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# Binding Constraints: Does Firm Size Matter?

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## Abstract

Using Bolivian firm level data from the World Bank 2010 Enterprise Survey, we attempt to find evidence to support the idea that distinct formal firms (according to their size) have a distinct likelihood of facing obstacles. We propose that a potential endogeneity between firms' constraints and firm size should be considered.

After calculating estimations from an IV-ordered probit with an ordinal endogenous regressor, the results suggest that the firm size affects the constraint level reported by firms, but not for all kind of obstacles. 'Corruption', 'Political Instability', and 'Crime, Theft and Disorder' are obstacles which affect all firms; 'Electricity' and 'Transportation' are binding constraints to medium and large firms; and 'Access to Financing' is a binding constraint to small firms.

These findings are important because they can be directly extrapolated to public policy that is focused on the performance of firms.

**JEL Codes: D22, L25.**

**Keywords: Firm, Size, Constraints, IV-oprobit.**

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# 1 Introduction

The causes and effects of firm's behavior are a fruitful field in economic research. Recognizing that firms represent the primary unit of production process we should accept that public policy must be technically oriented to improve its performance. This paper attempts to bring new results on two branches of firm's empirical evidence: i) relationship between firm size and firms' constraints, and; ii) firms' binding constraints.

Our paper has two objectives. First, we seek to verify whether level of firms' constraints depends on firm's size (i.e. small firms reported that they face more problematic obstacles than large firms or medium firms). In terms of public policy, our evidence will support an answer to the question: how do policies demanded by small firms differ from those demanded by other entrepreneurs? Our revision of theory and empiric researchs on firm's size and firm's constraints (see section 2) suggest a potential endogeneity that should be considered between both variables. Sometimes, firm size could be affected by a firm's constraint, while some other times the firms' constraints are explained by firm size. Second, we examine which are the most binding constraints for Bolivian entrepreneurs distinguishing between small, medium, and large firms. Our approach to identify the most binding constraint is based on the likelihood of facing more trouble (conditional on firm size).

Using the World Bank Enterprise Survey (ES) 2010, we count on a sample for formal small, medium, and large firms in the three main cities of Bolivia. The ES is meant to be representative of non-agricultural private sector bolivian economy, excluding firms with less than 5 employees<sup>1</sup>. In this sample, each enterprise identifies the obstacle level (throughout an ordinal scale) associated to 16 potential constraints for the functioning of the firms. This set of constraints permit us to develop a diagnostic parallel to that of [14]Hausmann, Rodrick & Velasco (HRV) (2005), looking for identifying the binding constraints, taking into account distinct firms characteristics (with emphasis on firms size).

Besides, the ES database permits us to use a novel estimation method: the Conditional (Recursive) Mixed-Process Model (CMP). We use this method to estimate models for every potential obstacle firms face, considering constraint levels as functions of an ordinal regressor which is potentially endogenous (firm size). The CMP model allows us to find empirical evidence of the potential endogeneity described above, and it also permits us to answer (in presence of endogeneity) if size matters when explaining the firms' constraints (see section 4).

Our results suggest that firm size, and other firms' characteristics such as the ownership structure and industry matter when analyzing firm's constraints, but not for all the obstacles considered. This conclusion is valuable because it would imply that we should consider distinct public policy orientation for distinct firm character-

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<sup>1</sup>"The sample is consistently defined in all countries and includes the entire manufacturing sector, the services sector, and the transportation and construction sectors. Public utilities, government services, health care, and financial services sectors are not included in the sample." (World Bank, 2007)

istics. Also, we were able to identify that some constraints affect all kind of firms broadly, while some other constraints are specific by firm size; we compute an obstacle ranking which confirms that ‘Corruption’, ‘Informality’ and ‘Political Instability’ seem to be common obstacles to all firms, while public services provision would be a problem for medium and large firms, particularly ‘Electricity’ and ‘Transportation’ represent considerable obstacles for large firms and medium firms, and ‘Telecommunications’ for medium firms. Another fact worth of mentioning is that ‘Access to Financing’ would be an important obstacle only for small firms.

The outline of the paper is as follows: In section two, we briefly describe the state of art on research about the firm size and firms’ constraints causes and effects, and the background about binding constraints literature with scope on enterprises’ performance. Section three shows some descriptive statistics of the firms’ behavior in Bolivia. Fourth section details the specifications of the models proposed. Section five describes the results, and finally, section six summarizes the main findings.

## 2 Literature Review

We will begin our literature review showing main results on papers related with firm size and firm’s constraints. We support that there is enough evidence to suggest a potential endogeneity between both concepts. After that, we briefly review binding constraints literature, and show a framework able to support identification of Bolivian most binding firms’ constraints.

The analysis of firms’ constraints and the determinants of firm’s size are fields that have been taking importance in the last years. One of the reasons for this expansion might be the availability of panel data and cross section databases, almost exclusively designed for characterizing firms’ behavior. These two fields will be the scope of our research. Their importance is evident considering that firms are the primary unit of production and therefore their behavior and success will determine the output growth and success of the whole economy.

Firms’ constraints could be considered as external factors<sup>2</sup> which affect the decisions to become an entrepreneur and the firm success, but as we will support below, their effects are not necessarily homogeneous between distinct firm sizes nor exogenous. Analogously, the firm size could be considered as an endogenous decision of the firm, furthermore, it could be related with the firm’s constraints. Below, we briefly develop the state of art in both points: *firms’ constraints* and *firms’ size*. Our intention is to support the links between firm’s size with firm’s constraints, and its importance to determine the entrepreneur behavior and the entrepreneurship success.

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<sup>2</sup>As we will see in Section 4, we consider a set of firm’s perceptions that includes the following potential constraints: Infrastructure and Services (Electricity); Sales and Supplies (Transportation, Customs and Trade Regulations, Informality); Access to Land; Functioning of the Courts; Crime; Government Relations (Tax Rates, Tax Administration; Business Licensing, Macroeconomic Instability, Political Instability, Corruption); Financing; Labor (Labor Regulations, Inadequately Educated Workforce).

With regards the first point, firms' constraints have been studied from different methodologies and several regional and causal scopes. Some research papers identify firm's constraints as determinants of entrepreneurship or firm's performance, while some others study the determinants of these constraints. In the former group, [2] Ardagna and Lusardi (2008) (using micro dataset for thirty-seven developed and developing countries [GEM project]) focused on individual characteristics and on countries' regulatory differences - and by means of estimating probit and IV-probit models - find that entrepreneurship is determined by individual characteristics, and that these last ones could be affected by regulations. [16] Holtz-Eakin et al. (1994) find that inheritance (and inheritance size) affects the individual decision to become an entrepreneur. These findings would be consistent with the effects of liquidity constraints over entrepreneurship. Their results are based on individual tax returns data for U.S. which are the input for the estimation of a probit model where the dependent variable is the transition from wage earning into entrepreneur. In an approach similar to the previous, [18] Johansson (2000) uses the Longitudinal Employment Statistics of Finland between the years 1987-1995. His strategy was to estimate a probit model for the probability of making a transition from wage employment into self-employment. The results show that individual's level of wealth is a significant variable to explain this transition positively, thus suggesting the existence of liquidity constraints. On the other hand, [17] Hurst & Lusardi (2004) propose that the relationship between wealth and entry into entrepreneurship is essentially flat over the majority of the wealth distribution (below the 95 percentile), and there is no evidence that wealth matters more for businesses requiring higher initial capital. This shows, according to the authors, that liquidity constraints while possibly important for some households are not a major deterrent to small business formation in the United States, even though they could affect the optimal scale of the business.

But, the literature on firms' constraints is not only devoted to analyze financial restrictions. Some studies, as [24] Parker & van Praag (2005) emphasise the role of human capital on entrepreneurial performance. They develop a theoretical model which includes not only capital constraints but investment of founders in human capital, taking into account potential endogeneity between these variables. Their empirical approach estimates an instrumental variable model using a cross section sample of dutch entrepreneurs for the 1995 year. Their main findings are: there are evidence that supports treating human and financial capital as endogenous variables; lower capital constraints lead to greater entrepreneurial performance; more years of educations (human capital) is asociated with lower capital constraints; extra years of schooling enhance entrepreneurial performance.

Besides, firms' constraints were not only analyzed as determinants of change from wage earning into entrepreneur, but as determinants of the successful of the firms. For example, literature on credit constraints suggest ([12] Greenwald and Stiglitz 1993; [26] Schiantarelli 1995) that they can cause a misallocation of resources in firm production and affect firm's profitability. In this framework, Rizov (2004), using balance sheets and profit and loss counts for Bulgaria (between 1997 and 1999), shows that firms with credit constraints have smaller profitability. In a similar approach,

[13] Halabí and Lussier (2010), in a study for the Chilean economy estimate an ordered probit model, that shows that firms which face larger constraints (structural constraints such as internet use or financial constraints such as working capital) decrease their probability to succeed.

Nevertheless, despite what we mentioned so far, the attention to the firms' constraints is not only devoted to its analysis as an exogenous variable but as an endogenous one. In the theoretical field, [8] Clementi and Hopenhayn (2006) propose a dynamic model to derive endogenous borrowing constraints which arise as part of the optimal design of a lending contract under asymmetric information. From the empirical side, [15] Hobdari et al. (2009), using a panel data for Estonian companies between years 1993 to 2002, find that the probability of being financially constrained depends on the ownership status of the firms. In a similar fashion, [7] Canton et al. (2010) use the Eurobarometer data covering 25 European countries to estimate a binary logistic model to get insights about the determinants of perceived financing constraints. Their findings show that financing constraints<sup>3</sup> depends on firm's age while ownership structures do not seem to have a systematical effect.

Regarding to the second element of our approach - firm size - there are several papers treating it as an endogenous or exogenous variable of firm's performance. A first insight on the theme is found in the survey collected by [5] Bernardt & Muller (2000) about the determinants of firm size. They classify the basic determinants of firm size within two groups: one at the firm level (i.e. economies of scale, transaction costs, agency costs), and the other at the sectoral level (i.e. external economies of scale, network externalities); and also, they identify what they call *trends and structural changes in firm size*. This last item would consider the economic environment constraints or external factors, in our definition: firm's constraints. Also, an extensive analysis is found in [22] Kumar et al. (1999), where, from a 15 European countries sample, the authors identify some industrial and country characteristics that affect the firm size positively, namely: market size, capital intensive industries, high wage industries, industries that do a lot of R&D, industries that require little external financing, efficient judicial systems, better financial markets. Some other times research is focussed on the firms size as exogenous variable; for example, [23] Pagano and Schivardi (2003), from a dataset of eight European countries, found that larger size of firms fosters productivity growth because it allows firms to take advantage of all the increasing returns associated with R&D. They support the view that firm size has a causal positive impact on growth.

Until now, we implicitly suggested that firms size and firm's constraints could be likely independent variables, nevertheless there are evidence to suspect about this apparent non-relationship. The empirical literature recognizes explicitly the interdependence between firm's size and firm's constraints. In this way, [21] Kumar and Francisco (2005), in a study made for Brazil (using the Investment Climate

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<sup>3</sup>The dependent variable takes value 1 if the answer to: "Would you say that today, access to loans granted by banks is very easy, fairly easy, fairly difficult or very difficult?" is either "very difficult" or "fairly difficult" and takes value 0 if the answer is either "very easy" or "fairly easy".

Assesment Survey) found that firm size strongly affects access to credit, and that this effect would be greater for longer-term loans. Also they suggest that public financial institutions are more likely to lend to large firms. In their study, they estimate a probit model and a two step maximum likelihood probit with sample selection, both for the probability of having a loan.

The results of [21] Kumar and Francisco (2005) are also supported by those of [20] Kounouwewa and Chao (2011). In their article, based in information from the World Business Environment Survey (WBES) for 16 African countries, they find that firms size and ownership structure are usefulness classifications to explain financing constraints. Besides, they show that institutional development is the most important country characteristic explaining cross-country variation in firm's financing obstacles. Their methodological and empirical approach is supported by an ordered probit regression for the response to the question: How problematic is financing for the operation and growth of your business? (which can take one of four options: no obstacle, minor obstacle, moderate obstacle and major obstacle). The authors include, as explanatory variable, the size of the firm by including two dummy variables for medium size and large size firms. In the same scope, [4] Beck et al. (2005), using a database covering 54 countries from WBES, find that financial, legal, and corruption constraints depend on firm size, and smallest firms are most constrained.

Also, there are studies that suggest a reverse causality, from firm's constraints to firm's size. For instance, [1] Angelini and Generale (2005), from a survey dataset of Italian firms and the WBES, found some interesting stylized facts: there is a negative relationship between financial constraints and firm's size, and; this relationship is stronger in developing countries. [11] Fagiolo and Luzzi (2006), also for Italy, look for an answer to an almost identical question: Do liquidity constraints matter in explaining firm size and growth? Some of their findings, based in panel data for the manufacture sector, are: liquidity constraints have a negative effect on growth, ii) small firms grow more, even after controlling for liquidity constraints.

Finally, we can mention two theoretical approaches that make an effort to explain the potential effects of financial constraints over the firm's size: [9] Cooley and Quadrini (2001), and [6] Cabral and Mata (2003) suggest that financing constraints could explain the firm size distribution and evolution over the time. The first document, using a model with firm heterogeneity in which long-lived firms solve a dynamic intertemporal optimization problem, concludes that financial factors are crucial in differentiating the production and investment decisions of firms of different size and this generates dynamics of entry, exit and growth. The second paper constructs a two-period model of a competitive industry. In the first period firms face financial constraints while in the second period the firm is no longer subject to financing constraint. The authors calibrate the model for Portuguese manufacturing firms, and show that this model does a good job explaining the evolution of firm size distribution.

So far, we have revised evidence that supports the links between firm's size and firm's constraints with the performance and enterprise decisions. From this section it is clear that we should be aware to consider a potential endogeneity between the firm's

constraints and the firm's size when trying to evaluate if firm's perceived constraints depend on firms' size. Our contribution aims to take this issue into account.

Nevertheless, our research objective also aims to verify which are the most binding constraints for Bolivian enterprises. A theoretical framework to identify the most important obstacles for economies and entrepreneurs is found in [14]Hausmann et al. (2005). In fact, they propose that scarce growth is primarily due to low levels of private investment and entrepreneurship. Then, based on a simple theoretical model, they divide the factors affecting growth into two categories: High Cost of Financing, and Low Return to domestic investment. In turn, these two categories can be associated with more subfactors that could be explaining low growth (see subsection 4.1). One of the main conclusions of that paper is that policymakers should be concerned about the most binding constraints because governments face administrative and political limitations, so their strategies require a sense of priorities.

In an applied fashion, and following closely the [14]Haussman et al. approach, [10]Dinh et al. (2010) identify the most binding constraints on firms operations in developing countries. They use the World Bank Enterprise Survey between 2006-2010 and find that access to finance is among the most binding constraint, specially for small firms, which could play a significant part in explaining why small firms do not grow into medium and large firms. Empirically, they estimate three econometric models for explaining the employment growth of firms. Under their definition, the most binding constraint would be that which explains heavily the growth of firms, with a negative sign.

A similar exercise is found in [3]Aterido et al. (2009). Using the World Bank Enterprise Surveys between 2000-2006 for 90 countries, the authors seek to identify which firms characteristics are relevant to explain investment climate conditions focusing on 4 areas: access to finance, business regulations, corruption, and infrastructure. After that, they run multiple regression models to estimate the impact of investment climate conditions on firm's employment growth. Their main objective is to assess whether there are heterogeneous effects of unlocking business environment constraints. As we will see in section 4, our approach is very similar in the sense we try to verify if firm's characteristics (specially firm size) could rise the likelihood of facing more obstacles.

According to the framework of most of the papers considered in our review, next section introduces an empirical approach to understand and suggest evidence about bolivian firms and their constraints.

### **3 Some Stylized Facts for Bolivia**

This section briefly analyzes main characteristics of firm size, and firms' constraints in Bolivia. The questionnaire of the World Bank Enterprise Survey 2010 for Bolivia includes 16 potential issues that could be representing obstacles for the functioning



of the firms<sup>4</sup>, also it classifies firms in four categories: i) less than 5 workers, ii) small (between 5 and 19 workers), iii) medium (between 20 and 99 workers), and iv) large (more than 100 workers). Enterprise Survey Project collects information for several countries around the world. Table 1 compares Bolivian firms' structure, according to their firm size, with respect to some other regional countries. Results between countries are somewhat diverging, however they show a pyramid structure for some countries: Bolivia, Argentina, Peru, and Uruguay, with a lot proportion of small firms in the pyramid's base and a small share of large firms in the pyramid's peak. On the other hand, Chile and Mexico show a firm size structure which depends more heavily in medium and large firms.

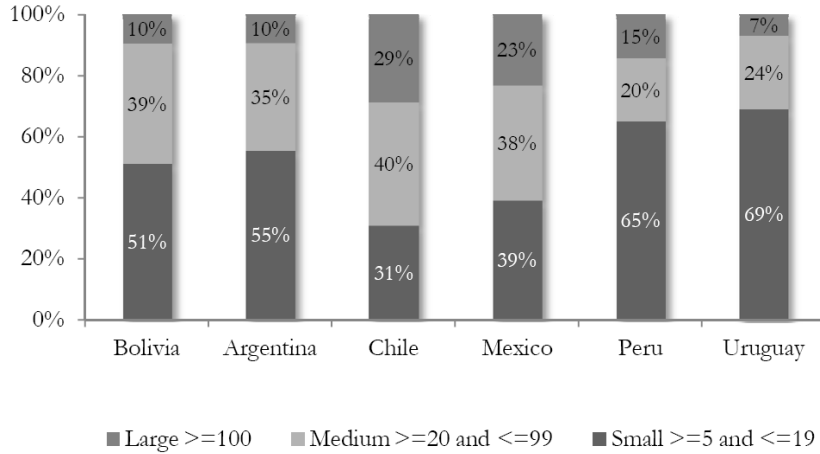


Figure 1. Distribution of Firms by Firm Size

Regarding firm's constraints, Figure 2 compares the share of firms identifying each obstacle as the worst for its functioning. It reveals that between the six regional countries included in the analysis, Bolivia has the worst perception about 'Practices of Competitors in the Informal Sector' and 'Political Instability'. If we take into account only the three worst obstacles for each country, we can find some common issues: 'Competitors Practices in the Informal Sector' represents a problem in 4 countries, Mexico(16%), Peru (29%), Uruguay (23%), and Bolivia (37%); 'Inadequately Educated Workforce' are perceived as a problem in Chile(22%), Perú (13%), Uruguay (12%), and Bolivia (12%); 'Tax Rates' are considered an important obstacle in Uruguay (24%), Argentina (20%), and Mexico (14%), and finally; 'Access to Financing' represent a constraint for the firms in Argentina (15%), Chile (12%), and Mexico (12%).

<sup>4</sup>Each one of these potential obstacles reports a perceived classification from firms in one of five options: No Obstacle, Minor Obstacle, Moderate Obstacle, Major Obstacle, and Very Severe Obstacle.

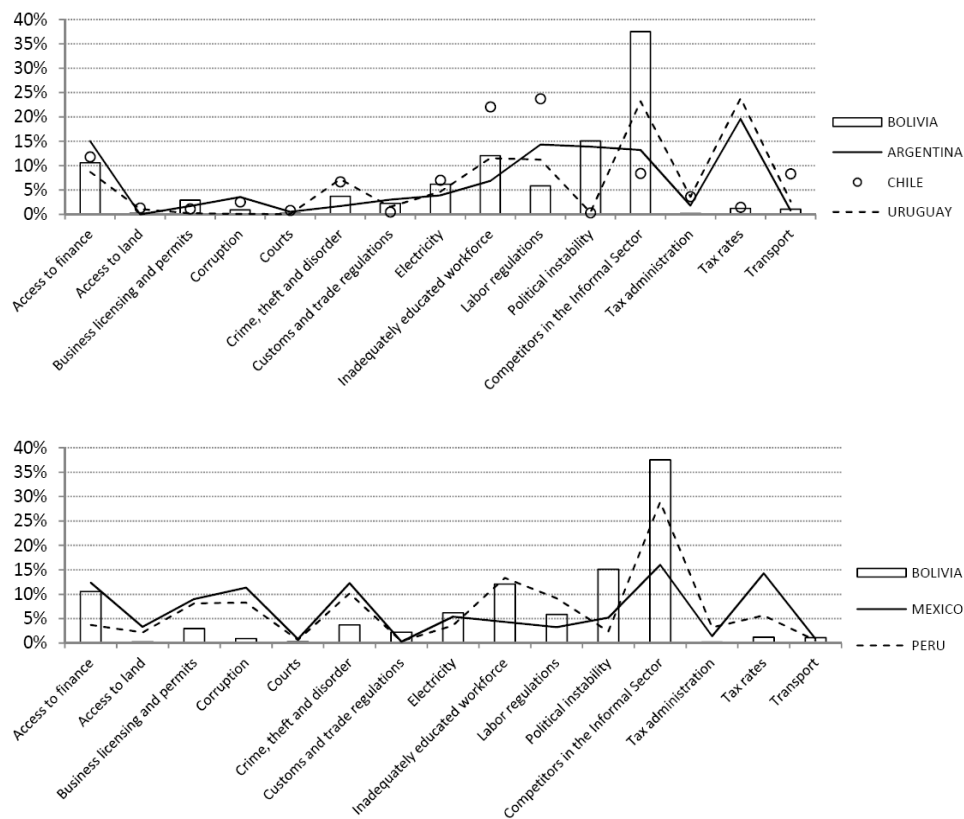


Figure 2. Business Environment Constraints for Firms in Selected Countries (% of firms)

Figure 3 shows the share of Bolivian firms that consider each element as a major or very severe obstacle. From this graphic, it is easy to identify the most conflictive elements: Corruption, Practices of Competitors in the Informal Sector, Political Instability, and Crime Theft and Disorder, in that order. In the other hand, it is possible to notice those elements that represent fewer problems to the firms: Tax Administration, Tax Rates, Business Licensing and Permits, and Access to Land.

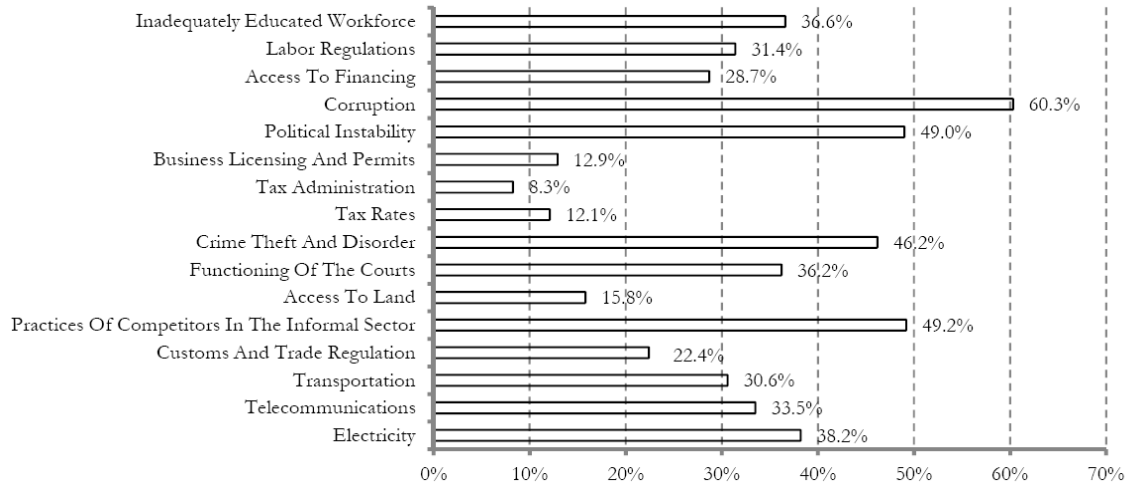


Figure 3. Proportion of Firms that Identify the Issue as a Major or Very Severe Obstacle

Now, our principal objective is far from only identify the main constraints that firms face, in fact we try to verify if each particular obstacle affects to the firms with distinct intensity according to the firm size. Our database contains a sample of 126 small and very small firms, 149 medium firms and 87 large firms. Initially, it is natural to believe that behavior between groups is not homogeneous, nevertheless, Table 1 suggests that the biggest problems are not common to all the firms taking into account the firm's size. In fact, only 2 of the top 5 rank of biggest obstacles are common between distinct firms size: Practices of Competitors in the Informal Sector, and Inadequately Educated Workforce.

<b>Proportion of Firms That First Ranked this Obstacle as the Biggest Problem for the Establishment</b>	
<b>Very Small and Small Firms</b>	
Practices Of Competitors In The Informal Sector	41.70%
Inadequately Educated Workforce	13.20%
Access To Financing	12.26%
Labor Regulations	7.10%
Electricity	5.82%
<b>Medium Firms</b>	
Political Instability	27.0%
Practices Of Competitors In The Informal Sector	25.8%
Inadequately Educated Workforce	14.0%
Access To Financing	11.3%
Electricity	8.9%
<b>Large Firms</b>	
Practices Of Competitors In The Informal Sector	59.1%
Political Instability	15.6%
Customs And Trade Regulation	8.6%
Labor Regulations	5.4%
Inadequately Educated Workforce	5.0%

*Table 1. Proportion of Firms That First Ranked this Obstacle as the Biggest Problem for the Establishment*

In order to get a second attempt about firm size-firm's constraints relationship, we calculated the proportion of small, medium, and large firms that answered that the obstacle  $k$  (with  $k = 1, \dots, 16$ ) represents: i) no obstacle, ii) minor obstacle, iii) moderate obstacle, iv) major obstacle, and v) a very severe obstacle. In the next figures, each proportion is presented graphically<sup>5</sup>.

<sup>5</sup>The proportions data including confidence intervals for the options: i) no obstacle, and ii) a major or very severe obstacle, is reported in A Appendix.

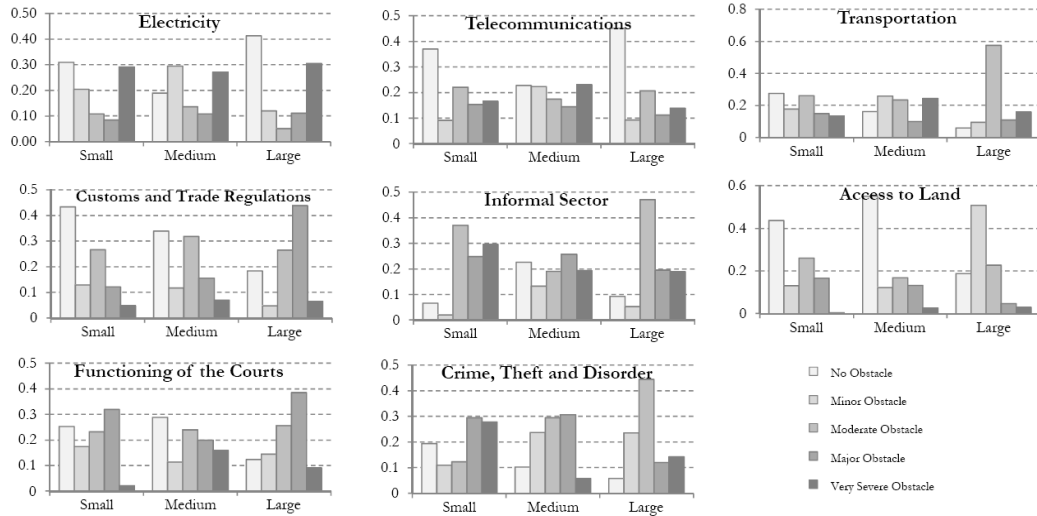


Figure 4. Level of Obstacle to the functioning of the establishment (Proportions)

Figure 4 shows that there are some visible trends in the firms' behavior according to their size. For example, Figure 3 reveals that small firms are likely to believe that 'Crime, Theft and Disorder' is considered such as an extreme situation, it represents none obstacle for 19% of small firms, and it represents a major or severe obstacle for 57% of small firms. On the other hand, large firms are likely to believe that 'Crime, Theft and Disorder' is more likely a moderate obstacle (6% believe it represents none obstacle, while 26% believe it represents a major or severe obstacle).

In some cases, the confidence interval of each proportion easily permits us to make inference about the significance of differences between firm sizes. Figure 4 (second graph of first column) is a good example to infer that the proportion of small firms that perceived 'Customs and Trade Regulations' as none obstacle (43%), is statistically different (at a confidence interval of 99%) from the same proportion (statistic) for large firms (19%). This trend is confirmed with the analysis of the same figure where we may expect that the proportion of small firms that perceived 'Customs and Trade Regulations' as a Major or Severe Obstacle (17%) is statistically distinct from the same proportion for large firms (50%). In fact, this visual analysis may be confirmed with a Wald Test over the coefficients.

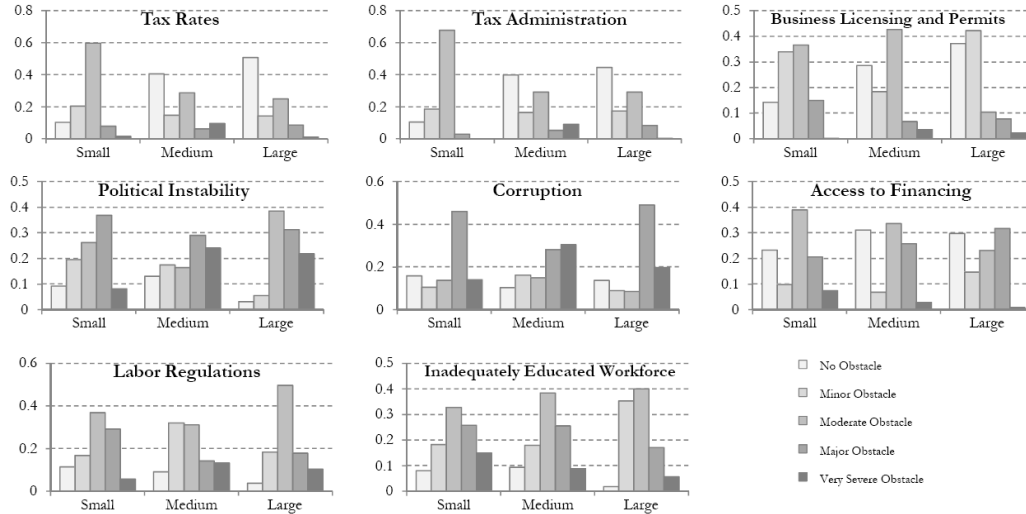


Figure 5. Level of Obstacle to the functioning of the establishment (Proportions)

Figure 5 let us continue the analysis. For example, the second graph in first column shows that 9% of small firms, 13% of medium firms, and 3% of large firms perceive ‘Political Instability’ as no issue for the functioning of the firm; while 45% of small firms, 53% of medium firms, and 53% of large firms identify ‘Political Instability’ as a Major or Very Severe Obstacle. Thus, Figure 5 confirms that Political Instability is a major obstacle for all kind of firms.

Finally, some obstacles are difficult to interpret visually. For example in Figure 5, ‘Access to Financing’ seems to represent none obstacle for about 23-30% of firms (no matter its size), while it represents a major or severe obstacle for almost one third of the firms (no matter its size either). In this case, it does not seem to be statistical differences between firms sizes. Nevertheless, this first insight with the data will be formalized with some more appropriate instruments of analysis (section 4).

The main findings of this section are: Bolivian firms differ from those of another regional countries because they seem to face more trouble concerning ‘Competitors in the Informal Sector’ and ‘Political Instability’. Besides, when asking to identify the level of constraint for each potential obstacle, 60% of Bolivian firms coincide that ‘Corruption’ is a major or very severe issue. We should expect that these three major constraints could be an important part of our results about binding constraints. On the other hand the descriptive analysis suggests that distinct to the other countries, Bolivian firms do not believe that tax rates are a major constraint for their functioning.

Other relevant findings - when distinguishing firm sizes - reveal that firms, according to the number of employees, do not perceive the same level of obstacles. For example results suggest that large firms face higher probabilities for considering ‘Tax Rates’ as no obstacle, while ‘Political Instability’ could be more harmful for

large firms respect to small firms. This kind of relations permit us to expect differences between distinct firms sizes perceptions. Evidently, the bivariate analysis of this section excludes interactions with some other relevant variables, such as the productive sector the firm belongs to. The empirical strategy that we describe below is intended to overcome this concern, and give a more accurate response to the firms size dependence, and - at the same time - provide a more accurate definition for binding constraints.

## 4 The Empirical Strategy

Our research objective is to find supporting evidence about: i) whether firm size matters when evaluating firm's constraints, and ii) most binding constraints for Bolivian firms. We consider the following potential obstacles: Infrastructure and Services; Transport; Informal Sector Practices; Access to Land; Crime; Access to Finance; Government Relations (Tax rates; Tax administration; Business Licensing and Permits; Political Instability; Corruption; Courts); Labor Regulations. In the next subsections we describe the data used and the theoretical methods to be employed.

### 4.1 A Framework about Binding Constraints

As stated above, we support our concern for identifying binding constraints on the HRV approach. It brings a theoretical framework for explaining low levels of private investment and entrepreneurship. Basically, HRV note that growth is mainly explained by the investment behavior, in turn, investment depends on other variables related with the economic environment. Figure 5 shows this scheme in a decision tree. The HRV approach for growth diagnostics, argue that low levels of economic activity can be explained by Low returns or High Cost of Finance. Then, this two potential explanations face, in turn, an extensive set of constraints. For example, Low Returns to Economic Activity could be due to Low Appropriability of these returns, which could be due to Government Failures, specifically High Taxes. In Table 2 we show the correspondence between HRV growth diagnostics and our set of potential binding constraints.

Even after recognizing that most or all of the constraints could be important, the main scope of the HRV approach is to identify the most binding constraints, considering them as the ones that *'are likely to provide the biggest bang for the reform buck'*. While the HRV approach is very well defined on the growth determinants, it gives us some degrees of freedom when evaluating the most binding constraint. In fact, HRV applied the growth diagnostic to Brasil, El Salvador, and Costa Rica, identifying the most binding constraint from stylized facts of every country; in this regard, they do not propose an empirical method or quantitative tool in particular.

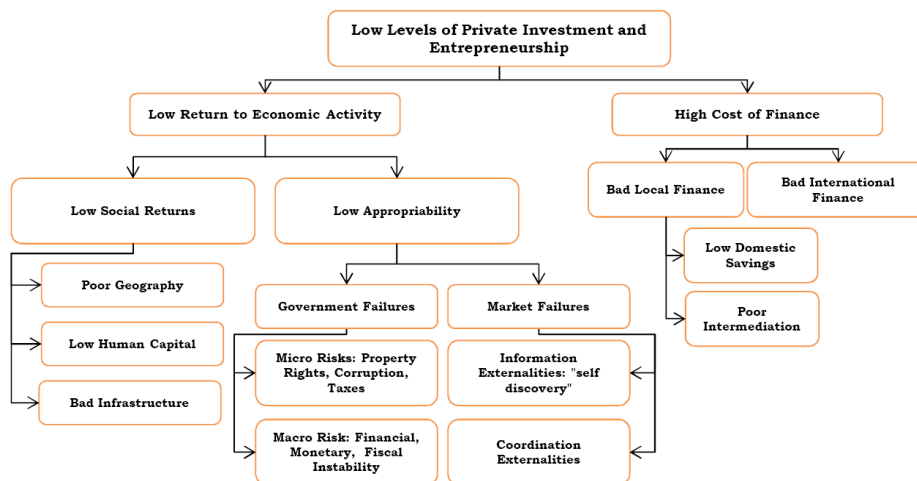


Figure 6. Growth Diagnostics (Hausmann, Rodrik & Velasco, (2005))

Indeed, Bari et al. (2005) identify growth binding constraints for Pakistan in a descriptive manner from the results of a the Pakistan Economic Survey 2001-02. They were concerned also in firm size differences, specially in the key role of small and medium enterprises. Using modern econometrics, with panel data between 2006-10, Dinh et al. (2010) constructed three specifications to explain the firm growth from which they define the most biding constraint the one whose variable coefficient ‘...is statistically significant, has a large coefficient in all estimations (models), and has the right sign...’.

Our approach to identify the most binding constraint is somehow between the above strategies. As it will be clear below, we define the most binding constraint to firms as those obstacles which represents the larger likelihood of facing a major or very severe obstacle to firms. We will distinguish results taking into account the firm size.



LA	Political Instability
LA	Corruption
LA	Practices of Competitors in the Informal Sector
LA	Functioning of the Courts
LA	Customs and Trade Regulations
LA	Labor Regulations
LA	Crime, Theft, and Disorder
LA	Access to Land
LA	Business Licensing and Permits
LA	Tax Administration
LA	Tax Rates
LSR	Electricity
LSR	Transportation
LSR	Telecommunications
LSR	Inadequately Educated Workforce
HCF	Access to Financing

LA stands for Low Appropriability; LSR stands for Low Social Returns; and HCF stands for High Cost of Finance.

*Table 2. Correspondence Between Factors Identified in the HRV approach and the set of obstacles available in the Enterprise Survey.*

## 4.2 The Data

We use the 2010 Bolivian Enterprise Survey database published by the World Bank. It contains 312 observations at firm level ([27] World Bank, 2007) from enterprises located in the three major cities of Bolivia: La Paz, Cochabamba and Santa Cruz. Sample includes formal small, medium, and large firms. The ES is meant to be representative of non-agricultural private sector bolivian economy, excluding firms with less than 5 employees. The strata for Enterprise Surveys are firms size, business sector, and geographic region within a country.

## 4.3 The Model

We would like to know whether constraints differ between distinct firm sizes. Initially, it is possible to specify a simple model for each obstacle. The constraint level vector will be some latent variable ( $Y_1^*$ ) which depends linearly on some matrix of explanatory variables ( $X_1$ ) and a vector representing the unobservable firm size ( $Y_2^*$ ).

$$Y_1^* = \alpha [ X_1 \quad Y_2^* ] + e_1 \tag{1}$$

Where  $e_1$  is a vector of independent and identically distributed random variables and  $\alpha$  is the vector of coefficients to be estimated. As we count on a discrete measure of perceived constraints we assume that each observed perception ( $y_{1,i}$ ) for any firm

$i$  is determined from the latent constraint level  $(y_{1,i}^*)$  according to the following rule:

$$y_{1,i} = \begin{cases} 0 & \text{if } y_{1,i}^* \leq \gamma_1 \\ 1 & \text{if } \gamma_1 < y_{1,i}^* \leq \gamma_2 \\ 2 & \text{if } \gamma_2 < y_{1,i}^* \leq \gamma_3 \\ 3 & \text{if } \gamma_3 < y_{1,i}^* \leq \gamma_4 \\ 4 & \text{if } \gamma_4 < y_{1,i}^* \end{cases} \quad (2)$$

To verify whether firm size  $(Y_2)$ <sup>6</sup>- after controlling by a set of regressors  $(X_1)$  - determines the constraint level  $(Y_1)$ <sup>7</sup>, we may solve the following log-likelihood function maximization problem (namely, an ordered probit). The transformation depends on the non continuous form of the observed variable  $(Y_1)$  according to the Limited Dependent Variable (LDV) literature.

$$l(\alpha, \gamma) = \sum_{i=1}^N \sum_{j=0}^4 \log(\Pr(y_{1,i} = j | x_{1,i}, y_{2,i}, \alpha, \gamma)) \cdot \mathbf{1}(y_{1,i} = j) \quad (3)$$

where  $j$  can take the values: 0=No Obstacle, 1= Minor Obstacle, 2= Moderate Obstacle, 3= Major Obstacle, 4= Very Severe Obstacle.  $N$  is the number of observations. The vector  $X_1$  may consider variables that characterize firms and are intuitively exogenous like the legal status of the firm, the firm's industry or the years of experience of the top manager. The vectors  $\alpha$  and  $\gamma$  will contain the coefficients and endogenous cut points to be estimated, respectively.

Actually, equation (3) estimation would obtain consistent estimates if we could assure that observed firm size  $(Y_2)$ <sup>8</sup> is not a result of firm's constraints (i.e. firm size is not caused by firm's constraints). Then, if we do not find evidence to consider the firm's size as an endogenous regressor, we may estimate equation (3) directly.

If we find evidence to consider the firm's size as an endogenous regressor<sup>9</sup> we could estimate an IV-ordered probit model with an ordinal endogenous regressor (for  $Y_1$ ). It means that equation (3) and equation (4) should be estimated jointly:

$$l(\beta, \delta) = \sum_{i=1}^N \sum_{h=0}^2 \log(\Pr(y_{2,i} = h | x_{1,i}, x_{2,i}, \beta, \delta)) \cdot \mathbf{1}(y_{2,i} = h) \quad (4)$$

where,  $h$  can take the next values: 0 = very small and small enterprise, 1= medium enterprise, and 2= large enterprise.  $X_2$  should consider variables that are

<sup>6</sup>The latent variable  $Y_2^*$  has a correspondence with  $Y_2$  according to a decision rule similar to that of equation (2).

<sup>7</sup>Where the constraint level may be any of the 16 obstacles we described above.

<sup>8</sup>Note that  $y_{2,i}$ , equivalently to  $y_{1,i}$ , is the observed firm size for the observation  $i$ .

<sup>9</sup>As [19] Kawatsu and Largey (2009) note, one proof of the endogeneity of the  $Y_2$  variable is found testing the significance of the covariance of the errors from equations (3) and (4). Or equivalently, testing the significance of the reported athrho statistic (which measures the Fisher's Z Transformation of the correlation between error from both models).

correlated with the firm size but are independent of the obstacle analyzed  $Y_1$ , like the formal/informal status of the firm when it began operations or the number of employees of the firm when it started operations. Analogously to equation (3), the vectors  $\beta$  and  $\delta$  will contain the coefficients and cut points to be estimated, respectively.

Our set of control variables ( $X_1$ ) includes: production sector, city, firm's current legal status, percent of the firm does the largest shareholder own, principal owner gender, origin of the investment financing needed to start the establishment, years of experience of the top manager, international-recognized quality certification status, and annual growth of labor (as a proxy to firm's performance).

On the other hand, our potential instruments, or excluded variables ( $X_2$ ) for the firm size ( $Y_2$ ) are: i) the establishment belongs to a larger firm, ii) the number of full time employees when the establishment started operations, iii) the legal status of the firm when it started operations, iv) the age of the firm (number of years from firm creation). The excluded variables must be correlated with firm size but independent of firms' constraints perception; we believe the set we chose accomplish it. In general, if firms belongs to a larger firm should be quite independent of obstacle perception, and correlated with firm size. The other mentioned instruments follow the past information rationale which means that all of them were determined in the past, while obstacle perception is determined under current conditions. Then, while initial number of employees, initial legal status, and age of firms are related to the current firm size, they are not rationally correlated with current constraints of firms.

The IV ordered probit model with an ordinal endogenous regressor, represented above by equations (3) and (4), can be estimated considering a system of equations nested by the Conditional (Recursive) Mixed-Process Model (CMP). CMP is appropriate for two types of models: 1) those in which a truly recursive data-generating process is posited; and 2) those in which there is simultaneity, but instruments allow the construction of a recursive set of equations (as in two-stage least squares) that can be used to consistently estimate structural parameters in the final stage. This kind of model embrace probit, iv-probit, biprobit, ordered probit, multinomial probit, and seemingly unrelated regression to name a few (see [25] Roodman, 2009).

The CMP procedure calculate its estimators from a maximum likelihood approach over a multivariate normal distribution. In this way, with this novel procedure, we are capable to take into account the potential endogeneity of a right-hand variable that is not continuous but dichotomous or polycotomous. In the next section we present the results of the model described above.

## 5 Results

Our strategy starts estimating the system composed by equations (3) and (4) [*IV-probit model*] for each one of the 16 obstacles included in the database. If we fail to reject the exogeneity test ( $H_0 : \text{athrho} = 0$ ) then the estimators of the single equation (3) [*Oprobit model*] should be consistent, otherwise the valid estimators

are those from the first equation of the two-equation system [*IV-oprobit model*] <sup>10</sup>. However, we report both alternatives with their full results in the appendix. In all estimations we include control variables: i) geographic variables for each city where the survey was taken, ii) the industry where the firm belongs, iii) the legal status and ownership structure of the firm, iv) characteristics of the firm (principal gender owner, years of experience of top manager, Internationally-recognized quality certification), and v) the performance of the firm (annual labor growth in the last three years). Then, we report marginal effects and conditional probabilities, which permit us to accomplish the two main objectives of the paper: verify if obstacles are different for distinct firm size, and identify the most binding constraints. Therefore we divide this section according to those two objectives:

### 5.1 Firms Constraints: Does Firm Size Matters?

In Table 3 we resume the model selection process, and the main results about the effect of firm size<sup>11</sup>:

CONSTRAINT	Endogeneity Issue?	Does Size Matter?
ACCESS TO FINANCING	YES	YES
ACCESS TO LAND	NO	NO
BUSINESS LICENSING AND PERMITS	YES	YES
CORRUPTION	NO	NO
CRIME THEFT AND DISORDER	NO	NO
CUSTOMS AND TRADE REGULATION	NO	NO
ELECTRICITY	YES	YES
FUNCTIONING OF THE COURTS/COURTS	NO	YES
INADEQUATELY EDUCATED WORKFORCE	NO	NO
LABOR REGULATIONS	NO	NO
POLITICAL INSTABILITY	NO	NO
PRACTICES OF COMPETITORS IN THE INFORMAL SECTOR	YES	YES
TAX ADMINISTRATION	NO	YES
TAX RATES	NO	YES
TELECOMMUNICATIONS	YES	YES
TRANSPORTATION	YES	YES

Table 3. Model Selection Resume

<sup>10</sup>There is not a known method to calculate the overidentification test for this kind of models. Therefore, only for reference purposes, we report this test, and the underidentification test for the same specifications reported using an instrumental variables ML estimator for an endogenous continuous structural variable ( $Y_1$ ) and an endogenous continuous regressor ( $Y_2$ ). See appendix.

<sup>11</sup>We assume that size matters when at least one of the associated coefficients to firm size were (statistically) significant at 5%.

The results in Table 3 show that 9 from 16 obstacles are perceived with different intensity depending on the firm size (i.e. size matters). Besides, there seems to be evidence of a potential endogeneity issue in 6 cases. Moreover, Table 4 shows the conditional probability of occurrence for each event by each potential obstacle. The top 4 probabilities for each event (No Obstacle [0], Minor Obstacle [1], Moderate Obstacle [2], Major Obstacle [3], and Very Severe Obstacle [4]) are reported in bold letters. For example, the probability that an average firm considers electricity as a very severe obstacle for its functioning is 25.5%, while the probability, for a representative firm, of ‘access to land’ representing no obstacle is 44.5%. Evidently, Table 4 allows us to identify which obstacles we should care about, and which ones are not so problematic. The model results show that ‘Electricity’, ‘Practices of Competitors in the Informal Sector’, ‘Transportation’, and ‘Corruption’ are the most likely very severe obstacles to firms, while ‘Access to land’, ‘Customs and Trade Regulations’, ‘Telecommunications’, and ‘Access to Financing’, may be considered such as minor issues since they expect a large likelihood of representing no obstacle to firms.

	Pr (Y1=0)	Pr (Y1=1)	Pr (Y1=2)	Pr (Y1=3)	Pr (Y1=4)
ELECTRICITY	0.221	<b>0.255</b>	0.126	0.123	<b>0.275</b>
TELECOMMUNICATIONS	<b>0.296</b>	0.150	0.227	0.174	0.153
TRANSPORTATION	0.206	0.215	0.279	0.125	<b>0.175</b>
CUSTOMS AND TRADE REGULATION	<b>0.334</b>	0.161	0.359	0.129	0.018
PRACTICES OF COMPETITORS IN THE INFORMAL SECTOR	0.075	0.071	0.375	<b>0.283</b>	<b>0.196</b>
ACCESS TO LAND	<b>0.445</b>	0.195	0.245	0.109	0.006
FUNCTIONING OF THE COURTS/COURTS	0.227	0.176	0.272	0.267	0.058
CRIME THEFT AND DISORDER	0.118	0.177	0.248	<b>0.309</b>	0.148
TAX RATES	0.203	<b>0.233</b>	<b>0.496</b>	0.047	0.020
TAX ADMINISTRATION	0.200	<b>0.230</b>	<b>0.529</b>	0.027	0.014
BUSINESS LICENSING AND PERMITS	0.172	<b>0.368</b>	0.378	0.074	0.008
POLITICAL INSTABILITY	0.071	0.178	0.264	<b>0.366</b>	0.121
CORRUPTION	0.086	0.130	0.162	<b>0.464</b>	<b>0.158</b>
ACCESS TO FINANCING	<b>0.260</b>	0.100	0.375	0.220	0.045
LABOR REGULATIONS	0.043	0.224	<b>0.477</b>	0.218	0.038
INADEQUATELY EDUCATED WORKFORCE	0.040	0.203	<b>0.431</b>	0.249	0.077

Table 4. Model Results: Predicted Probability for a Representative Firm.

However, the results presented so far do not take into account differences by firm size. The next graphs show the distinct results between different firm sizes in an illustrative manner. In the following - based on results from the ‘correct’ model - we just concentrate on those obstacles where size matters (see Table 3 for the detail).

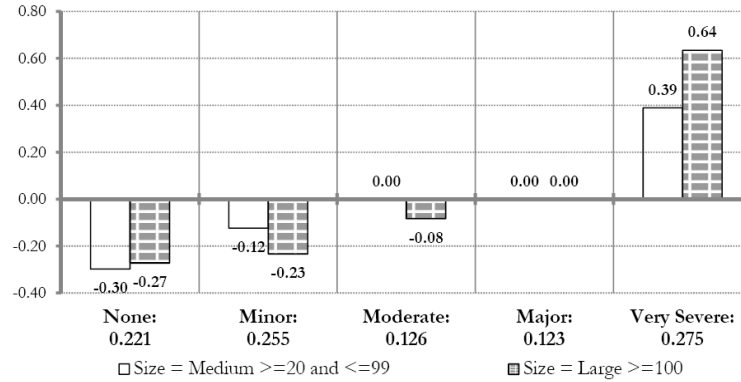


Figure 7. Electricity: Marginal Effects (for discrete change of dummy variable from 0 to 1)

Figure 6 shows that being a medium or large firm, increases the probability that ‘Electricity’ represents a very severe obstacle; the marginal effect for a large firm is 0.64, while for medium firms is 0.39. In a consistent manner, being a medium or large firm decreases the probability that ‘Electricity’ represents no obstacle for firms; marginal effect for a large firm is -0.27, and -0.30 for medium firms. In Figure 7 is possible to find the predicted probability calculated at the mean value of the explicative variables. The model predicts that - for a representative firm - there is a 22.1% likelihood for considering ‘Electricity’ such as no obstacle for its functioning; on the other hand, a representative firm will have a 27.5% probability of considering ‘Electricity’ as a very severe obstacle. These results suggest that provision of public infrastructure, like ‘Electricity’, is an important concern for all firms, but specially relevant for medium and large firms.

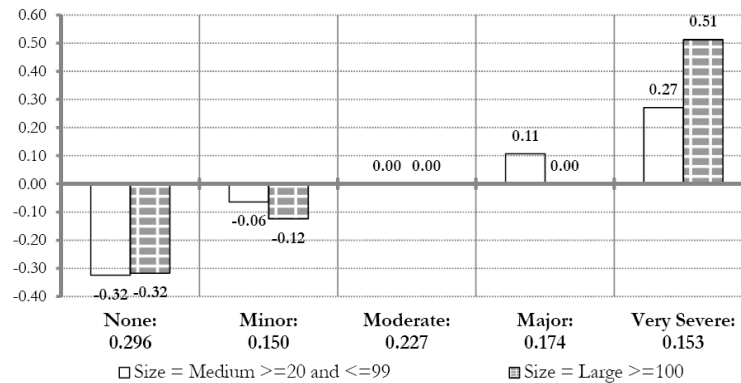


Figure 8. Telecommunications: Marginal Effects (for discrete change of dummy variable from 0 to 1)

Results on ‘Electricity’ resemble those of ‘Telecommunications’. Figure 8 shows some similarities. The likelihood that ‘Telecommunications’ represents a very severe obstacle is 15.3% but it increases when we refer to medium or large firms. Moreover, the probability that ‘Telecommunications’ represents no obstacle for firms (29.6%) decreases when we refer to medium and large firms. These results reinforce that provision of public infrastructure, like ‘Telecommunications’, is an important concern for all firms, but specially relevant for medium and large firms. Another interesting fact: the probability that ‘Electricity’ represents a major or very severe obstacle is about 40%, while the same probability for ‘Telecommunications’ obstacle is about 33%, then public policy may focus on both obstacles specially on medium and large firms.

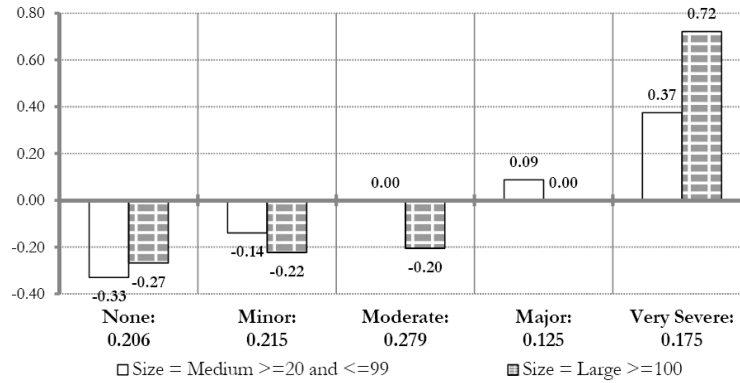


Figure 9. Transportation: Marginal Effects (for discrete change of dummy variable from 0 to 1)

When analyzing ‘Transportation’ as an obstacle, results shown in Figure 9 suggests that firm size matters, and according to marginal effects, it seems ‘Transportation’ will represent more trouble for medium and large firms. It seems logic if we consider that small firms are not intended to depend on transportation systems as much as large firms (which could be exporters or importers). In any case, the probability of representing a major or very severe obstacle, is slightly smaller than in the first two obstacles analyzed (30%).

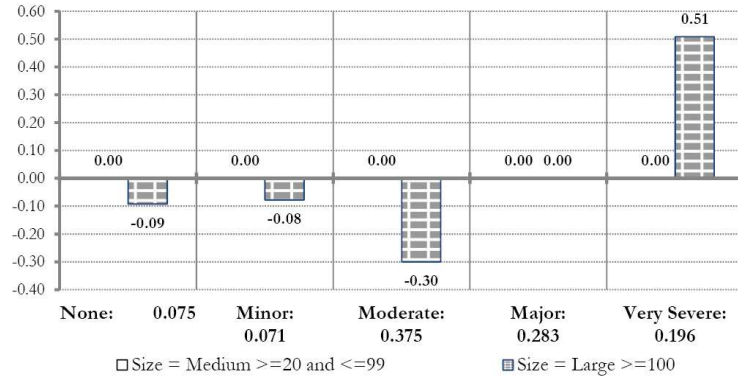


Figure 10. Practices of Competitors in the Informal Sector: Marginal Effects (for discrete change of dummy variable from 0 to 1)

Results concerning ‘Practices of Competitors in the Informal Sector’ are more revealing. First, it is clear that the probability that it represents no obstacle is small (7.5%), while the probability that it represents a major or very severe obstacle is high (48%!). We also notice that the likelihood of facing a very severe obstacle increases when we are talking about a large firm. These results confirm what we saw in section 3: informality represents the most important obstacle for firms in Bolivia. Even if large firms face more issues because of the existence of informal markets, the model demonstrate that it is a generalized problem.

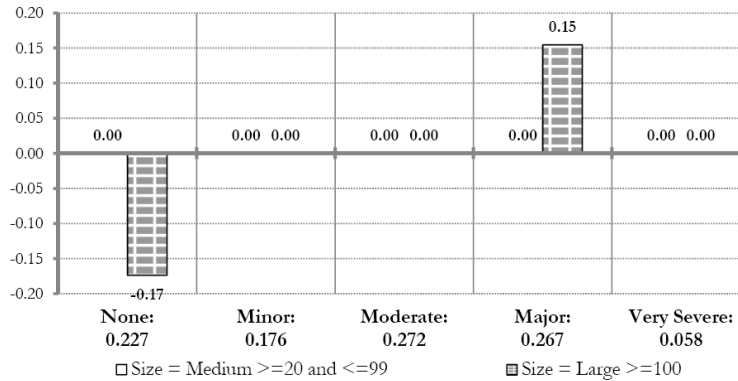


Figure 11. Courts: Marginal Effects (for discrete change of dummy variable from 0 to 1)

Following the same logic, the likelihood that ‘Functioning of Courts’ would be a major or very severe obstacle to firms is 33%. The results of Figure 11 suggest that it could be a bigger problem for large firms, as a matter of fact a large firm increases



the likelihood that ‘Functioning of Courts’ represents a major obstacle (in 0.15 pp), while it decreases its likelihood of representing none obstacle (in 0.17 pp).

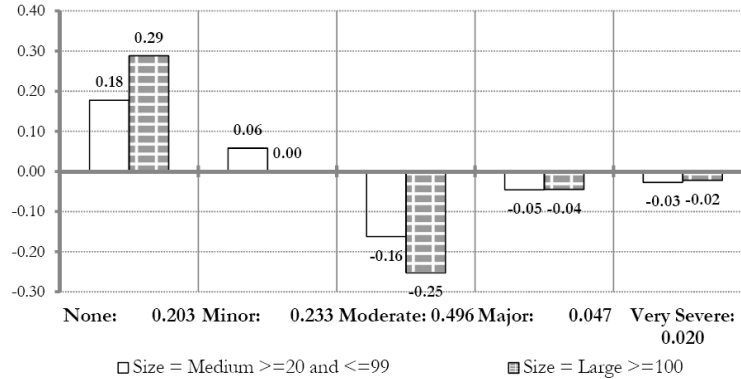


Figure 12. Tax Rates: Marginal Effects (for discrete change of dummy variable from 0 to 1)

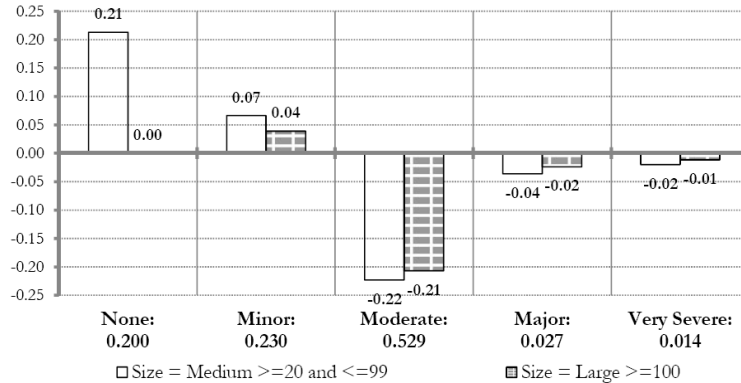


Figure 13. Tax Administration: Marginal Effects (for discrete change of dummy variable from 0 to 1)

While the obstacles described in figures 7-11 were relatively important for all firms, Figure 12 and Figure 13 show two obstacles which probably would not be considered as binding constraints, even though firm size matters when explaining them. ‘Tax Rates’ and ‘Tax Administration’ have minor probabilities associated to consider them as major or very severe obstacles, in fact, those probabilities are 6.7% and 4.1% respectively. The results also suggest that being a large or medium firm increases the likelihood for considering ‘Tax Rates’ as no obstacle.

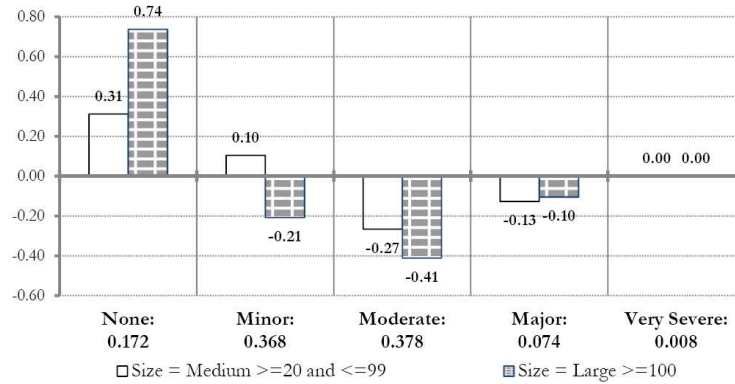


Figure 14. *Business Licensing and Permits: Marginal Effects (for discrete change of dummy variable from 0 to 1)*

On the other hand, according to Figure 14, ‘Business Licensing and Permits’ represents a moderate concern for firms. It reflects on the 7.5% probability of representing a major or very severe obstacle for the functioning of firms. Also, it is interesting that being a large or medium firm decreases the likelihood of facing a major problem, while increases the likelihood of facing no obstacle, then being a large or medium firm is good to expect ‘Business Licensing and Permits’ as no obstacle. This result seems natural as ‘Business Licensing and Permits’ could be considered a starting business activity, which should be associated strongly to small firms.

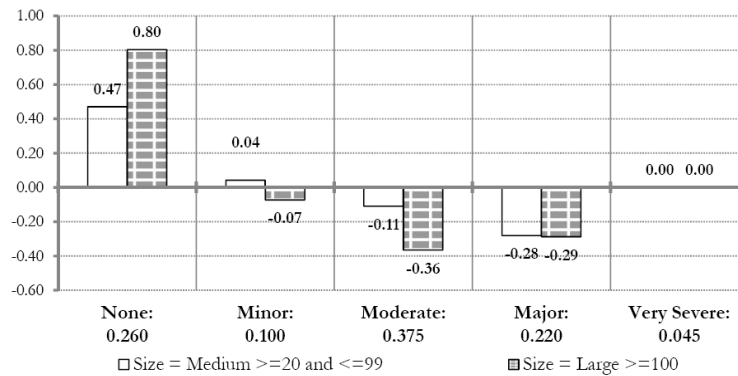


Figure 15. *Access to Financing: Marginal Effects (for discrete change of dummy variable from 0 to 1)*

Finally, the results from Figure 15 are very similar to those from Figure 14. ‘Access to Financing’ does not seem to represent a very severe obstacle (its likelihood is 4.5%), but there is a reasonable likelihood to represent a major problem (22%). Moreover, there is some evidence to distinguish a quantitative difference between

distinct firm sizes, in fact, medium and large firms would expect to face no obstacle with a larger likelihood than small firms. It is confirmed by noting that medium and large firms are less likely to face a major obstacle on the ‘Access to Finance’.

## 5.2 Binding Constraints

Finally, based on our calculations, we constructed two distinct measures to rank the worst obstacles (or most binding constraints) faced by each firm according to its size<sup>12</sup>.

- In the first one, we report the conditional probability (predicted by our models) for expecting a major or very severe obstacle by obstacle and firm size.
- The second approach is a relative measure. We use a *pivot category*: small firm size. So, for medium and large firms: we calculate the sum of marginal effects of facing a major or very severe obstacle when becoming a medium or large firm with respect to the base scenario (small firm). The higher is this sum, the worst is the obstacle. For small firms: we calculate the sum of marginal effects of facing a major or very severe obstacle from medium and large firms. The smaller is this sum, the worst is the obstacle for small firms. It is important to be clear that this second ranking should be read as a relative measure between firm size definitions.

Table 5 (and Figures 16 and 17) show the results from our first approach. We report the conditional probability predicted by the models for expecting a major or very severe obstacle in each issue. The ranking confirms that Corruption, Informality and Political Instability seem to be common obstacles to all firms. Also, it is possible to notice that public services provision would be a problem for medium and large firms (mainly ‘Electricity’ and ‘Transportation’). Another fact worthwhile mentioning is that ‘Access to Financing’ would be an important obstacle only for small firms (the likelihood of representing a major or very severe obstacle is 33% for small firms, 15% for medium firms, and just 7% for large firms).

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<sup>12</sup>In the first one, we report the conditional probability (predicted by our models) for expecting a major or very severe obstacle for each obstacle and by firm size.

The second approach is a relative measure. For medium and large firms: we calculate the sum of marginal effects of facing a major or very severe obstacle when becoming a medium or large firm, respect to the base scenario (small firm). The higher is this effect, the worst is the obstacle.

For small firms: we calculate the sum of marginal effects of facing a major or very severe obstacle from medium and large firms. The smaller is this effect, the worst is the obstacle for small firms. It is important to be clear that this second ranking should be read as a measure relative to other firm size definitions.

<b>Very Small + Small Firms</b>	
Corruption	0.63
Crime, Theft, and Disorder	0.54
Practices of Competitors in the Informal Sector	0.51
Political Instability	0.45
Access to Financing	0.33
Inadequately Educated Workforce	0.31
Electricity	0.29
Telecommunications	0.25
Functioning of the Courts	0.24
Labor Regulations	0.18
Transportation	0.17
Customs and Trade Regulations	0.12
Access to Land	0.12
Business Licensing and Permits	0.10
Tax Rates	0.09
Tax Administration	0.06
<b>Medium</b>	
Corruption	0.59
Political Instability	0.48
Electricity	0.47
Transportation	0.40
Functioning of the Courts	0.39
Practices of Competitors in the Informal Sector	0.39
Telecommunications	0.37
Crime, Theft, and Disorder	0.35
Inadequately Educated Workforce	0.21
Labor Regulations	0.19
Access to Financing	0.15
Customs and Trade Regulations	0.10
Access to Land	0.09
Tax Rates	0.03
Business Licensing and Permits	0.02
Tax Administration	0.01
<b>Large</b>	
Political Instability	0.71
Corruption	0.68
Practices of Competitors in the Informal Sector	0.64
Functioning of the Courts	0.52
Transportation	0.52
Electricity	0.49
Crime, Theft, and Disorder	0.44
Labor Regulations	0.34
Telecommunications	0.29
Inadequately Educated Workforce	0.27
Customs and Trade Regulations	0.25
Access to Land	0.18
Access to Financing	0.07
Tax Administration	0.02
Tax Rates	0.01
Business Licensing and Permits	0.00

*Table 5. Ranking of Conditional probabilities for expecting a major or very severe obstacle (by firm size).*

Figures 16 and 17 show the conditional probabilities for four types of firms: Average, Small, Medium, and Large. *Average* stands for the representative firm size in Bolivia (it is a weighted average of small, medium, and large firms), while following the definitions of the Enterprise Survey, Small firms represents firms with less than 19 workers, Medium Firms represent those firms with 20 to 99 workers, and Large Firms those firms with more than 100 workers.

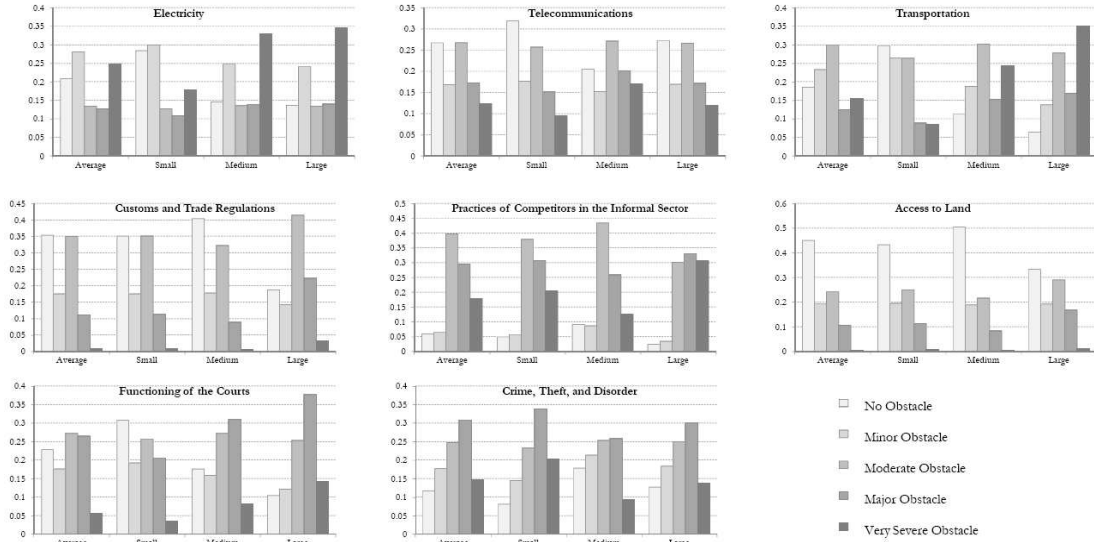


Figure 15. Level of Obstacle to the functioning of the establishment (Conditional Probability)

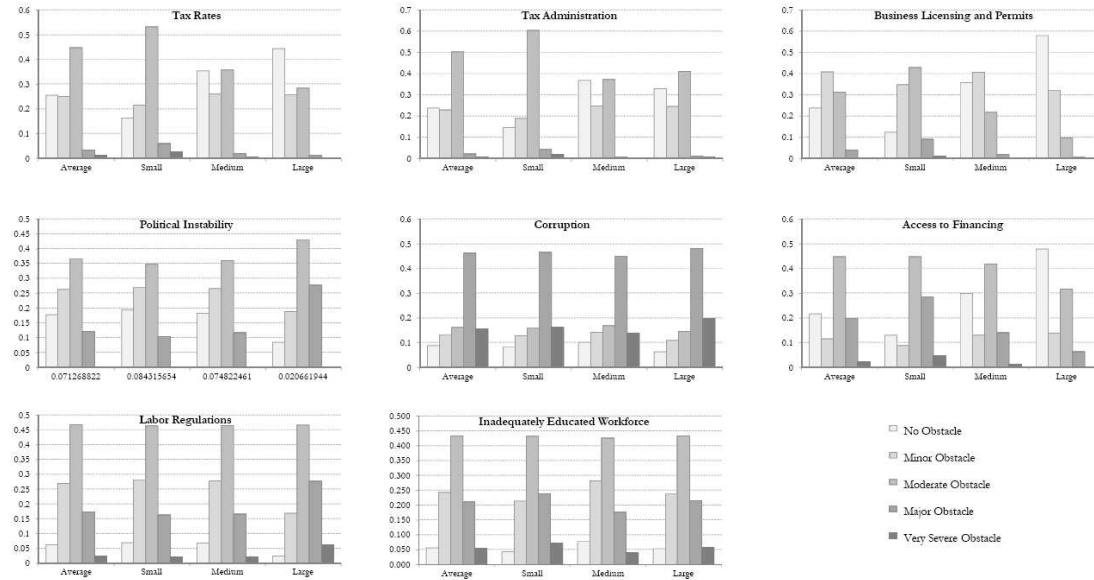


Figure 16. Level of Obstacle to the functioning of the establishment (Conditional Probability)

According to our second measure for constructing a ranking, in table 6 we summarize the most harmful obstacles for each firm according to its size, and with respect to the other categories. For example, ‘Access to Financing’ is the worst obstacle for small firms. We rank our findings according to a score, in the case of ‘Access to Financing’ the score is  $-0.57$ , and it is just the sum of marginal effects implied for

facing a major or very severe obstacle by being a medium (-0.28) or large firm (-0.27). It means that being a medium firm (respect to small firms) will reduce the likelihood of facing a major or very severe obstacle in 0.28, and being a large firm (respect to small firms) will reduce the likelihood of facing a major or very severe obstacle in 0.27, then, small firms are in a worse position than medium and large ones.

<b>Worst Obstacles by Firm Size</b>	
Small Firms	
Access to Financing	-0.57
Business Licensing and Permits	-0.23
Tax Rates	-0.14
Tax Administration	-0.09
Medium Firms	
Transportation	0.46
Electricity	0.39
Telecommunications	0.38
Large Firms	
Transportation	0.72
Electricity	0.64
Telecommunications	0.51
Practices of Competitors in the Informal Sector	0.51

*Table 6. Ranking of Relative Worst Obstacles by Firm Size*

The medium and large firms ranking is even easier to calculate. The score associated to ‘Transportation’ (0.46), is just the sum of marginal effects from being a medium firm (with respect to small firms) when facing a major or very severe obstacle. In this case, being a medium firm increases the likelihood of facing a major obstacle in 0.09, and increases the likelihood of facing a very severe obstacle in 0.37.

It is worth noting that, small firms seem to face more issues with starting business categories, and are more sensitive to fiscal policy (tax rates and tax administration). On the other hand, medium and large firms face more issues with infrastructure variables (transportation, electricity and telecommunications), and large firms should care more about ‘Practices of competitors in the informal sector’.

These relative results do not imply that public policy should be oriented with special consideration to Table 6 obstacles, indeed public policy should take into account that ‘Practices of Competitors in the Informal Sector’, ‘Political Instability’, and ‘Corruption’ are generalized problems, considering - at the same time - that some obstacles imply deeper differences between distinct firm sizes.

## **6 Concluding Remarks**

In this paper we attempt to generate evidence on two issues: Do constraints faced by firms have varying intensities according to the characteristics of firms?, and which

are the most binding constraints to firms in Bolivia?

Using the World Bank Enterprise Survey 2010 for Bolivia, we constructed the unconditional and conditional likelihood for being constrained considering three types of firm size. Besides, we claim that a potential indogeneity issue between firms' constraints and firm size should be considered when doing the calculations.

Our results distinguish two sets of binding constraints: i) those that are common to all kind of firms, and ii) those which affect more strongly a subset of firms according to their size. Regarding to the first set, our estimations show that Bolivian firms face common binding constraints: 'Corruption', 'Political Instability', and 'Crime, Theft and Disorder'; there is no evidence of firm size effect related with those constraints.

However, on the other hand there is a subset of binding constraints whose effect are distinct between different firm sizes: 'Practices of Competitors in the Informal Sector', 'Access to Financing', 'Electricity', 'Transportation', and 'Functioning of Courts'. For example, our results suggest that large firms are more sensitive to Informal Sector activities than medium and small firms. We predict that - for a representative firm - there is a 47.1% likelihood for considering 'Practices of Competitors in the Informal Sector' as a major or very severe obstacle for its functioning, while a large firm will have a 64% probability of considering 'Practices of Competitors in the Informal Sector' as a major or very severe obstacle.

Something similar occurs with 'Electricity', 'Transportation', and 'Functioning of Courts', which seem to influence stronger and negatively to large and medium firms. On the other hand, 'Access to Financing' is suggested as a binding constraint only for small firms.

Under the HRV approach, we suggest that obstacles associated with Low Appropriability would be common to all firms; obstacles associated to Low Social Returns (specially Bad Infrastructure problems) would be constraining medium and large firms; and binding constraints associated to High Cost of Finance would be affecting small firms performance.

Our findings are important because they can be directly extrapolated to public policy that is focused on the performance of firms. Our identification of binding constraints should allow a better resource allocation.

Finally, while the methodology proposed was applied with particular emphasis on firm size differences, there is no reason to avoid the analysis on firms' ownership structure or firms' industry. We left this as an extension of this paper.

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## A Appendix

Proportion of Small, Medium and Large Firms that Identify None, and Major or Severe Levels of Obstacles

**Level of Obstacle of ELECTRICITY to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.313 [0.170,0.503]	0.207 [0.102,0.376]	0.41 [0.149,0.733]	0.282 [0.184,0.406]
Major or very severe	0.375 [0.221,0.559]	0.368 [0.204,0.569]	0.421 [0.193,0.688]	0.376 [0.266,0.501]
N	362			

95% confidence intervals in brackets

**Level of Obstacle of TELECOMMUNICATIONS to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.371 [0.216,0.559]	0.247 [0.116,0.449]	0.443 [0.177,0.746]	0.33 [0.222,0.460]
Major or very severe	0.32 [0.184,0.494]	0.36 [0.204,0.552]	0.259 [0.113,0.490]	0.329 [0.230,0.447]
N	360			

95% confidence intervals in brackets

**Level of Obstacle of TRANSPORTATION to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.284 [0.146,0.479]	0.169 [0.061,0.387]	0.0626 [0.025,0.149]	0.219 [0.128,0.348]
Major or very severe	0.279 [0.153,0.452]	0.343 [0.190,0.539]	0.268 [0.120,0.496]	0.302 [0.207,0.419]
N	356			

95% confidence intervals in brackets

**Level of Obstacle of CUSTOMS AND TRADE REGULATION to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.44 [0.273,0.622]	0.331 [0.158,0.566]	0.181 [0.068,0.401]	0.374 [0.258,0.508]
Major or very severe	0.162 [0.080,0.301]	0.216 [0.100,0.408]	0.501 [0.233,0.768]	0.215 [0.136,0.324]
N	342			

95% confidence intervals in brackets

**Level of Obstacle of PRACTICES OF COMPETITORS IN THE INFORMAL SECTOR to the functioning of the establishment.**

	<b>Small &lt;= 19</b>	<b>Medium &gt;=20 and &lt;= 99</b>	<b>Large &gt;= 100</b>	<b>Total</b>
None	0.0627 [0.013,0.256]	0.222 [0.087,0.460]	0.0895 [0.032,0.225]	0.126 [0.059,0.251]
Major or very severe	0.544 [0.363,0.714]	0.46 [0.275,0.657]	0.4 [0.184,0.662]	0.498 [0.375,0.621]
N	352			

95% confidence intervals in brackets

**Level of Obstacle of ACCESS TO LAND to the functioning of the establishment**

	<b>Small &lt;= 19</b>	<b>Medium &gt;=20 and &lt;= 99</b>	<b>Large &gt;= 100</b>	<b>Total</b>
None	0.432 [0.267,0.614]	0.54 [0.345,0.724]	0.2 [0.096,0.371]	0.449 [0.329,0.576]
Major or very severe	0.169 [0.071,0.351]	0.158 [0.064,0.342]	0.078 [0.030,0.186]	0.156 [0.086,0.266]
N	351			

95% confidence intervals in brackets

**Level of Obstacle of FUNCTIONING OF THE COURTS to the functioning of the establishment**

	<b>Small &lt;= 19</b>	<b>Medium &gt;=20 and &lt;= 99</b>	<b>Large &gt;= 100</b>	<b>Total</b>
None	0.265 [0.130,0.466]	0.291 [0.138,0.511]	0.126 [0.053,0.271]	0.262 [0.162,0.395]
Major or very severe	0.329 [0.179,0.523]	0.349 [0.188,0.553]	0.477 [0.198,0.770]	0.351 [0.240,0.482]
N	337			

95% confidence intervals in brackets

**Level of Obstacle of CRIME, THEFT AND DISORDER to the functioning of**

	<b>Small &lt;= 19</b>	<b>Medium &gt;=20 and &lt;= 99</b>	<b>Large &gt;= 100</b>	<b>Total</b>
None	0.191 [0.084,0.378]	0.103 [0.033,0.281]	0.0565 [0.024,0.129]	0.145 [0.076,0.258]
Major or very severe	0.55 [0.374,0.715]	0.366 [0.204,0.566]	0.264 [0.106,0.520]	0.452 [0.334,0.576]
N	360			

95% confidence intervals in brackets

**Level of Obstacle of TAX RATES to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.112 [0.043,0.259]	0.402 [0.227,0.607]	0.501 [0.234,0.767]	0.261 [0.167,0.385]
Major or very severe	0.089 [0.030,0.235]	0.17 [0.072,0.351]	0.103 [0.042,0.229]	0.122 [0.066,0.214]
N	361			

95% confidence intervals in brackets

**Level of Obstacle of TAX ADMINISTRATION to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.121 [0.050,0.265]	0.395 [0.219,0.602]	0.447 [0.182,0.746]	0.258 [0.163,0.382]
Major or very severe	0.0339 [0.012,0.092]	0.164 [0.067,0.347]	0.0877 [0.033,0.215]	0.0889 [0.045,0.166]
N	359			

95% confidence intervals in brackets

**Level of Obstacle of BUSINESS LICENSING AND PERMITS to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.155 [0.074,0.295]	0.287 [0.136,0.508]	0.374 [0.119,0.725]	0.227 [0.139,0.347]
Major or very severe	0.147 [0.057,0.332]	0.113 [0.054,0.221]	0.0997 [0.040,0.230]	0.13 [0.070,0.227]
N	361			

95% confidence intervals in brackets

**Level of Obstacle of POLITICAL INSTABILITY to the functioning of the establishment**

	Small <= 19	Medium >=20 and <= 99	Large >= 100	Total
None	0.102 [0.037,0.253]	0.132 [0.044,0.334]	0.0304 [0.010,0.085]	0.107 [0.052,0.207]
Major or very severe	0.457 [0.291,0.632]	0.545 [0.348,0.729]	0.537 [0.248,0.803]	0.498 [0.377,0.620]
N	360			

95% confidence intervals in brackets

**Level of Obstacle of CORRUPTION to the functioning of the establishment**

	<b>Small &lt;=</b> <b>19</b>	<b>Medium</b> <b>&gt;=20 and &lt;= 99</b>	<b>Large &gt;=</b> <b>100</b>	<b>Total</b>
None	0.166 [0.069,0.349]	0.109 [0.032,0.313]	0.142 [0.047,0.360]	0.142 [0.074,0.253]
Major or very severe	0.59 [0.407,0.751]	0.579 [0.375,0.759]	0.688 [0.450,0.856]	0.595 [0.469,0.711]
N	358			

95% confidence intervals in brackets

**Level of Obstacle of ACCESS TO FINANCING to the functioning of the establishment**

	<b>Small &lt;=</b> <b>19</b>	<b>Medium</b> <b>&gt;=20 and &lt;= 99</b>	<b>Large &gt;=</b> <b>100</b>	<b>Total</b>
None	0.225 [0.110,0.408]	0.315 [0.163,0.521]	0.298 [0.130,0.546]	0.267 [0.174,0.388]
Major or very severe	0.289 [0.151,0.481]	0.279 [0.131,0.497]	0.315 [0.075,0.723]	0.287 [0.183,0.420]
N	351			

95% confidence intervals in brackets

**Level of Obstacle of LABOR REGULATIONS to the functioning of the establishment**

	<b>Small &lt;=</b> <b>19</b>	<b>Medium</b> <b>&gt;=20 and &lt;= 99</b>	<b>Large &gt;=</b> <b>100</b>	<b>Total</b>
None	0.111 [0.042,0.263]	0.0931 [0.042,0.194]	0.0368 [0.014,0.091]	0.0969 [0.051,0.177]
Major or very severe	0.343 [0.197,0.527]	0.293 [0.153,0.488]	0.289 [0.131,0.522]	0.319 [0.218,0.440]
N	360			

95% confidence intervals in brackets

**Level of Obstacle of INADEQUATELY EDUCATED WORKFORCE to the functioning of the establishment**

	<b>Small &lt;=</b> <b>19</b>	<b>Medium</b> <b>&gt;=20 and &lt;= 99</b>	<b>Large &gt;=</b> <b>100</b>	<b>Total</b>
None	0.0808 [0.023,0.249]	0.0962 [0.024,0.313]	0.0209 [0.006,0.067]	0.081 [0.033,0.186]
Major or very severe	0.41 [0.252,0.590]	0.341 [0.188,0.536]	0.239 [0.116,0.430]	0.367 [0.260,0.490]
N	358			

95% confidence intervals in brackets

## B Appendix

### Model Selection

REGRESSORS	Electricity			
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Medium $\geq 20$ and $\leq 99$	0.479	0.126	1.132	0.001
Size = Large $\geq 100$	0.523	0.219	1.827	0.012
Type = Manufacturing	-0.850	0.04	-1.000	0.006
City = Santa Cruz	-0.516	0.103	-0.678	0.006
Industry = Construction Section F	-1.794	0.022	-1.827	0.006
Industry = Services of Motor Vehides	-0.570	0.342	-1.139	0.031
Industry = Wholesale	-1.094	0.008	-1.021	0.005
Industry = Retail	-0.697	0.092	-0.796	0.086
Industry = Transport Section I	-0.965	0.01	-1.134	0.005
Years Experience Top Manager	0.023	0.062	0.024	0.041
Internationally-recognized quality certification = No	0.707	0.045	0.882	0.005
Growth	2.457	0.058	2.210	0.077
/cut_1_1	-0.271	0.688	0.143	0.812
/cut_1_2	0.514	0.432	0.850	0.130
/cut_1_3	0.858	0.181	1.168	0.034
/cut_1_4	1.220	0.054	1.508	0.005
<b>Athrho</b>			-0.698	0.036
Underidentification test	(Kleibergen-Paap rk LM statistic):			3941.662
	Chi-sq(4) P-val =			0.000
Overidentification test	Hansen J statistic:			3.903
	Chi-sq(3) P-val =			0.272

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	Telecommunications			
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small $\geq 5$ and $\leq 19$				
Size = Medium $\geq 20$ and $\leq 99$	0.357	0.298	1.052	0.001
Size = Large $\geq 100$	0.136	0.721	1.529	0.006
Type = Manufacturing	-0.715	0.025	-0.736	0.011
Type = Retail	1.409	0.000	1.033	0.012
City = La Paz	-0.580	0.203	-0.686	0.080
City = Santa Cruz	-0.920	0.062	-1.166	0.003
Industry = Wholesale	-1.283	0.001	-0.886	0.019
Industry = Retail	-1.798	0.007	-1.379	0.061
Internationally-recognized quality certification = Yes	1.033	0.038	0.863	0.076
Internationally-recognized quality certification = No	0.983	0.015	1.064	0.008
Growth	3.056	0.010	2.591	0.020
/cut_1_1	-0.260	0.693	0.079	0.896
/cut_1_2	0.200	0.756	0.497	0.397
/cut_1_3	0.894	0.168	1.121	0.063
/cut_1_4	1.518	0.015	1.688	0.004
<b>Athrho</b>			-0.736	0.002
Underidentification test	(Kleibergen-Paap rk LM statistic):			28.339
	Chi-sq(4) P-val =			0.000
Overidentification test	Hansen J statistic:			3.965
	Chi-sq(3) P-val =			0.265

Underidentification Test and Overidentification Test calculated on a IV-linear model.

OBSTACLES		Transportation			
REGRESSORS	OProbit		IV-OProbit		
	Coef.	P-value	Coef.	P-value	
Size = Small $\geq 5$ and $\leq 19$					
Size = Medium $\geq 20$ and $\leq 99$	0.678	0.053	1.327	0.001	
Size = Large $\geq 100$	0.991	0.002	2.173	0.000	
City = Santa Cruz	-0.558	0.085	-0.752	0.009	
Industry = Garments	-0.351	0.244	-0.569	0.053	
Industry = Services of Motor Vehides	-1.333	0.065	-1.655	0.009	
Legal Status = Sole (proprietorship)	0.524	0.160	0.701	0.060	
Internationally-recognized quality certification = Yes	1.467	0.003	1.313	0.007	
Internationally-recognized quality certification = No	1.355	0.008	1.421	0.002	
/cut_1_1	0.682	0.212	1.101	0.032	
/cut_1_2	1.371	0.010	1.727	0.000	
/cut_1_3	2.154	0.000	2.454	0.000	
/cut_1_4	2.588	0.000	2.865	0.000	
<b>Athrho</b>			-0.600	0.048	
Underidentification test	(Kleibergen-Paap rk LM statistic):			4082.000	
	Chi-sq(5) P-val =			0.000	
Overidentification test	Hansen J statistic			8.560	
	Chi-sq(4) P-val =			0.073	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

OBSTACLES		Customs and Trade Regulation			
REGRESSORS	OProbit		IV-OProbit		
	Coef.	P-value	Coef.	P-value	
Size = Small $\geq 5$ and $\leq 19$					
Size = Medium $\geq 20$ and $\leq 99$	-0.141	0.627	-0.269	0.418	
Size = Large $\geq 100$	0.502	0.182	0.198	0.732	
Type = Manufacturing	0.712	0.022	0.747	0.016	
Type = Retail	0.777	0.022	0.800	0.014	
Industry = Construction Section F	2.277	0.021	2.291	0.018	
Industry = Wholesale	1.330	0.001	1.312	0.001	
Industry = Transport Section I	0.998	0.016	1.011	0.011	
Internationally-recognized quality certification = Yes	2.561	0.000	2.572	0.000	
Internationally-recognized quality certification = No	1.166	0.016	1.117	0.025	
Growth	2.141	0.061	2.134	0.065	
/cut_1_1	1.925	0.000	1.837	0.001	
/cut_1_2	2.375	0.000	2.286	0.000	
/cut_1_3	3.473	0.000	3.374	0.000	
/cut_1_4	4.666	0.000	4.554	0.000	
<b>Athrho</b>			0.148	0.389	
Underidentification test	(Kleibergen-Paap rk LM statistic):			31.379	
	Chi-sq(7) P-val =			0.000	
Overidentification test	Hansen J statistic			4.144	
	Chi-sq(6) P-val =			0.657	

Underidentification Test and Overidentification Test calculated on a IV-linear model.



OBSTACLES		Practices of Competitors in the Informal Sector			
REGRESSORS	OProbit		IV-OProbit		
	Coef.	P-value	Coef.	P-value	
Size = Small >=5 and <=19					
Size = Medium >=20 and <=99	-0.319	0.248	0.289	0.450	
Size = Large >=100	0.324	0.336	1.434	0.012	
Type = Manufacturing	-0.828	0.005	-0.810	0.004	
City = La Paz	-1.255	0.001	-1.276	0.000	
City = Santa Cruz	-0.964	0.006	-1.154	0.001	
Industry = Garments	1.979	0.005	1.597	0.013	
Industry = Chemicals	2.004	0.000	2.144	0.000	
Industry = Services of Motor Vehicles	-1.461	0.097	-1.756	0.024	
Legal Status = Privately held, limited liability company	-0.616	0.098	-0.876	0.005	
Percentage held by largest owner (25-49%)	1.365	0.000	1.297	0.000	
Percentage held by largest owner (50-74%)	0.675	0.020	0.620	0.017	
Years Experience Top Manager	-0.022	0.041	-0.019	0.071	
Internationally-recognized quality certification = No	0.301	0.286	0.530	0.074	
/cut_1_1	-2.951	0.000	-2.398	0.000	
/cut_1_2	-2.541	0.000	-2.009	0.001	
/cut_1_3	-1.336	0.002	-0.897	0.090	
/cut_1_4	-0.482	0.278	-0.089	0.859	
<b>Athrho</b>			-0.533	0.052	
Underidentification test	(Kleibergen-Paap rk LM statistic):			3277.000	
	Chi-sq(5) P-val =			0.000	
Overidentification test	Hansen J statistic			4.035	
	Chi-sq(4) P-val =			0.401	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

OBSTACLES		Access to Land			
REGRESSORS	OProbit		IV-OProbit		
	Coef.	P-value	Coef.	P-value	
Size = Small >=5 and <=19					
Size = Medium >=20 and <=99	-0.179	0.527	-0.236	0.494	
Size = Large >=100	0.262	0.377	0.139	0.806	
City = Santa Cruz	-0.603	0.021	-0.584	0.031	
Industry = Foods	0.997	0.027	1.027	0.030	
Industry = Hotel and restaurants: section H	0.574	0.018	0.575	0.019	
Industry = Transport Section I	0.851	0.005	0.859	0.006	
Percentage held by largest owner (50-74%)	0.675	0.047	0.679	0.045	
Internationally-recognized quality certification = Yes	1.986	0.000	2.016	0.000	
Internationally-recognized quality certification = No	1.702	0.000	1.704	0.000	
/cut_1_1	1.653	0.001	1.636	0.001	
/cut_1_2	2.150	0.000	2.133	0.000	
/cut_1_3	2.990	0.000	2.972	0.000	
/cut_1_4	4.285	0.000	4.268	0.000	
<b>Athrho</b>			0.054	0.798	
Underidentification test	(Kleibergen-Paap rk LM statistic):			4195.000	
	Chi-sq(5) P-val =			0.000	
Overidentification test	Hansen J statistic			1.108	
	Chi-sq(4) P-val =			0.893	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	Courts			
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small $\geq 5$ and $\leq 19$				
Size = Medium $\geq 20$ and $\leq 99$	0.427	0.209	0.708	0.120
Size = Large $\geq 100$	0.754	0.052	1.429	0.036
Type = Manufacturing	-0.801	0.007	-0.873	0.003
Type = Retail	-0.943	0.002	-0.972	0.002
Industry = Textiles	-1.785	0.007	-1.726	0.004
Legal Status = Publicly listed company	2.895	0.000	2.895	0.000
Legal Status = Privately held, limited liability company	2.434	0.002	2.377	0.003
Legal Status = Sole (proprietorship)	2.893	0.000	3.051	0.000
Legal Status = Partnership	2.393	0.002	2.454	0.001
/cut_1_1	1.380	0.069	1.611	0.045
/cut_1_2	1.884	0.015	2.103	0.010
/cut_1_3	2.584	0.001	2.785	0.001
/cut_1_4	3.702	0.000	3.877	0.000
<b>Athrho</b>			-0.301	0.197
Underidentification test	(Kleibergen-Paap rk LM statistic):			2423.000
	Chi-sq(5) P-val =			0.000
Overidentification test	Hansen J statistic:			4.144
	Chi-sq(4) P-val =			0.387

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	Crime Theft and Disorder			
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small $\geq 5$ and $\leq 19$				
Size = Medium $\geq 20$ and $\leq 99$	-0.479	0.086	-0.803	0.040
Size = Large $\geq 100$	-0.259	0.394	-1.069	0.186
Industry = Textiles	-1.878	0.006	-1.940	0.012
Industry = Retail	0.683	0.012	0.637	0.013
Industry = Hotel and restaurants: section H	0.704	0.056	0.635	0.077
Industry = Transport Section I	0.988	0.009	0.983	0.001
/cut_1_1	-1.244	0.000	-1.425	0.000
/cut_1_2	-0.597	0.039	-0.801	0.013
/cut_1_3	0.051	0.854	-0.172	0.607
/cut_1_4	0.988	0.001	0.734	0.068
<b>Athrho</b>			0.382	0.329
Underidentification test	(Kleibergen-Paap rk LM statistic):			3926.000
	Chi-sq(5) P-val =			0.000
Overidentification test	Hansen J statistic:			3.067
	Chi-sq(4) P-val =			0.547

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	OBSTACLES		Tax Rates	
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small >=5 and <=19				
Size = Medium >=20 and <=99	-0.602	0.034	-0.609	0.120
Size = Large >=100	-0.836	0.011	-0.852	0.100
Type = Manufacturing	-0.610	0.010	-0.609	0.009
Industry = Other Manufacturing	0.858	0.000	0.855	0.000
Industry = Garments	0.906	0.058	0.908	0.067
Industry = Chemicals	-0.902	0.001	-0.906	0.004
Industry = Hotel and restaurants: section H	1.155	0.001	1.155	0.001
Legal Status = Privately held, limited liability company	0.818	0.034	0.823	0.030
Percentage held by largest owner (0-24%)	-2.312	0.000	-2.301	0.000
Percentage held by largest owner (50-74%)	0.594	0.022	0.594	0.022
Internationally-recognized quality certification = Yes	0.545	0.017	0.548	0.035
/cut_1_1	-0.791	0.001	-0.794	0.002
/cut_1_2	-0.121	0.562	-0.124	0.590
/cut_1_3	1.534	0.000	1.531	0.000
/cut_1_4	2.090	0.000	2.087	0.000
<b>Athrho</b>			0.006	0.970
Underidentification test	(Kleibergen-Paap rk LM statistic):		3350.000	
	Chi-sq(6) P-val =		0.001	
Overidentification test	Hansen J statistic		1.787	
	Chi-sq(5) P-val =		0.878	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	OBSTACLES		Tax Administration	
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small >=5 and <=19				
Size = Medium >=20 and <=99	-0.722	0.008	-0.763	0.052
Size = Large >=100	-0.616	0.074	-0.710	0.203
Industry = Other Manufacturing	0.619	0.019	0.606	0.025
Industry = Textiles	-1.760	0.003	-1.765	0.004
Industry = Hotel and restaurants: section H	1.162	0.000	1.160	0.000
Legal Status = Privately held, limited liability company	0.835	0.013	0.864	0.015
Percentage held by largest owner (0-24%)	-1.679	0.004	-1.604	0.021
Percentage held by largest owner (50-74%)	0.670	0.020	0.672	0.019
Principal Owner Gender= Female / Are any of the pri	-0.479	0.060	-0.483	0.061
Growth	1.925	0.092	1.903	0.098
/cut_1_1	-0.826	0.000	-0.850	0.001
/cut_1_2	-0.196	0.451	-0.219	0.472
/cut_1_3	1.774	0.000	1.750	0.000
/cut_1_4	2.287	0.000	2.260	0.000
<b>Athrho</b>			0.039	0.842
Underidentification test	(Kleibergen-Paap rk LM statistic):		23.417	
	Chi-sq(6) P-val =		0.001	
Overidentification test	Hansen J statistic		2.961	
	Chi-sq(5) P-val =		0.706	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

OBSTACLES		Business Licensing and Permits			
REGRESSORS	OProbit		IV-OProbit		
	Coef.	P-value	Coef.	P-value	
Size = Small >=5 and <=19					
Size = Medium >=20 and <=99	-0.792	0.002	-1.125	0.000	
Size = Large >=100	-1.358	0.002	-2.245	0.000	
Type = Manufacturing	0.591	0.097	0.720	0.032	
Industry = Other Manufacturing	1.323	0.001	1.356	0.000	
Industry = Foods	1.375	0.012	1.599	0.003	
Industry = Textiles	-1.309	0.037	-1.293	0.065	
Industry = Plastics & rubber	1.889	0.019	2.053	0.012	
Industry = Construction Section F	1.895	0.000	2.025	0.000	
Industry = Services of Motor Vehides	2.144	0.000	2.521	0.000	
Industry = Wholesale	1.585	0.000	1.646	0.000	
Industry = Retail	1.039	0.042	1.205	0.010	
Industry = Hotel and restaurants: section H	1.966	0.000	2.052	0.000	
Industry = Transport Section I	1.864	0.000	2.047	0.000	
Legal Status = Privately held, limited liability company	0.794	0.021	0.940	0.000	
Principal Owner Gender= Female / Are any of the pri	-0.437	0.076	-0.412	0.062	
/cut_1_1	-0.133	0.671	-0.142	0.620	
/cut_1_2	0.952	0.003	0.910	0.002	
/cut_1_3	2.304	0.000	2.207	0.000	
/cut_1_4	3.353	0.000	3.210	0.000	
<b>Athrho</b>			0.454	0.007	
Underidentification test	(Kleibergen-Paap rk LM statistic):			19.774	
	Chi-sq(6) P-val =			0.003	
Overidentification test	Hansen J statistic			6.840	
	Chi-sq(5) P-val =			0.233	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

OBSTACLES		Political Instability			
REGRESSORS	OProbit		IV-OProbit		
	Coef.	P-value	Coef.	P-value	
Size = Small >=5 and <=19					
Size = Medium >=20 and <=99	0.064	0.839	-0.398	0.323	
Size = Large >=100	0.664	0.055	-0.342	0.635	
Industry = Textiles	-1.377	0.055	-1.321	0.098	
Industry = Chemicals	-1.266	0.000	-1.407	0.000	
Industry = Hotel and restaurants: section H	0.455	0.095	0.475	0.080	
Legal Status = Sole (proprietorship)	-0.710	0.061	-0.833	0.022	
Percentage held by largest owner (0-24%)	-1.383	0.000	-0.793	0.076	
Percentage held by largest owner (75-100%)	-0.904	0.005	-0.773	0.024	
Principal Owner Gender= Female / Are any of the pri	-0.510	0.039	-0.500	0.049	
Internationally-recognized quality certification = Yes	0.433	0.125	0.542	0.079	
/cut_1_1	-1.960	0.000	-2.143	0.000	
/cut_1_2	-1.170	0.001	-1.378	0.000	
/cut_1_3	-0.461	0.142	-0.690	0.037	
/cut_1_4	0.675	0.017	0.392	0.239	
<b>Athrho</b>			0.394	0.098	
Underidentification test	(Kleibergen-Paap rk LM statistic):			19.708	
	Chi-sq(4) P-val =			0.001	
Overidentification test	Hansen J statistic			1.662	
	Chi-sq(3) P-val =			0.645	

Underidentification Test and Overidentification Test calculated on a IV-linear model.

	OBSTACLES		Corruption	
REGRESSORS	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small >=5 and <=19				
Size = Medium >=20 and <=99	-0.103	0.720	0.102	0.816
Size = Large >=100	0.145	0.627	0.601	0.384
City = Santa Cruz	0.751	0.001	0.662	0.022
Industry = Textiles	-2.189	0.000	-2.117	0.000
Industry = Plastics & rubber	-0.832	0.089	-0.934	0.049
Industry = Hotel and restaurants: section H	0.935	0.007	0.930	0.006
Industry = Transport Section I	0.823	0.048	0.770	0.088
Percentage held by largest owner (25-49%)	1.045	0.008	1.016	0.009
Percentage held by largest owner (50-74%)	0.721	0.019	0.687	0.026
Principal Owner Gender= Female / Are any of the pri	-0.791	0.000	-0.795	0.000
Internationally-recognized quality certification = Yes	1.511	0.000	1.473	0.000
Internationally-recognized quality certification = No	1.215	0.001	1.282	0.000
/cut_1_1	0.109	0.735	0.235	0.488
/cut_1_2	0.689	0.063	0.807	0.029
/cut_1_3	1.164	0.002	1.279	0.001
/cut_1_4	2.474	0.000	2.580	0.000
<b>Athrho</b>			-0.207	0.405
Underidentification test	(Kleibergen-Paap rk LM statistic):			4770.000
	Chi-sq(4) P-val =			0.000
Overidentification test	Hansen J statistic			12.609
	Chi-sq(3) P-val =			0.027

Underidentification Test and Overidentification Test calculated on a IV-linear model.

	OBSTACLES		Access to Financing	
REGRESSORS	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small >=5 and <=19				
Size = Medium >=20 and <=99	-0.596	0.025	-1.413	0.000
Size = Large >=100	-1.069	0.000	-2.965	0.000
Type = Manufacturing	0.592	0.036	0.492	0.062
City = Santa Cruz	0.120	0.582	0.324	0.087
Industry = Foods	0.501	0.083	0.900	0.001
Industry = Textiles	-2.349	0.000	-1.970	0.012
Legal Status = Publicly listed company	-1.225	0.000	-1.209	0.026
Legal Status = Sole (proprietorship)	0.015	0.972	-0.743	0.026
Legal Status = Partnership	-0.243	0.227	-0.687	0.002
Percentage held by largest owner (0-24%)	0.766	0.065	1.775	0.001
Percentage held by largest owner (50-74%)	0.732	0.001	0.497	0.020
Internationally-recognized quality certification = Yes	1.105	0.000	1.033	0.000
/cut_1_1	-0.591	0.064	-1.379	0.000
/cut_1_2	-0.242	0.450	-1.093	0.000
/cut_1_3	0.961	0.002	-0.105	0.771
/cut_1_4	2.199	0.000	0.964	0.106
<b>Athrho</b>			1.120	0.001
Underidentification test	(Kleibergen-Paap rk LM statistic):			2912.000
	Chi-sq(6) P-val =			0.000
Overidentification test	Hansen J statistic			4.293
	Chi-sq(5) P-val =			0.508

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	OBSTACLES		Labor Regulations	
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small >=5 and <=19				
Size = Medium >=20 and <=99	0.016	0.953	0.170	0.594
Size = Large >=100	0.484	0.052	0.826	0.034
Type = Manufacturing	-1.131	0.000	-1.128	0.000
City = La Paz	-0.938	0.017	-0.960	0.017
City = Santa Cruz	-0.835	0.021	-0.905	0.015
Industry = Other Manufacturing	0.942	0.000	0.900	0.001
Industry = Foods	0.946	0.001	0.866	0.010
Industry = Garments	1.884	0.020	1.804	0.025
Industry = Plastics & rubber	1.430	0.016	1.341	0.029
Industry = Transport Section I	-1.024	0.023	-1.073	0.019
Legal Status = Publicly listed company	-0.682	0.047	-0.735	0.034
Legal Status = Partnership	0.477	0.055	0.482	0.055
Percentage held by largest owner (50-74%)	0.587	0.014	0.575	0.017
Percentage held by largest owner (75-100%)	-0.544	0.062	-0.574	0.053
Principal Owner Gender= Female / Are any of the pri	-0.608	0.006	-0.614	0.006
/cut_1_1	-2.591	0.000	-2.545	0.000
/cut_1_2	-1.497	0.000	-1.468	0.000
/cut_1_3	-0.220	0.560	-0.196	0.603
/cut_1_4	0.901	0.031	0.933	0.025
<b>Athrho</b>			-0.161	0.300
Underidentification test	(Kleibergen-Paap rk LM statistic):			4626.000
		Chi-sq(7) P-val =		0.000
Overidentification test	Hansen J statistic			3.973
		Chi-sq(6) P-val =		0.680

Underidentification Test and Overidentification Test calculated on a IV-linear model.

REGRESSORS	OBSTACLES		Inadequately Educated Workforce	
	OProbit		IV-OProbit	
	Coef.	P-value	Coef.	P-value
Size = Small >=5 and <=19				
Size = Medium >=20 and <=99	-0.293	0.291	-0.504	0.180
Size = Large >=100	-0.106	0.667	-0.550	0.340
Type = Retail	0.595	0.081	0.611	0.076
City = Santa Cruz	0.389	0.095	0.447	0.041
Industry = Other Manufacturing	0.829	0.013	0.822	0.013
Industry = Textiles	-2.050	0.025	-2.098	0.031
Industry = Garments	-0.735	0.076	-0.655	0.105
Industry = Plastics & rubber	1.467	0.033	1.571	0.019
Industry = Construction Section F	0.938	0.043	0.946	0.025
Industry = Retail	-0.933	0.097	-0.938	0.080
Percentage held by largest owner (0-24%)	-1.733	0.000	-1.505	0.011
Percentage held by largest owner (50-74%)	0.514	0.043	0.532	0.030
Internationally-recognized quality certification = Yes	0.707	0.018	0.692	0.028
Internationally-recognized quality certification = No	0.776	0.010	0.694	0.023
/cut_1_1	-0.781	0.005	-0.922	0.005
/cut_1_2	0.278	0.460	0.130	0.769
/cut_1_3	1.427	0.000	1.267	0.011
/cut_1_4	2.399	0.000	2.231	0.000
<b>Athrho</b>			0.187	0.424
Underidentification test	(Kleibergen-Paap rk LM statistic):			4536.000
		Chi-sq(6) P-val =		0.000
Overidentification test	Hansen J statistic			2.457
		Chi-sq(5) P-val =		0.652

Underidentification Test and Overidentification Test calculated on a IV-linear model.