.1742)	(0.1839)
Courts - SevO	0.4579***	0.4161***	0.3468***	0.6777***	0.5416*
	(0.1556)	(0.1064)	(0.1109)	(0.2035)	(0.3119)
Cut1	-0.4493	-0.1652	-0.1807	0.1782	-0.1837
	(0.2848)	(0.2330)	(0.2756)	(0.2516)	(0.3331)
Cut2	0.4486	0.6412**	0.6678**	1.1030***	0.7726**
	(0.2826)	(0.2492)	(0.2749)	(0.2644)	(0.3360)
Cut3	1.5593***	1.8103***	1.8161***	2.3623***	1.8439***
	(0.2896)	(0.2523)	(0.2704)	(0.2651)	(0.3196)
Cut4	2.8518***	3.0540***	3.0579***	3.6981***	3.1460***
	(0.3189)	(0.2739)	(0.2792)	(0.3041)	(0.3327)
Country dummies	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y
No. of countries	114	114	114	114	114
Observations	28,769	31,767	38,981	22,583	26,953
Pseudo R2	0.0961	0.0886	0.0801	0.134	0.100

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 19: Robustness Check 5 - Controlling for Unobserved Heterogeneity in Firms' Productivity

Dependent variable: INFORMAL COMPETITION	(1) Main specification for this sample	(2) Incl. residual from production function
Finance - MinO	0.5596**	0.4834**
	(0.2569)	(0.1905)
Finance - ModO	0.5151***	0.5770***
	(0.1200)	(0.1465)
Finance - MajO	0.5744***	0.6667***
	(0.1665)	(0.2526)
Finance - SevO	1.2055***	1.2792***
	(0.1316)	(0.1906)
Small	0.1383	0.0525
	(0.1480)	(0.1812)
Large	-0.5089***	-0.5554***
	(0.0926)	(0.1080)
Small city	0.5597***	0.6768**
	(0.1886)	(0.2659)
Capital	0.0515	0.1064
	(0.1423)	(0.1880)
Age	0.0040**	0.0043***
	(0.0017)	(0.0016)
Foreign	0.2413	0.2955
	(0.4870)	(0.5381)
Part of larger firm	0.4903***	0.4813***
	(0.0735)	(0.0662)
Export	-0.5416**	-0.4824***
	(0.2204)	(0.1787)
Female	-0.0845	-0.0791
	(0.1573)	(0.1617)
Experience	0.0065**	0.0080*
	(0.0033)	(0.0041)
Labor productivity	-0.1792*	-0.0973
	(0.1054)	(0.0883)
Corruption - MinO	0.1128	0.1808
	(0.1886)	(0.2399)
Corruption - ModO	0.6049**	0.6611**
	(0.2772)	(0.3283)
Corruption - MajO	0.6171***	0.6314***
	(0.1523)	(0.1579)
Corruption - SevO	0.9370***	1.0472***
	(0.1823)	(0.2040)
Tax rates - MinO	0.3191**	0.3178**
	(0.1301)	(0.1249)
Tax rates - ModO	0.5734**	0.5873**
	(0.2672)	(0.2777)
Tax rates - MajO	0.7244**	0.7103**
	(0.3030)	(0.2934)
Tax rates - SevO	0.7606**	0.6902***
	(0.3169)	(0.2655)
Tax admin - MinO	-0.0680	-0.0698
	(0.1846)	(0.1939)
Tax admin - ModO	-0.0207	-0.0970
	(0.1513)	(0.2157)
Tax admin - MajO	0.5677*	0.5665*
	(0.3428)	(0.3237)
Tax admin - SevO	0.4304	0.3248

	(0.2923)	(0.2371)
Labor - MinO	-0.0705	-0.0529
	(0.2793)	(0.2731)
Labor - ModO	-0.1443	-0.2396
	(0.2863)	(0.3800)
Labor - MajO	-0.6160	-0.5811
	(0.6212)	(0.6379)
Labor - SevO	0.9565***	1.0410***
	(0.2970)	(0.2922)
Licensing - MinO	0.4345*	0.3851**
	(0.2262)	(0.1665)
Licensing - ModO	-0.0189	0.0170
	(0.1732)	(0.1523)
Licensing - MajO	-0.0402	0.0212
	(0.2552)	(0.2263)
Licensing - SevO	-0.6352	-0.9130
	(0.6052)	(0.7535)
Courts - MinO	-0.3783	-0.3469
	(0.3408)	(0.2869)
Courts - ModO	-0.5517	-0.4446
	(0.4644)	(0.3737)
Courts - MajO	0.3739**	0.3211*
	(0.1642)	(0.1779)
Courts - SevO	0.2489*	0.2579**
	(0.1280)	(0.1179)
Residual		-0.2173**
		(0.0993)
Cut1	0.1995	0.3193
	(0.3785)	(0.3026)
Cut2	1.1136***	1.2430***
	(0.3871)	(0.3125)
Cut3	2.3628***	2.4997***
	(0.3459)	(0.2930)
Cut4	3.8150***	3.9768***
	(0.2976)	(0.3139)
Country dummies	Y	Y
Industry dummies	Y	Y
Year dummies	Y	Y
No. of countries	84	84
Observations	17,821	17,821
Pseudo R2	0.141	0.147

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011 and includes 84 countries. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. 'Residual' is the residual obtained from estimating a standard production function, see table F.3 in Appendix F. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 20: Robustness Check 6 - Controlling for the 'Kvetch' Factor

Dependent variable: INFORMAL COMPETITION_aa	
Finance_aa	0.1797**
	(0.0849)
Small	0.0512
	(0.0733)
Large	-0.4740***
	(0.0637)
Small city	0.0973
	(0.1936)
Capital	-0.1452
	(0.2038)
Age	0.0041*
	(0.0022)
Foreign	0.1596
	(0.2966)
Part of larger firm	0.2165
	(0.1444)
Export	-0.2961***
	(0.0757)
Female	-0.0073
	(0.1018)
Experience	0.0007
	(0.0025)
Labor productivity	0.0094
	(0.0375)
Corruption_aa	0.0771
	(0.0881)
Tax rates_aa	-0.2629**
	(0.1021)
Tax administration_aa	-0.1931**
	(0.0793)
Labor regulations_aa	0.0392
	(0.0647)
Business licensing_aa	-0.4574***
	(0.1685)
Courts_aa	-0.1194
	(0.1184)
Constant	0.3276
	(0.2224)
Country dummies	Y
Industry dummies	Y
Year dummies	Y
No. of countries	114
Observations	42,038
Pseudo R2	0.0781

Note: The estimated model is a binary logit model. The dependent variable equals one if the reported severity of informal competition is above the average level of reported constraints and zero otherwise. The same holds for all business constraints indicated by _aa (aa stands for above average). The pooled sample period is 2006 to 2011 and includes 114 countries and 15 industries. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank all business constraints below their average level of reported constraints. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 21: Robustness Check 7 - IV Approaches

Dependent variable: INFORMAL COMPETITION	(1) Linear IV	(2) Linear IV	(3) Binary Probit IV	(4) Ordered Probit IV
Finance (instrumented)	0.1727**	0.1727**	0.1745**	0.1083**
	(0.0864)	(0.0823)	(0.0720)	(0.0421)
Small	-0.0184	-0.0100	-0.0338	0.0059
	(0.0801)	(0.0773)	(0.0952)	(0.0636)
Large	-0.2682***	-0.2949***	-0.2613**	-0.3050***
	(0.0405)	(0.0432)	(0.1046)	(0.1017)
Small city	0.1192	0.1446	0.1162	0.1109*
	(0.1018)	(0.1165)	(0.0832)	(0.0587)
Capital	-0.0253	0.0089	0.1065	0.0768
	(0.0980)	(0.1101)	(0.0761)	(0.0495)
Age	0.0013	0.0008	0.0006	0.0004
	(0.0011)	(0.0013)	(0.0015)	(0.0021)
Foreign	0.0981	0.1232	0.3139	0.1160
	(0.1483)	(0.1327)	(0.2041)	(0.1146)
Part of larger firm	0.0887	0.1069	0.0670	0.0276
	(0.0625)	(0.0665)	(0.0569)	(0.0774)
Export	-0.2296***	-0.2376***	-0.1702*	-0.1613***
	(0.0652)	(0.0690)	(0.1023)	(0.0577)
Female	0.0432	0.0399	0.0528	0.0503
	(0.0292)	(0.0271)	(0.0470)	(0.0519)
Experience	0.0040	0.0032*	0.0051***	0.0013
	(0.0025)	(0.0019)	(0.0019)	(0.0024)
Labor productivity	0.0269	0.0385	0.0690***	0.0284
	(0.0253)	(0.0347)	(0.0242)	(0.0256)
Corruption - MinO	-0.0082		-0.1141	-0.0097
	(0.0733)		(0.0841)	(0.0699)
Corruption - ModO	0.0860		-0.1642	0.0968
	(0.0855)		(0.1015)	(0.0741)
Corruption - MajO	0.3093***		0.0411	0.2645***
	(0.0773)		(0.1071)	(0.0685)
Corruption - SevO	0.4941***		0.3337**	0.4297***
	(0.1115)		(0.1430)	(0.0810)
Tax rates - MinO	0.0462		0.0081	0.0798
	(0.0630)		(0.0715)	(0.0652)
Tax rates - ModO	0.0072		0.0387	0.0405
	(0.0705)		(0.1255)	(0.0658)
Tax rates - MajO	0.0004		-0.0078	-0.0042
	(0.0713)		(0.1044)	(0.0867)
Tax rates - SevO	0.1200		0.1838	0.1224
	(0.0831)		(0.1308)	(0.1113)
Tax admin - MinO	-0.0537		-0.0913	-0.0372
	(0.0575)		(0.1033)	(0.0673)
Tax admin - ModO	0.0869		-0.0271	0.0807
	(0.0866)		(0.0803)	(0.0723)
Tax admin - MajO	0.2630**		0.1270	0.2039**
	(0.1093)		(0.1279)	(0.0919)
Tax admin - SevO	0.1349		0.1148	0.1459
	(0.0851)		(0.1034)	(0.1438)
Labor - MinO	0.0478		-0.0353	0.0760
	(0.0693)		(0.0743)	(0.0519)
Labor - ModO	0.1296		-0.0091	0.1042
	(0.0952)		(0.1061)	(0.0639)
Labor - MajO	0.1022		-0.0956	0.0428
	(0.1161)		(0.0930)	(0.0887)
Labor - SevO	0.6433***		0.6201***	0.5780***

	(0.1187)		(0.1646)	(0.1567)
Licensing - MinO	0.1019*		0.1157	0.1031*
	(0.0543)		(0.0770)	(0.0577)
Licensing - ModO	0.0320		0.0046	0.0199
	(0.0628)		(0.0711)	(0.0665)
Licensing - MajO	0.0683		-0.0325	0.0016
	(0.0987)		(0.1162)	(0.1000)
Licensing - SevO	-0.0992		-0.0414	-0.1332
	(0.1243)		(0.0799)	(0.1465)
Courts - MinO	0.1331		0.1113	0.1167*
	(0.0947)		(0.0714)	(0.0665)
Courts - ModO	0.0084		-0.1013	0.0149
	(0.2001)		(0.2096)	(0.0757)
Courts - MajO	0.2552***		0.2304**	0.2162**
	(0.0759)		(0.0930)	(0.0907)
Courts - SevO	0.3199***		0.0136	0.2584**
	(0.0674)		(0.1434)	(0.1104)
Corruption (instr.)		0.0962***		
		(0.0325)		
Tax rates (instr.)		0.0287		
		(0.0445)		
Tax administration (instr.)		0.0836		
		(0.0545)		
Labor regulations (instr.)		0.1607***		
		(0.0592)		
Business licensing (instr.)		-0.0993		
		(0.0743)		
Courts (instr.)		0.1408***		
		(0.0403)		
Constant	1.1522***	1.0114***	-1.5838***	
	(0.2061)	(0.2335)	(0.2311)	
Cut1				-0.0932
				(0.1419)
Cut2				0.4008***
				(0.1442)
Cut3				1.0540***
				(0.1461)
Cut4				1.7260***
				(0.1506)
Country dummies	Y	Y	N	N
Industry dummies	Y	Y	N	N
Year dummies	Y	Y	Y	Y
No. of countries	114	114	114	114
Observations	42,038	42,038	42,038	42,038
R-squared	0.225	0.206		

Note: The dependent variable is the severity of informal competition. It is treated as a continuous variable ranging from 0 (no obstacle) to 4 (very severe obstacle) in the linear IV, as a binary variable which equals 1 if it takes the value of 4 in the binary probit IV model and as a discrete variable with five ordered outcomes in the ordered probit IV model. Finance is instrumented using country-industry-location-size averages of financial constraints. It is treated as a continuous variable in the linear and binary probit IV model and as a discrete variable with ordered outcomes in the ordered probit IV model. In the second linear IV, instruments have been added for six more business constraints. "Instr." stands for "instrumented". The estimation is based on cross-sectional data and includes year dummies in all three models and country and industry dummies in the linear IV model. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank the business constraints as 'no obstacle'. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 22: Robustness Check 9 - Exploring Regional Differences

Dependent variable: INFORMAL COMPETITION	(1) Africa	(2) Latin America and the Caribbean	(3) Eastern Europe and Central Asia
Finance - MinO	0.2546***	0.0680	0.3638**
	(0.0617)	(0.1083)	(0.1545)
Finance - ModO	0.2564***	0.3387***	0.4403***
	(0.0660)	(0.1186)	(0.1514)
Finance - MajO	0.7429***	0.0280	0.5441**
	(0.0802)	(0.1459)	(0.2176)
Finance - SevO	0.6939***	1.2673***	0.8011***
	(0.0880)	(0.1341)	(0.2077)
Small	0.6163***	-0.3204	0.0792
	(0.1515)	(0.3350)	(0.1083)
Large	-0.3028***	-0.5020***	-0.4312**
	(0.0449)	(0.1207)	(0.1759)
Small city	0.0864	0.4522*	-0.0913
	(0.2499)	(0.2491)	(0.1644)
Capital	-0.2880	-0.0551	-0.2257
	(0.1898)	(0.1443)	(0.1843)
Age	0.0087***	0.0017	0.0039
	(0.0030)	(0.0037)	(0.0041)
Foreign	0.0040	0.2605	-0.0421
	(0.0742)	(0.7791)	(0.1845)
Part of larger firm	-0.2509***	-0.0852	0.2017
	(0.0444)	(0.1544)	(0.1625)
Export	-0.2857***	-0.6564*	-0.2425*
	(0.0689)	(0.3910)	(0.1465)
Female	0.1101**	-0.1333	0.0603
	(0.0520)	(0.1008)	(0.0706)
Experience	-0.0010	0.0103*	-0.0044
	(0.0019)	(0.0059)	(0.0049)
Labor productivity	-0.1677**	0.1359	0.0089
	(0.0764)	(0.2000)	(0.0274)
Corruption - MinO	0.4863***	-0.0514	0.2690
	(0.0902)	(0.1972)	(0.1729)
Corruption - ModO	0.9378***	-0.0647	0.2672
	(0.1827)	(0.2543)	(0.1825)
Corruption - MajO	0.8690***	0.0753	0.7451***
	(0.0839)	(0.2805)	(0.2018)
Corruption - SevO	1.4434***	0.1976	1.0247***
	(0.3702)	(0.3778)	(0.2276)
Tax rates - MinO	0.3147***	0.8166***	-0.1420
	(0.0396)	(0.3091)	(0.2220)
Tax rates - ModO	0.3240***	0.6911	-0.3138
	(0.0654)	(0.4245)	(0.2202)
Tax rates - MajO	0.4046***	0.7048*	-0.1523
	(0.0907)	(0.3681)	(0.2413)
Tax rates - SevO	0.5617***	1.0914**	0.0589
	(0.2100)	(0.5296)	(0.2853)
Tax admin - MinO	0.3638***	-0.6097**	0.1215
	(0.1147)	(0.2493)	(0.1259)
Tax admin - ModO	0.2579*	-0.1722	0.5434**
	(0.1426)	(0.2235)	(0.2469)
Tax admin - MajO	0.0140	0.6870***	0.3918*
	(0.2621)	(0.2078)	(0.2008)
Tax admin - SevO	0.0817	0.2855	0.0738
	(0.2980)	(0.2154)	(0.2595)

Labor - MinO	0.0223	-0.7123*	0.3174**
	(0.0354)	(0.3795)	(0.1389)
Labor - ModO	0.1004*	-0.2218	0.1862
	(0.0558)	(0.2918)	(0.1199)
Labor - MajO	0.6199***	-0.3199	0.5429***
	(0.1142)	(0.2119)	(0.1607)
Labor - SevO	0.8479***	0.6199*	0.8346**
	(0.1937)	(0.3478)	(0.3471)
Licensing - MinO	0.2841***	0.4083***	0.0463
	(0.0549)	(0.1266)	(0.1316)
Licensing - ModO	0.3832***	-0.0587	0.2260
	(0.0869)	(0.1701)	(0.1677)
Licensing - MajO	0.4768***	-0.2273	0.3520
	(0.1822)	(0.2020)	(0.2162)
Licensing - SevO	0.9355***	-0.5777	0.1921
	(0.3213)	(0.4142)	(0.3174)
Courts - MinO	0.2213***	-0.0012	0.1735
	(0.0713)	(0.2308)	(0.1314)
Courts - ModO	0.2439*	-0.3574	-0.0401
	(0.1260)	(0.5118)	(0.1482)
Courts - MajO	0.0148	0.6379***	0.0555
	(0.1038)	(0.1662)	(0.1491)
Courts - SevO	0.1609	0.4785**	0.2727*
	(0.1808)	(0.2322)	(0.1592)
Cut1	0.6738*	0.9381**	0.1995
	(0.3981)	(0.4494)	(0.4194)
Cut2	1.7460***	1.8218***	1.0733***
	(0.4340)	(0.4580)	(0.3548)
Cut3	2.7306***	3.3015***	2.1502***
	(0.4972)	(0.4439)	(0.3358)
Cut4	3.9545***	4.8406***	3.2046***
	(0.5447)	(0.4525)	(0.3656)
Country dummies	Y	Y	Y
Industry dummies	Y	Y	Y
Year dummies	Y	Y	Y
No. of countries	39	31	30
Observations	9,646	10,762	7,107
Pseudo R2	0.133	0.132	0.0657

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The specifications are separately run for the three regions Africa, Latin America and the Caribbean, and Eastern Europe and Central Asia. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank access to finance, corruption, tax rates, tax administration, labor regulations, business licensing and courts as 'no obstacle'. MinO, ModO, MajO and SevO stand for minor obstacle, moderate obstacle, major obstacle and very severe obstacle, respectively. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 23: Robustness Check 9 - Average Change in Predicted Probabilities per Region

	AFR	LAC	ECA
Ideal firm type I			
Finance - SevO	0.0598	0.1074	0.0748
Large	0.0214	0.0484	0.0420
Export	0.0203	0.0619	0.0240
Female	0.0081	0.0133	0.0060
Corruption - SevO	0.1316	0.0214	0.0955
Tax rates - SevO	0.0446	0.0943	0.0059
Tax administration -SevO	0.0121	0.0298	0.0074
Labor regulation - SevO	0.0651	0.0592	0.0775
Business licensing - SevO	0.0769	0.0564	0.0190
Courts - SevO	0.0134	0.0460	0.0269
Ideal firm type II			
Finance - SevO	0.0699	0.1215	0.0780
Large	0.0287	0.0463	0.0415
Export	0.0273	0.0612	0.0237
Female	0.0114	0.0120	0.0060
Corruption - SevO	0.1336	0.0198	0.0974
Tax rates - SevO	0.0549	0.1033	0.0059
Tax administration - SevO	0.0167	0.0281	0.0074
Labor regulation - SevO	0.0748	0.0596	0.0810
Business licensing - SevO	0.0851	0.0529	0.0192
Courts - SevO	0.0186	0.0449	0.0272

Notes: Based on regressions in table 22. Ideal firm type I is small, non-exporting, owned by a female national, not part of a larger firm, located in the capital. Ideal firm type II is large, exporting, owned by a male national, not part of a larger firm, located in the capital. All other variables are set to their mean. AFR: Africa, LAC: Latin America and the Caribbean, ECA: Eastern Europe and Central Asia.

Appendix A - The World Bank Enterprise Surveys

The World Bank Enterprise Surveys (ES)[72] are the main data source for our research, as they provide all firm-level data, including measures of informal competition and access to finance. The ES have been conducted by the World Bank and its partners since 2002[73] in over 100 developing and transition countries and aim to provide insights into a country's business environment from the perspective of the firm. Data are collected in face-to-face interviews with firm managers and owners on topics including regulation and taxes, corruption, crime, informality, gender participation, access to finance, infrastructure, trade and labor. Questions either ask for (quantitative) objective facts about the firms' business activities or for (qualitative) subjective perceptions about business constraints. Responses on the aforementioned topics, combined with reported firm characteristics, allow to thoroughly explore the investment climate and link it to firm performance in and across countries.

The universe of the ES is the non-agricultural formal private economy and includes small, medium and large enterprises in the manufacturing sector, the service sector and the transportation and construction sectors. Firms with less than five employees and fully-government owned firms are excluded from the survey. The definition of the universe is uniform for all countries. A standardized global methodology has been implemented since 2006 in all regions and makes comparisons between economies possible. Three types of questionnaires have been designed: The 'Core' questionnaire is asked in all countries and all industries; the 'Manufacturing Module' and the 'Service Module' build on the 'Core' questionnaire and include additional questions relevant to the manufacturing and service sector respectively. A number of country-specific surveys that focus on a particular topic have been conducted as well but are not intended for cross-country comparisons. The sampling methodology[74] for the ES is stratified random sampling: All firms are first grouped within homogeneous groups ('strata') and then simple random samples, where each firm has the same probability of being selected, are drawn within each group. Stratified random sampling improves the precision of estimates for each of the strata. Three levels of stratification are used: Firm size, location, and business sector. Size stratification is defined by small (5-19 employees), medium (20-99 employees) and large (>99 employees) firms.

[72] See www.enterprisesurveys.org

[73] Precursors of the World Bank ES were the World Bank-EBRD Business Environment and Enterprise Performance Survey (BEEPS) for the transition countries, the World Business Environment Survey (WBES) for 80 countries in 1999/2000 and the Investment Climate Assessment (ICA) for almost 100 countries at the beginning of 2000s.

[74] See World Bank (2009).

Stratification by location is undertaken by selecting the main economic centers of a country. The degree of stratification by sector is determined by the size of the economy as measured by the Gross National Income (GNI) of each country. Very small economies with a GNI below $15 billion have two strata, the manufacturing sector and the rest of the non-agricultural economy. Small (GNI: $15-100 billion), medium-sized (GNI: $15-100 billion) and large (GNI >$500 billion) economies are stratified into manufacturing, retail and the rest of the non-agricultural economy, while the manufacturing sector is further divided into subsectors with four additional strata for medium-sized and six additional strata for large economies. The overall sample size for each country depends on the sample sizes for each level of stratification. Sample sizes vary between 150 and 1,320 firms per country. With survey rounds taking place in three years intervals in every region, the Enterprise Surveys aim to build a panel in order to track changes in the business environment and firm performances over time and across countries.

We use data from the ES for 114 countries over the period 2006 to 2011.[75] 19 of the countries were surveyed twice during the time period, 14 of which are Latin American countries, four are African countries and one is Eastern European.[76] For the countries surveyed twice we include both surveys in our analysis to maximize the number of observations. In a robustness check, we only include the latest survey round to show that the findings do not differ (see section 6.8). Note that we do not use panel data (see footnote 20).

[75] We do not use data from earlier periods because survey instruments of the ES were standardized in 2005/06.
[76] See table F.1 in Appendix F for a list of the countries included.

Appendix B - Interpreting Outputs of Non-Linear Models

The predicted probabilities for an observed Y[77] to fall into a certain outcome category m are given by

$$\begin{aligned} P(Y_{jkl} = m|X_{jkl}) &= P(c_{m-1} \leq Y^*_{jkl} < c_m|X_{jkl}) \\ &= P(c_{m-1} \leq X_{jkl}\theta + \varepsilon_{jkl} < c_m|X_{jkl}) \\ &= F(c_m - X_{jkl}\theta) - F(c_{m-1} - X_{jkl}\theta) \end{aligned} \quad \text{(B.1)}$$

(cf. equation (6)). Under the assumption of logistically distributed errors, the predicted probabilities for the five outcomes in our analysis are:[78]

$$\begin{aligned} P(Y_{jkl} = 0|X_{jkl}) &= \Lambda(c_1 - X_{jkl}\theta) \\ P(Y_{jkl} = 1|X_{jkl}) &= \Lambda(c_2 - X_{jkl}\theta) - \Lambda(c_1 - X_{jkl}\theta) \\ P(Y_{jkl} = 2|X_{jkl}) &= \Lambda(c_3 - X_{jkl}\theta) - \Lambda(c_2 - X_{jkl}\theta) \\ P(Y_{jkl} = 3|X_{jkl}) &= \Lambda(c_4 - X_{jkl}\theta) - \Lambda(c_3 - X_{jkl}\theta) \\ P(Y_{jkl} = 4|X_{jkl}) &= 1 - \Lambda(c_4 - X_{jkl}\theta) \end{aligned} \quad \text{(B.2)}$$

where $\Lambda(X_{jkl}\theta) = \frac{\exp(X_{jkl}\theta)}{1+\exp(X_{jkl}\theta)}$ is the logistic function and the sum of the predicted probabilities is unity.

The nonlinearity of the ordered response model makes interpretation of output more challenging than that of linear models. Whereas in linear models the effect of a change in an independent variable is usually constant regardless of its starting value or the level of the other independent variables, in nonlinear models the effect depends on the values of all variables in the model and is not equal to the estimated coefficient. If the estimated coefficients in an ordered response model were to be interpreted directly, they would represent the partial change in the latent variable Y^* with respect to X, holding all other variables constant, since the model is linear in Y^* (Long, 1997: 128). This interpretation is not very convenient, given that the latent variable rarely has a well-defined unit of measurement (Wooldridge, 2010: 566). The magnitude of the estimated coefficients does not have a direct interpretation but higher coefficients are indicative of higher partial changes. The sign of the coefficients indicates the direction of influence of an independent variable for

[77] In our analysis, Y is the degree of obstacle of informal competition (ranging from 'no obstacle' (0) to 'very severe obstacle' (4)) reported by firm j in industry k and country l.

[78] In STATA, the ordered response model typically does not have an intercept, since the intercept is assumed to be zero for the model to be identified. Other statistical packages report an intercept but set one of the cut points to zero. Neither the parameters nor the probabilities are affected by either assumption (Long 1997: 124).

the extreme outcomes *Y=0* and *Y=4*, while for the intermediate outcomes *Y=1,2,3* the sign must not necessarily show the direction of effect (Wooldridge, 2010: 656).

One way of interpreting results is to use **odds ratios**. This is only possible in the ordered logit model. Taking the exponential of each coefficient yields the odds of a higher outcome compared to a lower outcome for a unit increase in *X*, holding all other factors constant (see Long and Freese, 2006: 165ff.).

Another way of interpreting results is to calculate **predicted probabilities** of the possible outcomes and changes thereof. Predicted probabilities are obtained by using the equations in (B.2) and choosing values for the explanatory variables.

Measures of change demonstrate the change in predicted probabilities of an outcome in response to a change in one of the independent variables. Because of the nonlinearity of the model, measures of change in the outcome probabilities depend on the levels of *all* variables in the model. The independent variables are typically set to their mean or specific values are chosen for them. Measures of change for the ordered response model are marginal changes and discrete changes.

Marginal changes are shown by the tangent to the probability density function (p.d.f.) and are calculated by taking the derivative of the p.d.f. with respect to *X*, while specifying values for the other independent variables:

$$\frac{\partial P(Y_{jkl} = m|X_{jkl})}{\partial X_{jkl}} = \frac{\Lambda'(c_m - X_{jkl}\theta)}{\partial X_{jkl}} - \frac{\Lambda'(c_{m-1} - X_{jkl}\theta)}{\partial X_{jkl}} \qquad \text{(B.3)}$$

However, marginal changes do not exactly indicate the amount of change in the probability for a one unit change in the explanatory variable. Only when the p.d.f. is close to linear, do the marginal effects properly represent the effect of a one unit change in the independent variable on probabilities. In fact, marginal changes can lead to misleading results when the probability curve is changing rapidly or when an independent variable is a dummy variable (Long, 1997: 135; Long and Freese, 2006: 162).

Therefore, it is safer to calculate **discrete changes**, which is the change in the predicted probability for a change in x from a start value x_1 to an end value x_2, holding all other variables at specified values (see Long 1997: 136ff.; Long and Freese 2006: 163f.):

$$\frac{\Delta P(Y_{jkl} = m|X_{jkl})}{\Delta X_{jkl}} = P\left(Y_{jkl} = m\middle|X_{jkl}, x = x_2\right) - P\left(Y_{jkl} = m\middle|X_{jkl}, x = x_1\right) \qquad \text{(B.4)}$$

The value of the discrete change depends on the start level of the variable that is being changed, the amount of change in that variable and the level of all other variables in the model. For binary variables, the discrete change is calculated as the variable changes from 0 to 1. For continuous variables, the discrete change can be interpreted for a one-unit change centered around the mean, for a standard deviation change centered around the mean, or as the variable changes from its minimum to its maximum value. For our analysis, we primarily rely on discrete changes for interpretation, as the main variables of interest are binary.

Appendix C - Estimations Clustered by Country-Industry

Dependent variable: INFORMAL COMPETITION	(1) Incl. only firm characteristics	**(2) Main specification**	(3) RZI	(4) RZI and interactions
Finance - MinO	0.4167***	**0.2855*** **	0.2380*	0.1369
	(0.1047)	**(0.0996)**	(0.1339)	(0.1740)
Finance - ModO	0.6566***	**0.3727*** **	0.4575**	0.2323
	(0.1020)	**(0.1166)**	(0.1827)	(0.2064)
Finance - MajO	0.7311***	**0.3405** **	0.4743*	0.3453
	(0.1479)	**(0.1484)**	(0.2431)	(0.3365)
Finance - SevO	1.4712***	**1.0095*** **	1.4227***	1.3105***
	(0.2189)	**(0.2111)**	(0.3221)	(0.4069)
Small	-0.0303	**-0.0055**	-0.0732	-0.0889
	(0.1123)	**(0.1053)**	(0.2489)	(0.2468)
Large	-0.4181*	**-0.4463** **	-0.5936*	-0.5927**
	(0.2198)	**(0.1875)**	(0.3069)	(0.2993)
Small city	0.1679*	**0.1735***	0.5248***	0.5129***
	(0.0916)	**(0.0916)**	(0.1576)	(0.1522)
Capital	0.0153	**-0.0494**	0.1136	0.1054
	(0.0964)	**(0.0870)**	(0.1427)	(0.1382)
Age	0.0045	**0.0034**	0.0051	0.0046
	(0.0032)	**(0.0030)**	(0.0042)	(0.0046)
Foreign	0.2850	**0.1541**	0.3441	0.3331
	(0.2252)	**(0.1880)**	(0.3191)	(0.3141)
Part of larger firm	0.1041	**0.1489**	0.1867	0.1911
	(0.1363)	**(0.1357)**	(0.2572)	(0.2609)
Export	-0.2942***	**-0.3496*** **	-0.5417***	-0.5313***
	(0.1025)	**(0.0977)**	(0.1847)	(0.1834)
Female	0.0142	**0.0257**	0.0339	0.0302
	(0.0961)	**(0.0898)**	(0.1680)	(0.1697)
Experience	0.0036	**0.0048**	0.0044	0.0049
	(0.0033)	**(0.0036)**	(0.0039)	(0.0038)
Labor productivity	0.0269	**0.0338**	-0.0441	-0.0336
	(0.0392)	**(0.0391)**	(0.1475)	(0.1426)
Corruption - MinO		**0.0535**	0.1552	0.1630
		(0.1013)	(0.1506)	(0.1534)
Corruption - ModO		**0.2145**	0.5378**	0.5538**
		(0.1484)	(0.2472)	(0.2451)
Corruption - MajO		**0.5158*** **	0.6379***	0.6289***
		(0.1143)	(0.2059)	(0.2037)
Corruption - SevO		**0.7897*** **	0.9238***	0.9438***
		(0.1400)	(0.2450)	(0.2445)
Tax rates - MinO		**0.1111**	0.2390	0.2308
		(0.1161)	(0.1745)	(0.1730)
Tax rates - ModO		**0.0200**	0.4937***	0.4869***
		(0.1188)	(0.1731)	(0.1698)
Tax rates - MajO		**0.0592**	0.4906**	0.4567**
		(0.1384)	(0.1919)	(0.1841)
Tax rates - SevO		**0.2692**	0.8184**	0.7797**
		(0.2569)	(0.3594)	(0.3634)
Tax admin - MinO		**-0.0632**	-0.0631	-0.0622
		(0.1045)	(0.1825)	(0.1832)
Tax admin - ModO		**0.1648**	0.0164	0.0535
		(0.1165)	(0.1944)	(0.2112)
Tax admin - MajO		**0.3921** **	0.3109	0.3405
		(0.1560)	(0.2764)	(0.2802)
Tax admin - SevO		**0.2014**	0.2347	0.2737

		(0.2699)	(0.4138)	(0.4231)
Labor - MinO		**0.0963**	-0.1219	-0.1201
		(0.0952)	(0.1648)	(0.1651)
Labor - ModO		**0.1920**	-0.2101	-0.2219
		(0.1211)	(0.2600)	(0.2532)
Labor - MajO		**0.2138**	-0.2316	-0.2259
		(0.1610)	(0.3462)	(0.3502)
Labor - SevO		**0.9578*** **	0.7915**	0.8167**
		(0.2275)	(0.3771)	(0.3785)
Licensing - MinO		**0.1722***	0.4309***	0.4266***
		(0.0892)	(0.1320)	(0.1289)
Licensing - ModO		**0.0815**	0.0715	0.0682
		(0.1118)	(0.1856)	(0.1926)
Licensing - MajO		**0.0956**	0.0086	-0.0150
		(0.1540)	(0.2673)	(0.2792)
Licensing - SevO		**-0.1322**	-0.6592	-0.6861
		(0.3205)	(0.5660)	(0.5724)
Courts - MinO		**0.2349****	-0.0109	-0.0186
		(0.1024)	(0.1457)	(0.1489)
Courts - ModO		**0.0130**	-0.3999*	-0.4134*
		(0.1484)	(0.2357)	(0.2391)
Courts - MajO		**0.3934*** **	0.4976**	0.4908*
		(0.1489)	(0.2408)	(0.2529)
Courts - SevO		**0.4255*** **	0.4567*	0.4839**
		(0.1645)	(0.2360)	(0.2298)
RZI (Rajan Zingales)			-0.4014***	-0.8118***
			(0.1417)	(0.1801)
Finance MinO*RZI				0.3394
				(0.2471)
Finance ModO*RZI				0.6959***
				(0.2179)
Finance MajO*RZI				0.4522
				(0.5718)
Finance SevO*RZI				0.3874
				(0.4416)
Cut1	-0.5898**	**-0.2574**	-0.0326	-0.1788
	(0.2627)	**(0.3316)**	(0.5843)	(0.6133)
Cut2	0.2219	**0.5957***	0.8258	0.6807
	(0.2556)	**(0.3275)**	(0.5639)	(0.5912)
Cut3	1.2942***	**1.7358*** **	2.0197***	1.8751***
	(0.2605)	**(0.3324)**	(0.5863)	(0.6127)
Cut4	2.4599***	**2.9695*** **	3.3445***	3.2023***
	(0.2647)	**(0.3338)**	(0.5719)	(0.6003)
Country dummies	Y	**Y**	Y	Y
Industry dummies	Y	**Y**	N	N
Year dummies	Y	**Y**	Y	Y
No. of countries	114	**114**	85	85
Observations	42,038	**42,038**	22,031	22,031
Pseudo R2	0.0587	**0.0839**	0.114	0.115

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011. Columns 1, 2, 3, 4 correspond to the regressions in table 4b column 11, table 5 column 6, table 7 column 2 and table 7 column 3 with the notable difference that standard errors in this table are clustered by country-industry. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank all business constraints as 'no obstacle'. Heteroskedasticity-robust standard errors are clustered by country-industry and are represented in parentheses. The estimations are weighted by the inverse of firms' probability of selection; the weights were provided by the World Bank. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Appendix D - Unweighted Estimations

Dependent variable: INFORMAL COMPETITION	(1) Incl. only firm characteristics	**(2) Main specification**	(3) RZI	(4) RZI and interactions
Finance - MinO	0.3773***	**0.2134*** **	0.2197***	0.2251***
	(0.0482)	**(0.0437)**	(0.0652)	(0.0651)
Finance - ModO	0.6019***	**0.3279*** **	0.3325***	0.3736***
	(0.0466)	**(0.0416)**	(0.0658)	(0.0731)
Finance - MajO	0.8165***	**0.4131*** **	0.4108***	0.4690***
	(0.0578)	**(0.0473)**	(0.0747)	(0.0832)
Finance - SevO	1.1408***	**0.6584*** **	0.6558***	0.6668***
	(0.0678)	**(0.0577)**	(0.0799)	(0.0870)
Small	0.0443	**0.0945*** **	0.1555***	0.1560***
	(0.0350)	**(0.0335)**	(0.0520)	(0.0520)
Large	-0.1987***	**-0.2079*** **	-0.2098***	-0.2118***
	(0.0305)	**(0.0340)**	(0.0458)	(0.0457)
Small city	-0.0110	**-0.0033**	0.0255	0.0271
	(0.0547)	**(0.0539)**	(0.0592)	(0.0589)
Capital	0.0395	**-0.0008**	0.1000	0.1004
	(0.0587)	**(0.0582)**	(0.0686)	(0.0684)
Age	0.0043***	**0.0036*** **	0.0027***	0.0027***
	(0.0006)	**(0.0006)**	(0.0008)	(0.0008)
Foreign	-0.1606***	**-0.1773*** **	-0.2574***	-0.2603***
	(0.0331)	**(0.0334)**	(0.0483)	(0.0482)
Part of larger firm	0.0081	**-0.0193**	-0.0058	-0.0048
	(0.0393)	**(0.0371)**	(0.0589)	(0.0585)
Export	-0.3078***	**-0.3503*** **	-0.3586***	-0.3581***
	(0.0358)	**(0.0342)**	(0.0393)	(0.0392)
Female	0.0791***	**0.0760*** **	0.1483***	0.1491***
	(0.0235)	**(0.0214)**	(0.0304)	(0.0304)
Experience	0.0042***	**0.0034*** **	0.0015	0.0015
	(0.0011)	**(0.0011)**	(0.0013)	(0.0013)
Labor productivity	-0.0096	**0.0069**	-0.0425	-0.0433
	(0.0201)	**(0.0178)**	(0.0350)	(0.0350)
Corruption - MinO		**0.2678*** **	0.2949***	0.2946***
		(0.0369)	(0.0518)	(0.0522)
Corruption - ModO		**0.3999*** **	0.4262***	0.4246***
		(0.0459)	(0.0697)	(0.0698)
Corruption - MajO		**0.5792*** **	0.6001***	0.6008***
		(0.0500)	(0.0756)	(0.0756)
Corruption - SevO		**0.8855*** **	0.9225***	0.9225***
		(0.0683)	(0.1007)	(0.1004)
Tax rates - MinO		**0.0324**	0.0920*	0.0930*
		(0.0428)	(0.0547)	(0.0547)
Tax rates - ModO		**0.0975** **	0.2040***	0.2056***
		(0.0463)	(0.0657)	(0.0658)
Tax rates - MajO		**0.2679*** **	0.3802***	0.3819***
		(0.0504)	(0.0700)	(0.0701)
Tax rates - SevO		**0.4734*** **	0.5711***	0.5717***
		(0.0753)	(0.1044)	(0.1045)
Tax admin - MinO		**0.1029*** **	0.0869*	0.0857*
		(0.0349)	(0.0472)	(0.0475)
Tax admin - ModO		**0.0803** **	0.0469	0.0445
		(0.0348)	(0.0471)	(0.0471)
Tax admin - MajO		**0.1735*** **	0.1772***	0.1746***
		(0.0501)	(0.0673)	(0.0675)
Tax admin - SevO		**0.2648*** **	0.2111***	0.2109***

		(0.0668)	(0.0794)	(0.0795)
Labor - MinO		**0.1337*** **	0.1041	0.1035
		(0.0458)	(0.0667)	(0.0663)
Labor - ModO		**0.2696*** **	0.1950***	0.1956***
		(0.0437)	(0.0616)	(0.0613)
Labor - MajO		**0.4130*** **	0.3820***	0.3810***
		(0.0554)	(0.0643)	(0.0641)
Labor - SevO		**0.6819*** **	0.7242***	0.7227***
		(0.0712)	(0.0851)	(0.0851)
Licensing - MinO		**0.0487**	-0.0079	-0.0071
		(0.0349)	(0.0495)	(0.0493)
Licensing - ModO		**0.0643**	-0.0230	-0.0226
		(0.0395)	(0.0494)	(0.0493)
Licensing - MajO		**0.1555*** **	0.0579	0.0594
		(0.0434)	(0.0588)	(0.0589)
Licensing - SevO		**0.2523*** **	0.1077	0.1087
		(0.0703)	(0.0979)	(0.0979)
Courts - MinO		**0.1467*** **	0.1205**	0.1207**
		(0.0423)	(0.0598)	(0.0596)
Courts - ModO		**0.1122*** **	0.0899	0.0900
		(0.0435)	(0.0585)	(0.0584)
Courts - MajO		**0.1743*** **	0.1058	0.1057
		(0.0499)	(0.0720)	(0.0720)
Courts - SevO		**0.2156*** **	0.1427*	0.1415*
		(0.0598)	(0.0841)	(0.0847)
RZI (Rajan Zingales)			-0.2032***	-0.1340
			(0.0524)	(0.0818)
Finance MinO*RZI				-0.0148
				(0.1071)
Finance ModO*RZI				-0.1242
				(0.0917)
Finance MajO*RZI				-0.1875*
				(0.1062)
Finance SevO*RZI				-0.0270
				(0.1351)
Cut1	-0.6701***	**-0.1368**	-0.4331***	-0.4078***
	(0.0985)	**(0.1134)**	(0.1356)	(0.1323)
Cut2	0.1502	**0.7221*** **	0.4344***	0.4597***
	(0.0988)	**(0.1126)**	(0.1317)	(0.1279)
Cut3	1.1138***	**1.7387*** **	1.4639***	1.4895***
	(0.1044)	**(0.1120)**	(0.1204)	(0.1171)
Cut4	2.2493***	**2.9352*** **	2.6602***	2.6861***
	(0.1100)	**(0.1178)**	(0.1275)	(0.1239)
Country dummies	Y	**Y**	Y	Y
Industry dummies	Y	**Y**	N	N
Year dummies	Y	**Y**	Y	Y
No. of countries	114	**114**	85	85
Observations	42,038	**42,038**	22,031	22,031
Pseudo R2	0.0562	**0.0794**	0.0796	0.0797

Note: The estimated model is an ordered logit model with the severity of competition by the informal sector as the dependent variable. The pooled sample period is 2006 to 2011. Columns 1, 2, 3, 4 correspond to the regressions in table 4b column 11, table 5 column 6, table 7 column 2 and table 7 column 3 with the notable difference that the estimations in this table are unweighted. The reference categories are medium-sized, domestic, non-exporting, fully male-owned firms that are located in medium-sized cities, that are not part of a larger firm and that rank all business constraints as 'no obstacle'. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Appendix E - Measure of Credit Constraints (CC)

The four categories of credit constrained status are:[79]

1) **Fully credit constrained** firms are those that meet the following conditions simultaneously:
A. Did not use external sources[80] of finance for both working capital[81] and investments during the previous fiscal year;
B. Applied for a loan during the previous fiscal year:
C. Do not have a loan outstanding at the time of the survey which was disbursed during the last fiscal year or later.
Additionally, firms that fulfill the following criteria are fully credit constrained:
A. Did not use external sources of finance for both working capital and investments during the previous fiscal year;
B. Did not apply for a loan during the previous fiscal year;
C. Do not have an outstanding loan at the time of the survey;
D. The reason for not applying for a loan was other than having enough capital for the firm's needs. Some characteristics of the potential loan's terms and conditions deterred these firms from applying. It is thus concluded that they were rationed out of the market.

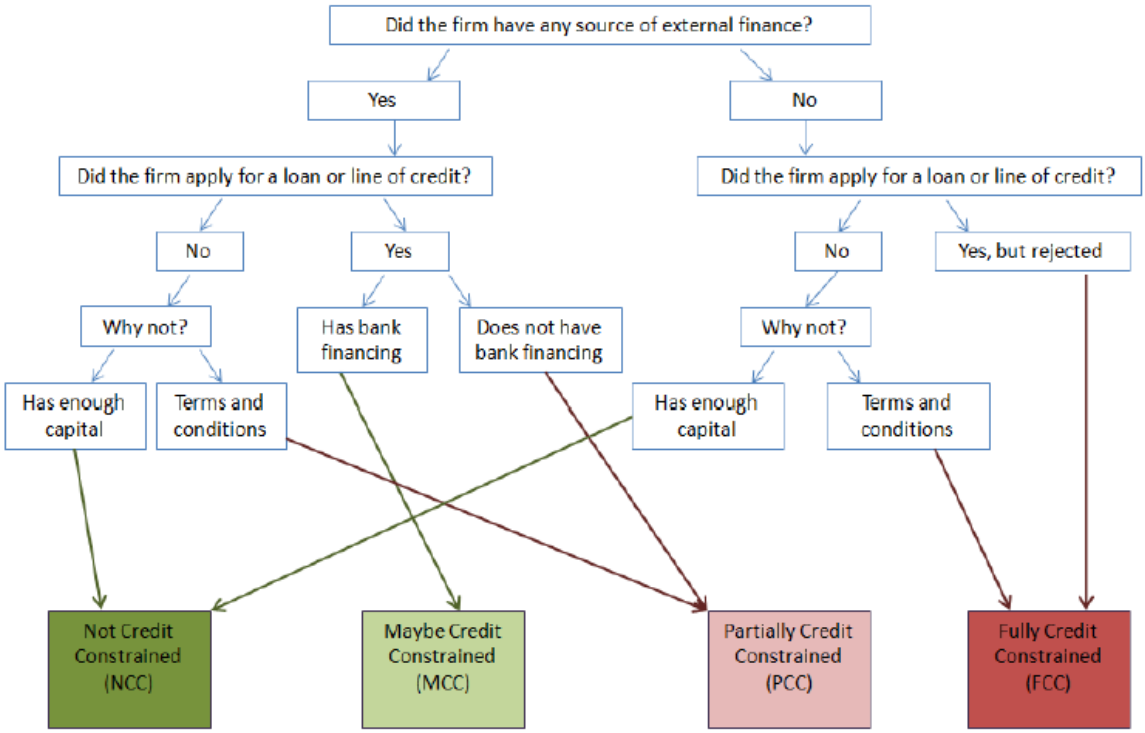
2) **Partially credit constrained (PCC)** firms include those that:
A. Used external sources of finance for working capital and/or investments during the previous fiscal year and/or have a loan outstanding at the time of the survey, and either;
B. Did not apply for a loan during the previous fiscal year and the reason for not applying for a loan was other than having enough capital for the firm's needs, or;
C. Applied for a loan but was rejected.

3) **Maybe credit constrained (MCC)** firms include those that:
A. Used external sources of finance for working capital and/or investments during the previous fiscal year and/or have a loan outstanding at the time of the survey;
B. Applied for a loan during the previous fiscal year.

4) **Non credit constrained (NCC)** firms meet the following criteria:
A. Did not apply for a loan during the previous fiscal year;
B. The reason for not applying for a loan was having enough capital for the firm's needs.

[79] Description adopted from Kuntchev et al. (2012: 9ff.).
[80] We excluded those observations for which the financing sources did not sum up to 100. If for one of the sources a value was missing, we filled that value so that the sources summed up to 100. For Venezuela in 2006, there is no differentiation between 'supplier credit' and 'other sources' of external financing for working capital (500 observations) and between 'supplier credit', 'new debt' and 'other sources' of external financing for investments (170 observations). For about 6,400 observations in the ECA region, there is no differentiation between external sources of financing 'borrowed from non-bank financial institutions', 'supplier credit' and 'other sources' of external financing for investment.
[81] The question on the use of external financing for working capital was not asked in ECA countries. A region-specific question on the use of credit from suppliers was used as a proxy. Although credit from suppliers does not capture the whole spectrum of external financing sources, it is the most commonly used source of external financing. Evidence shows that about 70 percent of firms use credit from suppliers (Kuntchev et al., 2012: 12).

Figure E. 1: Construction of the Measure of Credit Constrained Status (CC)



Source: Kuntchev et al. (2012: 20)

Appendix F - Miscellaneous

Table F. 1: List of Countries

Region	Country	Year	Number of firms
ECA	Albania	2007	147
AFR	Angola	2006	400
AFR	Angola	2010	179
LAC	Antigua and Barbuda	2010	112
LAC	Argentina	2006	727
LAC	Argentina	2010	848
ECA	Armenia	2009	226
ECA	Azerbaijan	2009	153
LAC	Bahamas	2010	98
LAC	Barbados	2010	97
ECA	Belarus	2008	130
LAC	Belize	2010	145
AFR	Benin	2009	92
LAC	Bolivia	2006	405
LAC	Bolivia	2010	180
ECA	Bosnia and Herzegovina	2009	242
AFR	Botswana	2006	332
AFR	Botswana	2010	203
LAC	Brazil	2009	1,043
ECA	Bulgaria	2007	782
ECA	Bulgaria	2009	140
AFR	Burkina Faso	2009	270
AFR	Burundi	2006	268
AFR	Cameroon	2009	302
AFR	Cape Verde	2009	101
AFR	Central African Republic	2011	126
AFR	Chad	2009	131
LAC	Chile	2006	759
LAC	Chile	2010	881
LAC	Colombia	2006	787
LAC	Colombia	2010	798
AFR	Congo	2009	34
LAC	Costa Rica	2010	371
ECA	Croatia	2007	400
ECA	Czech Republic	2009	138
AFR	Democratic Republic Congo	2006	338
AFR	Democratic Republic Congo	2010	211
LAC	Dominica	2010	136
LAC	Dominican Republic	2010	269

Region	Country	Year	Number of firms
LAC	Ecuador	2006	510
LAC	Ecuador	2010	306
LAC	El Salvador	2006	524
LAC	El Salvador	2010	268
AFR	Eritrea	2009	98
ECA	Estonia	2009	166
EAP	Fiji	2009	60
AFR	Gabon	2009	53
AFR	Gambia	2006	172
ECA	Georgia	2008	186
AFR	Ghana	2007	489
LAC	Grenada	2010	104
LAC	Guatemala	2006	425
LAC	Guatemala	2010	397
AFR	Guinea	2006	218
AFR	Guinea Bissau	2006	152
LAC	Guyana	2010	125
LAC	Honduras	2006	361
LAC	Honduras	2010	222
ECA	Hungary	2009	234
EAP	Indonesia	2009	605
MNA	Iraq	2011	563
AFR	Ivory Coast	2009	142
LAC	Jamaica	2010	191
ECA	Kazakhstan	2009	343
AFR	Kenya	2007	643
ECA	Kosovo	2009	119
ECA	Kyrgyz Republic	2009	163
EAP	Lao PDR	2009	164
ECA	Latvia	2009	204
AFR	Lesotho	2009	77
AFR	Liberia	2009	47
ECA	Lithuania	2009	195
ECA	Macedonia	2009	232
AFR	Madagascar	2009	220
AFR	Malawi	2009	113
AFR	Mali	2007	489
AFR	Mali	2010	109
AFR	Mauritania	2006	229
AFR	Mauritius	2009	141
LAC	Mexico	2006	1,022
LAC	Mexico	2010	1,268
ECA	Moldova	2009	202

Region	Country	Year	Number of firms
ECA	Mongolia	2009	199
ECA	Montenegro	2009	71
AFR	Mozambique	2007	463
AFR	Namibia	2006	311
SAR	Nepal	2009	310
LAC	Nicaragua	2006	385
LAC	Nicaragua	2010	240
AFR	Niger	2009	77
AFR	Pakistan	2007	470
LAC	Panama	2006	408
LAC	Panama	2010	166
LAC	Paraguay	2006	403
LAC	Paraguay	2010	280
LAC	Peru	2006	500
LAC	Peru	2010	868
EAP	Philippines	2009	788
ECA	Poland	2009	183
ECA	Romania	2009	188
ECA	Russia	2009	514
AFR	Rwanda	2006	209
EAP	Samoa	2009	50
AFR	Senegal	2007	504
ECA	Serbia	2009	293
AFR	Sierra Leone	2009	19
ECA	Slovak Republic	2009	155
ECA	Slovenia	2009	236
AFR	South Africa	2007	912
SAR	Sri Lanka	2011	407
LAC	St. Kitts and Nevis	2010	102
LAC	St. Lucia	2010	130
LAC	St. Vincent and the Grenadines	2010	100
LAC	Suriname	2010	152
AFR	Swaziland	2006	283
ECA	Tajikistan	2008	191
AFR	Tanzania	2006	406
EAP	Timor Leste	2009	103
AFR	Togo	2009	95
EAP	Tonga	2009	60
LAC	Trinidad and Tobago	2010	293
ECA	Turkey	2008	720
AFR	Uganda	2006	540
ECA	Ukraine	2008	429
LAC	Uruguay	2006	318

Region	Country	Year	Number of firms
LAC	Uruguay	2010	416
ECA	Uzbekistan	2008	308
EAP	Vanuatu	2009	85
LAC	Venezuela	2010	156
EAP	Vietnam	2009	778
MNA	Yemen	2010	205
AFR	Zambia	2007	479
AFR	Zimbabwe	2011	528
	World (114 countries)		42,038

Note: AFR stands for Africa, EAP for East Asia and Pacific, ECA for Eastern Europe and Central Asia, LAC for Latin America and the Caribbean, MNA for Middle East and North Africa and SAR for South Asia.

Table F. 2: Rajan Zingales Index (RZI)

ISIC	Sector	Number of firms in the sample	Rajan Zingales Index (RZI)
15	Manufacture of food products and beverages	5,247	0.14
16	Manufacture of tobacco products	43	-0.45
17	Manufacture of textiles	1,675	0.40
18	Manufacture of wearing apparel; dressing and dyeing of fur	3,169	0.003
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	400	-0.14
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	659	0.28
21	Manufacture of paper and paper products	235	0.18
22	Publishing, printing and reproduction of recorded media	618	0.20
23	Manufacture of coke, refined petroleum products and nuclear fuel	25	0.04
24	Manufacture of chemicals and chemical products	2,136	1.49
25	Manufacture of rubber and plastics products	1,096	0.23
26	Manufacture of other non-metallic mineral products	1,202	0.006
27	Manufacture of basic metals	328	0.09
28	Manufacture of fabricated metal products, except machinery and equipment	2,060	0.24
29	Manufacture of machinery and equipment n.e.c.	1,096	0.45
30	Manufacture of office, accounting and computing machinery	9	1.06
31	Manufacture of electriccal machinery and apparatus n.e.c.	390	0.77
32	Manufacture of radio, television and communication equipment and apparatus	102	1.04
33	Manufacture of medical, precision and optical instruments, watches and clocks	41	0.96
34	Manufacture of motor vehicles, trailers and semi-trailers	193	0.39
35	Manufacture of other transport equipment	60	0.31
36	Manufacture of furniture; manufacturing n.e.c.	1,247	0.24
	Total number of manufacturing firms	22,031	

Note: ISIC Classification based on Rev. 3.1 code D. Rajan Zingales Index taken from Rajan and Zingales (1998).

Table F. 3: Robustness Check 5 - Production Function

Dependent variable: LOGGED SALES	
Ln (sales in t-3)	0.6286***
	(0.0228)
Ln (L)	0.4520***
	(0.0283)
Ln (K)	0.1666***
	(0.0275)
Ln(H)	-0.0163
	(0.0101)
Constant	3.5215***
	(0.2354)
Country dummies	Y
Industry dummies	Y
Year dummies	Y
No. of countries	84
Observations	17,821
Adj. R-squared	0.881

Note: The model is estimated by OLS. The dependent variable is log of total annual sales, converted into international dollar using PPP exchange rates taken from the World Economic Outlook Database. Labor *L* is proxied by total employment, capital *K* by capacity utilization and human capital *H* by the share of skilled workers in the total number of full-time production workers. See table F.4 in Appendix F for a detailed description of the variables. The pooled sample period is 2006 to 2011. The estimation is based on cross-sectional data and includes a full set of industry, country and year dummies. The sample consists of manufacturing firms only, since the covariates were only available for these firms. Heteroskedasticity-robust standard errors are clustered by country and are represented in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table F. 4: List of Variables

Variable	Definition	Source
Firm-level data		
Firm size	*Question a6a*	ES
Small	Dummy=1 if firm has less than 20 employees	ES
Medium-sized	Dummy=1 if firm has 20-99 employees	ES
Large	Dummy=1 if firm has more than 99 employees	ES
Firm location	*Question a3*	ES
Small city	Dummy=1 if firm is located in a town/city with a population of less than 250,000	ES
Medium-sized city	Dummy=1 if firm is located in a city with a population of more than 250,000	ES
Capital	Dummy=1 if firm is located in the country's capital	ES
Firm age (logged)	Calculated as the difference between the year of the survey and the answer to *question b5:* In what year did this establishment begin operations in this country?	ES
Foreign	Dummy=1 if foreign ownership exceeds 10% Calculated from *question b2 (option b):* What percentage of this firm is owned by each of the following: Private domestic individuals, companies or organizations (b2a); Private foreign individuals, companies or organizations (b2b); Government/state (b2c); Other (b2d)	ES
Part of larger firm	Dummy=1 if firm is part of a larger firm *(question a7)*	ES
Export	Dummy=1 if revenues from national sales is below 90% Calculated from *question d3 (option a):* In the last fiscal year, what percent of this establishment's sales were: National sales (d3a); Indirect exports (d3b); Direct exports (d3c)	ES
Female	Dummy=1 if one of the firm owners is female *(questions b4 and b3a)* Missing values were filled with the following questions (in that order): *Question b3b:* Is the largest owner female? *Question b7a:* Is the top manager female?	ES
Experience	*Question b7:* How many years of experience working in this sector does the top manager have?	ES
Labor productivity	Log of total annual sales *(question d2)* over the total number of full-time employees, including both permanent *(question l1)* and temporary workers *(question l6)*, where temporary workers are weighted by their average length in months of employment *(question l8)* according to firm size	ES
Sales	*Question d2:* In the last fiscal year, what were this establishment's total annual sales?	ES
Sales three years ago	*Question n2:* Three fiscal years ago, what was total annual sales for this establishment?	ES
Total employment	Calculated from *Question l1:* At the end of the last fiscal year, how many permanent, full-time employees did this establishment employ? and *Question l6:* How many full-time temporary employees did this establishment employ in last fiscal year? Full-time, temporary workers are all paid short-term (i.e. for less than a fiscal year) employees with no guarantee of renewal of	ES

	employment contract and that work eight or more hours per day. Temporary workers are weighted by average length of employment. *Question l8:* What was the average length of employment of all full-time temporary employees in the last fiscal year?	
Capacity (for manufacturing firms only)	*Question f1:* In the last fiscal year, what was this establishment's current output in comparison with the maximum output possible using its facilities at the time? Measured in %.	ES
Share of skilled workers (for manufacturing firms only)	Calculated from *Question 4 (option a):* At the end of last fiscal year, how many permanent, full-time employees were: Skilled production workers (l4a); unskilled production workers (l4b). This as a share of total full-time production workers from *Question l3 (option a):* At the end of last fiscal year, how many permanent, full-time employees were: production workers (l3a); non-production workers (e.g. managers, administration, sales) (l3b)	ES
Obstacle: Competition by the informal sector	*Question e30:* Do you think that practices in the informal sector are No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of the firm?	ES
Obstacle: Access to finance	*Question k30:* Is access to financing, which includes availability and cost (interest rates, fees and collateral requirements), No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of the firm? Access to finance refers to both the availability of finance, and the cost of finance. Availability refers to how difficult it is to actually obtain a loan. Cost of finance refers to the price of the loan and the transaction costs that are necessary to fulfill the application and disbursement process (interest rates, fees, collateral premiums).	ES
Obstacle: Corruption	*Question j30f:* Is corruption No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Corruption refers to public corruption only. Therefore, it refers to the lack of transparency in government decisions, the extent to which government officials ask and are willing to accept informal payments, and the extent to which government contracts are offered to those with political connections.	ES
Obstacle: Tax rates	*Question j30a:* Are tax rates No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Tax rates refer to the actual amount of money that is paid in fulfilling tax obligations.	ES
Obstacle: Tax administration	*Question j30b:* Is the tax administration No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Tax administration refers to the manner in which tax obligations and regulatory requirements are enforced in practice (e.g. inspections, audits, red-tape, unclear regulations).	ES

Obstacle: Labor regulations	*Question l30a:* Are labor regulations No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment?	ES
Obstacle: Business licensing and permits	*Question j30c:* Are business licensing and permits No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Business licensing and permits refers to the document for which the establishment applies and a government agency dispatches as proof of official recognition that the establishment is allowed to carry out the activities required to carry out its business.	ES
Obstacle: Courts	*Question h30:* Is political instability No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment?	ES
Obstacle: Political instability	*Question j30d:* Is political instability No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Political instability refers to the predictability of political development and/or the predictability of the national government's direction.	ES
Obstacle: Crime	*Question i30:* Do you think that crime, theft and disorder are No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment?	ES
Obstacle: Customs and trade regulations	*Question d30b:* Do you think that customs and trade regulations are No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Customs and trade regulations refer to: Documents required to export/import goods; approvals, signatures or stamps that are required to export/import goods; terms of compliance for all procedures required to export/import goods	ES
Obstacle: Access to land	*Question g30a:* Do you think that access to land is No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Access to land refers to the possibility of buying or renting land, if the establishment needs to acquire it.	ES
Obstacle: Electricity	*Question c30:* Is electricity No Obstacle (0), a Minor Obstacle (1), a Moderate Obstacle (2), a Major Obstacle (3), or a Very Severe Obstacle (4) to the current operations of this establishment? Electricity refers to power supply received from the public grid. All aspects of that supply are being ascertained; its cost, quality, and dependability.	ES
Top obstacle	*Question m1a:* Please tell me the three obstacles that you think are currently the biggest problem, beginning with the worst of all three. Answer options: Access to finance (availability and cost);	ES

	access to land; business licensing and permits; corruption; courts; crime, theft and disorder; customs and trade regulations; electricity; inadequately educated workforce; labor regulations; political instability; practices of competitors in the informal sector; tax administration; tax rates; transportation of goods, supplies, and inputs	
Reason for non-application	*Question k17:* What was the main reason why this establishment did not apply for a line of credit or loan in the last fiscal year? Answer options: No need for a loan - establishment has sufficient capital; application procedures for loans or line of credit are complex; interest rates are not favorable; collateral requirements for loans or line of credit are unattainable; size of loan and maturity are insufficient; did not think it would be approved; other	ES
Credit constrained status (CC)	Developed by Kuntchev et al. (2012) The following question from the WBES were used: *Question k3:* Over the last fiscal year, please estimate the proportion of this establishment's working capital that was financed from each of the following sources: Internal funds/retained earnings (k3a); Borrowed from banks (private and state-owned) (k3bc); Borrowed from non-bank financial institutions (k3e); Purchases on credit from suppliers and advances from customers (k3f); Other (moneylenders, friends, relatives, etc.) (k3hd) Question k3 not available for ECA region; instead *question k1d:* In the last fiscal year, did this establishment purchase any material inputs or services and pay for them after delivery (on credit)? *Question k5:* Over the last fiscal year, please estimate the proportion of this establishment's purchase of fixed assets that was financed from each of the following sources? Internal funds/retained earnings (k5a); Borrowed from banks (private and state-owned) (k5bc); Borrowed from non-bank financial institutions (k5e); Purchases on credit from suppliers and advances from customers (k5f); Owners' contribution or issued new equity shares (k5i); Issued new debt (incl. commercial paper ad debentures) (k5j); Other (moneylenders, friends, relatives, etc.) (k5hd) *Question k8:* At this time, does this establishment have a line of credit or loan from a financial institution? *Question k16:* Going back to the past, in the last fiscal year, did this establishment apply for loans or lines of credit? *Question k17:* What was the main reason why this establishment did not apply for line of credit or loan in the last fiscal year? No need for a loan - establishment has sufficient capital; Application procedures for loans or line of credit are complex; Interest rates are not favorable; Collateral requirements for loans or line of credit are unattainable; Size of loan and maturity are insufficient; Did not think it would be approved; Other See Appendix E for a detailed description of the CC measure.	ES

Industry data		
Rajan Zingales Index (RZI)	The fraction of capital expenditures not financed with cash flows from operations for U.S. firms in the 1980s.	Rajan and Zingales (1998)
Macroeconomic data		
PPP exchange rate	Local currency unit per current international dollar	World Economic Outlook Database, April 2012 edition (by IMF)
Size of the informal sector	As share of official GDP, unweighted average for 1999-2007	Schneider (2010: 45-47)
Other data		
Bank finance for day-to-day operations	Dummy=1 if firm uses banks to finance day-to-day operations *Question k4e:* In the last year, have you financed the day-to-day operations of this business by using banks?	Informal Surveys (World Bank)
Bank finance for investments	Dummy=1 if firms uses banks to finance investments *Question k8e:* In the last year, have you financed this business' purchases of machinery, vehicles or other means of transport, equipment, land or buildings by using banks?	Informal Surveys (World Bank)
Benefit of registering	*Questions r7a:* What is the most important benefit for your business activity that could be obtained from registration? Answer options: Better access to financing; better access to raw materials; less bribes to pay; better legal foundations on the property rights of land and buildings; more access to government programs or services; better access to workers; better opportunities with formal firms; better access to markets; better access to infrastructure service	Informal Surveys (World Bank)
Top obstacle	*Questions m1a:* Which of the following elements of the business environment, if any, currently represents the biggest obstacle faced by this business? Answer options: Limited access to finance; restricted access to land; corruption; crime, theft and disorder; poor public infrastructure; inadequately educated workforce; political instability; difficult business registration procedures; workers are unreliable; poor health of workforce; limited demand for product or services	Informal Surveys (World Bank)

Note: The Enterprise Surveys and Informal Surveys are downloadable - once access is granted - under: https://www.enterprisesurveys.org/portal/. The last update of the Enterprise Surveys used in this paper was on May 7, 2012.