UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Informal Micro and Small Enterprises in Bolivia

- An Empirical Analysis

Rebecca Stål

Bachelor thesis 15 ECTS
Department of Economics and Statistics
School of Business, Economics and Law University of Gothenburg
June 2016

Authors: Tina Afshari & Rebecca Stål
Supervisor: Dick Durevall

Abstract

The major part of economic activity in Bolivia is informal, and most enterprises in Bolivia are micro firms. This thesis seeks to examine the characteristics of informal and formal firms in Bolivia. Previous studies show that the relationship between formality and revenue is positive. In order to test this hypothesis we use a survey with micro and small manufacturing firms conducted by the Bolivian National Institute of Statistics. We also examine variables that would affect the probability of a firm being formal. We find a significant positive correlation between annual revenue and formality when controlling for other relevant variables. We also show that firms owned by women have a negative effect on revenue. Furthermore, we find that education increases the probability of owning a formal firm and that the percentage of women in the workforce decreases the probability of a firm being formal.

Keywords: Bolivia, informality, formal, micro enterprises, women.

Acknowledgement

We would like to thank our supervisor Professor Dick Durevall for his valuable guidance and constructive feedback. Our sincere thanks to the individuals and organizations in Bolivia for generously disposing their time and insight; Confederación de Empresas Privadas de Bolivia, Federación de Empresas Privadas de Cochabamba, Andrés Franco Aguilar, Instituto de Estudios Avanzados en Desarollo and Ministerio de Desarollo Productivo. Last but not least, we want to express our gratitude to SIDA (The Swedish International Development Cooperation Agency) and the Department of Economics and Statistics at the University of Gothenburg for giving us the opportunity to conduct this field study.

Table of Contents

1. Introduction

Ever since it was uncovered and defined in the early 1970's, informal economy has been debated and continues to be so by policy makers and researchers. The importance of the global workforce outside the labour legislation or social protection makes it an important area in the study of economics in general and in particular development economics.

A large share of global employees are not protected by labour legislation or social security. In spite of this, informal work has not only persisted and expanded; it has also appeared in new forms in unanticipated places, often limiting productivity and opportunities for growth (Chen, Vanek & Carr 2004). It is at the same time a facilitator of economic activity while also an obstacle to it. Informal activities have negative implications for employment, growth and the provision of public goods (Sakho & World Bank 2009). Bolivia is of key importance because it has the highest rate of employment in the informal economy in Latin America and the Caribbean (ILO 2013).

A relevant characteristic of Bolivia's high informality is the large share of informal micro firms, in this study defined as firms with four or less individuals. Micro firms are estimated to constitute 95 per cent of all enterprises in Bolivia (INE 2013). These firms are associated with lower profits and lower degree of formality in comparison to larger firms (World Bank 2007).

This study aims to map characteristics of informal micro and small firms in Bolivia. We examine theories of informality in general and informality in Bolivia. Since firms' informality and limits to growth is associated with governmental regulation (Maloney 2004), we also examine degrees of formality and the formalization process in Bolivia. We look at the association between revenue and formality for manufacturing firms. Our hypothesis is that a formal firm have higher estimated revenue. We also examine the association between formality and individual- and firm characteristics. We expect our results to show that education, the age of the business owner and the number of years a firm has been active increase the probability of a firm being formal. Since previous studies suggest that women in Bolivia earn less and are more often informal we investigate the association between firm revenue and female ownership, as well as the probability of the firm being formal depending on the percentage of women in the workforce. The study uses data on micro and small manufacturing firms collected by Bolivia's National Statistics Institute. The results show that

formal firms have higher estimated revenues and that education, the age of the owner as well as the age of the firm increases the probability of formality, while a higher percentage of women working in the firm decreases the probability.

The structure of the paper is as follows: a literature review in section 2 is followed by informality and government regulation in Bolivia, in section 3. Section 4 contains differences between formal and informal firms and in section 5 we present our methodology. The empirical analysis and results are discussed in section 6. Section 7 concludes the thesis. An appendix is found in the end.

2. Literature Review

2.1 Informality

Many studies on the topic acknowledge the controversies in defining informal economic activities. The International Labour Organization (ILO) first coined the phrase *informal sector* in the 1970s during field research about additional income-generating activities. While the *informal sector* is often used to describe enterprises and economic activity, the new definition; *informal economy*, seeks to include all "…employment relationships that are not legally regulated or protected" (Chen 2007, p. 1). In short, the new definition of the *informal economy* focuses on the kind of employment in addition to the characteristics of enterprises. *Informal employment* includes both self-employment in smaller unregistered enterprises and wage employment that is unprotected. Furthermore, informal economy is often restricted to non-agricultural activities and will be referred to as such in this paper (Chen 2007).

It is worth noting that formal and informal activities often are interactive and overlapping due to the nature of the production system. There are few informal firms that operate in total isolation from formal enterprises. Most informal firms source raw materials or supply finished goods to formal enterprises, or both (Chen 2007).

Despite its negative consequences for economic development and social protection, the informal economy can also alleviate poverty by providing job opportunities to individuals who are disadvantaged in the formal economy (Sakho & World Bank 2009). Informal activities provide opportunities for the lower income levels, constituted mainly by women,

indigenous people, young people and the older generations, often with a lower than average level of education (Collao et al. 2011). Maloney (2004) finds a positive correlation between the percentage of population active in the informal economy and average years of schooling. A lack of education coupled with a scarcity of formal jobs make individuals seek income opportunities outside the formal economy. However, both wages and job-security in the informal economy are generally lower than in the formal economy (World Bank 2007). ILO (2012) identifies a positive association between the percentage of population living below the poverty line and the percentage of labour force engaged in the informal economy.

An important aspect of informality is low productivity as a result of limited access to physical, financial and human capital (Sakho & World Bank 2009). Informality is also closely linked to the share of labour force working in micro and small firms. According to the World Bank (2007), low productivity can be the cause of the plenitude of micro firms. Maloney (2004) finds a negative correlation between the share of self-employed in the labour force and industrial productivity. An increase in productivity and salaries in the formal economy increases the opportunity cost for self-employed in the informal economy as the labour demand curve shifts outwards. Increased productivity can thus lead to a decrease in the share of informal activities as individuals change from small-scale self-employment to formal employment.

2.2 Informality and Firms

As discussed in the preceding section, there is a link between informality, productivity and the size of firms in an economy. La Porta & Shleifer (2008) find evidence for lower profits and lower production among informal firms in cross-country data. This is partly explained by the lower educational level and lower managerial level of informal firm owners. Gennaioli, La Porta, Lopez-de-Silanes & Shleifer (2013) find that the low productivity of informal firms is related to the low level of human capital of the people who run them. The World Bank (2007) shows that formal firms typically have higher labour productivity, while informal firms are more labour intensive since the comparative cost of labour they face is lower than that of formal firms. World Bank (2007) also finds that both types of firms seem to share similar constraints, except for the cost of credit, which appears to affect informal firms more. The cost and the limited access to credit forces informal firms to rely more on their own savings and loans from family and friends (World Bank 2007). The limited access to credit in turn

affects the access to equipment and physical capital as well as access to business and manufacturing premises.

Micro and small firms tend to have less access to capital even though their return to capital is higher. A study based on *Mexico's National Survey of Microenterprises* shows that returns to capital for firms with investments smaller than 200 dollars is 15 per cent per month, while enterprises with investments higher than 500 dollars get returns to capital of 3-5 per cent (McKenzie & Woodruff 2006). Despite this claim, many micro and small firms operate below their efficient scale of production, which is partly due to lack of credit, according to the World Bank (2007). Providing credit to small firms is risky and expensive in comparison to larger firms. Also, micro firms operated by women generally have less capital than comparative male firms, since it is more difficult for women to accumulate capital. Women are to a larger extent responsible for the household and child rearing, which take time away from paid work. Women also tend to earn less than men for the same paid work (Andersen & Muriel 2007).

Why are firms informal despite their overall lower profit and productivity? Sakho & World Bank (2009) consider informality to be a rational choice; it is attractive to so many as it offers increased flexibility and independence, especially if the services provided in the formal economy are fairly poor.

Female firm owners operate on a lower relative scale and their firms are more often informal. The higher rate of women active in the informal economy might reflect their greater need for flexibility due to reproductive and household roles (Sakho, & World Bank 2009). One possible explanation is that women have a smaller incentive to expand their business since it would then lose some of its attractive characteristics. Furthermore, profitability of female-owned firms is typically lower, around 40 per cent lower than male micro firms a month (Andersen & Muriel 2007).

Most notably the poor and uneducated parts of the workforce tend to work in the informal economy (Selby, Murphy & Lorenzen 1990). Despite the benefits of high flexibility, informal activities are not always a satisfactory choice. Mercado & Rios (2005) find evidence for high dissatisfaction among the informal workforce. Furthermore, it matters whether the transition into the informal economy is voluntary or not. Maloney (2004) finds evidence for increased

wages when workers in Mexico voluntarily transitioned from formal employment to informal self-employment. One explanation for this wage gain might be attributed to the need for informal wages to, at least to some extent, cover for the lost benefits of social protection.

Previous literature on the subject of informality presents various explanations of why some firms are informal; some argue formality is a choice made by firms, while others explain informality as a result of exclusion.

Barriers to formality such as complex and costly regulations, a view most famously presented by de Soto (1998), is one type of exclusion from formality. Maloney (2004) presents rather contrary evidence of micro firms' voluntary participation in formal institutions, the decision being made in a cost-benefit analysis. Business owners choose their degree of participation according to their preferences and the constraints faced. Similarly, Perry et al. (2007) underline the importance of the "social contract" between state and economic actors. If the state is not able to provide services for economic actors, the benefits of registering and paying taxes would be substantially diminished. Workers in the informal economy may instead choose to rely on social protection provided by other actors.

McKenzie & Sakho (2008) argue that firms choose whether to become formal by registering for taxes or not if the expected present value of net benefits from becoming formal outweighs the direct costs. That is, the choice between formality and informality is illustrated in the following equation:

$$\left[\sum_{t=1}^{T} \delta^t E\left(\pi_{F,t} - \pi_{I,t}\right) + \theta_{law-abiding}\right] > \left[C_{Money} + C_{Time} + C_{Information}\right] \quad (1)$$

Where $\pi_{F,t}$ indicates the firm's profit if it is formally registered at time t, and $\pi_{I,t}$ indicates the firm's profit if it is not formally registered at time t. $\theta_{law-abiding}$ indicates the benefit to firm owners from following the law and to make them feel like they are contributing to state welfare by paying taxes. C_{Money} indicates the monetary, C_{Time}, time and $C_{Information}$ information costs from registering (McKenzie & Sakho 2008).

The equation above demonstrates an essential challenge of detecting the effect of formality on a firm's profitability. The effect of formality on firms' profits, $(\pi_{F,t} - \pi_{I,t})$, depends on the

option to register for taxes. Hence, if there are no costs of registering and no non-monetary benefits from doing so, firms that find it profitable to be registered will have done so and only firms that don't find it profitable to be registered will continue to be informal. The costs of time and information will depend on the time it takes to register and also the distance from the firm and an office where they can register, and also the amount of general information that is available about the registration procedure.

3. Background

In recent years, significant changes have taken place in Bolivia. Between 2001 and 2005 the country went through five different presidencies. Since the election of the first indigenous President Evo Morales in 2006, the country has had an average growth rate of 5 per cent, partly due to high export prices on commodities such as gas, minerals and soybeans (The Economist 2014; World Bank 2015). The government under Morales introduced a new constitution, adopted in 2009. The same year *Plan Nacional de Desarrollo* and *Plan Sectorial de Desarrollo Productivo con Empleo Digno* came into practice, both containing objectives for decreasing informality. Efforts have focused mainly on labour legislation, while costs and bureaucracy remain high (Estado Plurinacional de Bolivia 2009).

3.1 Informality in Bolivia

In Bolivia, the informal economy amounts to around 70 per cent of gross domestic product, the highest in Latin America (Schneider 2005). Bolivia also has the highest rate of informal employment in Latin America, reaching 75.6 per cent (ILO 2013). Additionally, data on five-year periods starting in 1990 shows that Bolivia is one of the few economies in Latin America where non-agricultural employment in the informal economy has increased (Charmes 2012). The plenitude of micro enterprises in Bolivia affect tax collection, 10 companies provide 53 per cent of the country's tax revenues (SIN 2014).

The National Statistics Institute (INE 2013) reports that 94,9 per cent of all enterprises in Bolivia are micro enterprises (1-4 employees), while 4,8 per cent are small and medium enterprises (5- 49 employees) and only 0,3 per cent are large enterprises (50 or more employees). The same data presents the existence of 623,251 micro enterprises across the

country: 222,012 are in La Paz (35,6 per cent), 153,033 in Santa Cruz (24,6 per cent) and 116,980 in Cochabamba (18,8 per cent) (Salvatierra 2013).

Statistics from Bolivia's household survey (INE 2014) show that the main part of Bolivians are self-employed, 42,77 per cent of women and 47,75 per cent of men are informally self-employed (see Table (A.2) in the appendix). Women are more often informal and operate in sectors where profits are lower such as food vending, textiles and clothing manufacturing, while men tend to operate in wood manufacturing and transportation sectors where profits are higher (Lunde, Sakho & Arribas-Banos 2009).

In the last few decades an increasing number of Bolivian women have entered into the labour market. However, the entry rate has not been matched by an increase in formal working positions (Andersen & Muriel 2007). Labour regulations are more restrictive towards women, as an example the permitted working hours per week are lower and they are not allowed to work at night apart from a few exceptions (NATLEX 2014). Female owned-businesses also tend to be less profitable.

3.2 Governmental Regulations and Business Climate

Economies with more business regulations and weaker judicial services also tend to have higher informality in the long run (Loayza & Rigoloni 2006). As discussed in section (2.3), high costs of registering and paying taxes influence the firms' decision to become formal. Grounding in this previous discussion, we proceed to a description of government regulations in Bolivia.

For a firm to be fully formal in Bolivia, three types of registration are required at three different government agencies. First, the firm must obtain a municipal business license by registering with the municipal government. Second, they need to obtain a tax identification number by registering with the National Tax Office (*Servicios de Impuestos Nacionales, SIN*). Third, and finally, they need to register at the Registry of Commerce (*Fundempresa*). In addition to registering their firm with these three institutions, firms with employees must register with the National Health System (*Caja Nacional de Salud, CNS*) in order for them to avail of health benefits. Furthermore, they must be registered with the Pension Fund (*Administradora de Fondos de Pensiones*, AFP), for social security, and finally, the employer

needs to register their employees with the Labour Ministry *(Minesterio de Trabajo, Empleo y Prevision Social)*. Thus, nearly all micro and small enterprises are informal to some degree (McKenzie & Sakho 2008).

Using a comparative lens, the Doing Business Index (World Bank 2015) ranks economies with respect to business regulations on local firms. Bolivia ranks at 157 of the 189 economies represented in the index. Most notably, under the topic *Paying taxes*, Bolivia ranks last of the 189 countries. This is largely due to the world's highest average time taken; to prepare, file and pay taxes. The procedures (Table 1) take on average 1025 hours per year compared with the average 366 hours for the Latin American and Caribbean region. Under the topic *Starting a business,* Bolivia ranks 171 with an average of 49 days, a cost of 64,4 per cent income per capita with 15 corresponding procedures.

TABLE 1: DOING BUSINESS IN BOLIVIA

Starting a Business in Bolivia				Paying Taxes		
Procedures (number)	Time (days)	Cost (% of income)	Paid-in min. capital (% of income)	Payments (number)	Time (days)	Total tax rate (% of profit)
15	50	57.9	0	42	1025	83.7

Source: Doing Business Index (2016).

Doing Business measures companies that are a limited liability company with a minimum of five employees. The Doing Business Index is included in this study to give an overall representation of how businesses in Bolivia relate to businesses in other countries. For micro and small enterprises the procedures are fewer than for limited liability companies.

Applying our theoretical framework as seen in equation (1) in section (2.3), we see that becoming formal in Bolivia is associated with numerous procedures and costly regulations, making firms less likely to be formal. The equation shows that, among others factors, the time and costs of registering will determine weather a firm become formal or not. For micro firms in Bolivia the time to complete these registrations require seven procedures, takes about 42 days excluding the time and cost it takes traveling back and forth to the offices and the cost for all procedures is 433 BOB, which corresponds to 15,09 per cent of the income (see Table (A.3) in the appendix).

Other costs associated with formal activities is paying employees according to minimum wage (see Figure (A.1) in the appendix) and paying obligatory Christmas bonus. The government under Morales has implemented annual increases in the minimum wage, averaging 14,4 per cent annually since 2006. 86 per cent of the salaried workforce are receiving this wage, while only 42 per cent of the, non-salaried workers are paid accordingly (Muriel 2014). Also, since 2014 a double Christmas bonus is obligatory for formal firms (Minesterio de Trabajo, Empleo y Prevision Social 2015).

As discussed previously there are different degrees of formality. Firms registering for a tax number would first of all be obliged to pay the costs of registering and taxes. Moving beyond paying taxes to engage with more government institutions increases the regulations applicable to firms. A firm registered at the tax office might not pay minimum wage and Christmas bonus to all their employees, but a firm seeking to be fully formal would have to abide by these regulations.

4. Data and Data Description

In this section we present the data and a description of the data, we also compare main characterises of formal and informal firms.

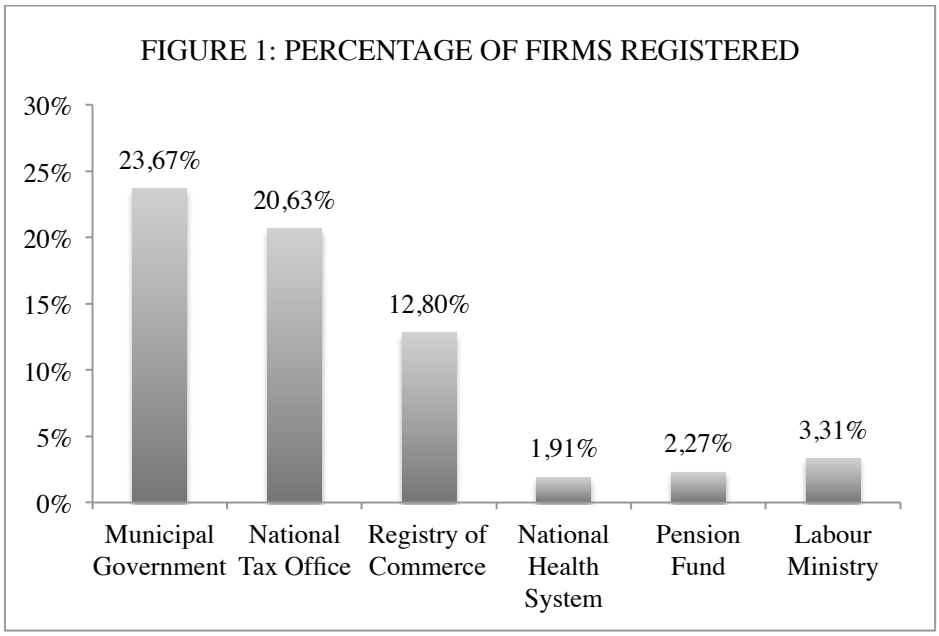
4.1 Data

The cross-sectional data, *Encuesta MyPEs de la Industria Manufacturera,* was collected by The National Institute of Statistics in Bolivia. The survey was conducted in 2014 and contains 9516 observations. The data has been collected from the nine different geographical departments in Bolivia and includes 21 different manufacturing sectors.

4.2 Data Description

In this study we define formality as having a tax number from the tax office. This definition was introduced as a measure of informality by UDAPE (2007) and has been used in previous studies in Bolivia to measure the formality of firms (Andersen & Muriel 2007; World Bank 2009). In our sample, registration with the national tax office is the second most common type of registration for firms (Figure 1). A total of 1963 (20,63 per cent) of the firms are formal according to this definition. While 809 firms have registered with all of the three most

common institutions; Municipal Government, National Tax Office and Registry of Commerce, only 94 firms have also registered their employees with the three additional agencies.



Firms that have registered at the tax office are also more likely to engage with other governmental institutions. Formal firms would therefore also be expected to pay the obligatory Christmas bonus to a larger extent than informal firms. However, of the total 1271 firms in the sample that pay Christmas bonuses, 41 per cent are informal. Thus, although informal firms do not comply with legal requirements, they may have a type of adjusted compliance, paying Christmas bonuses but without being obliged to pay the legally determined amounts.

The main part of the informal firms is found in La Paz department (see Figure (A.2) in the appendix). It shows the distribution of formal and informal firms in the nine departments in absolute numbers. A likely contributory factor of the high rate of informality in La Paz is its inclusion of El Alto, a highly informal and fast growing city close to the capital (Hillenkamp, Lapeyre & Lemaître 2014). The rate of formal firms in departments varies between 6 per cent and 37 per cent. However, the procedures of becoming formal are the same for all departments of Bolivia.

Out of the total 21956 individuals in the sample, 63 per cent work in informal firms. The average number of employees per firm is 2,3. Individuals can be divided into eight types of labour activity. Table (2) shows a comparison between the labour activities for formal and informal firms. Individuals in formal firms are more often permanent employees and temporary employees. Only a tenth of formal workers are self-employed. Among informal workers the most common activity is self-employment. It is also more common for individuals in informal firms to be family workers.

TABLE 2: EMPLOYMENT IN FORMAL AND INFORMAL FIRMS

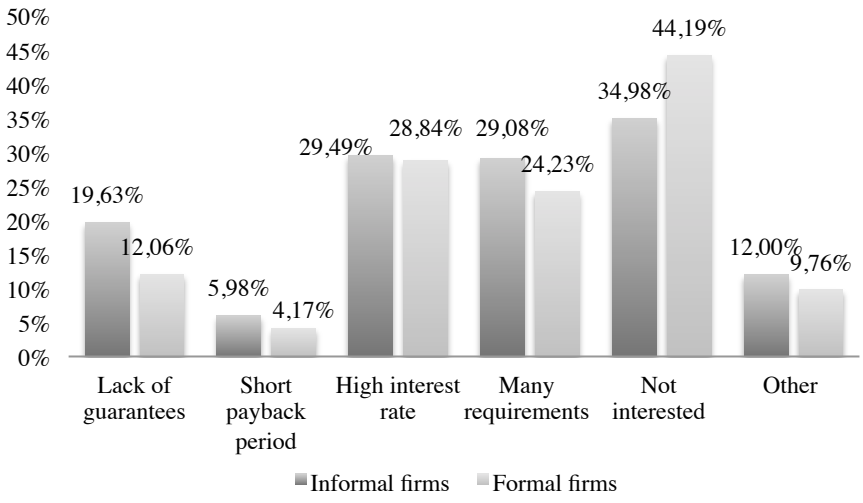
		Receiving Salary				Receiving no Salary			
	Self-employed	Employers	Permanent employees	Temporary employees	Family workers	Employers	Family workers	Trainees	Total
Formal	9.51%	3.98%	36.59%	20.93%	4.75%	15.87%	7.90%	0.47%	100%
Informal	33.72%	2.66%	15.36%	12.53%	5.54%	13.10%	16.52%	0.56%	100%

Table A.4 (in the appendix) presents some of the main differences between formal and informal firms in the sample. The average annual revenue of a formal firm is almost three times as high as than of an informal firm and average revenue per employee in formal firms is 53,7 per cent. Four categories of expenses are presented in which formal and informal firms have similar expenditures as percentage of annual sales in the categories operating costs paid monthly, operating costs paid yearly and utilities expenses. Informal firms pay less for raw materials as a percentage of revenue than formal firms. A notable difference can also be seen in the average value of capital; formal firms have 3,7 times the value of capital, and the double average capital per employee in comparison to informal firms. Formal firms more often have a loan, 51,81 per cent of the formal firms and 35.23 per cent of the firms in our sample have a loan. Information about loans are however limited to the holding of a loan, rather than the size of the loan. The higher amount of capital for formal firms might imply that their loans are larger. Having a loan could, in addition to being an indicator for access to finance, also measure willingness to financial commitment as well as and knowledge about bank procedures.

Despite the difference in the amount of formal and informal firms having a loan, they report similar reasons for not obtaining one. Figure (2) shows that the firms experience similar problems with high interest rates. Informal firms more often report lack of guarantees, short

payback time and many requirements as an obstacle to obtaining a loan. Among both formal and informal firms the most common reason stated is having no interest in obtaining a loan.

FIGURE 2: REASONS FOR NOT OBTAINING A LOAN

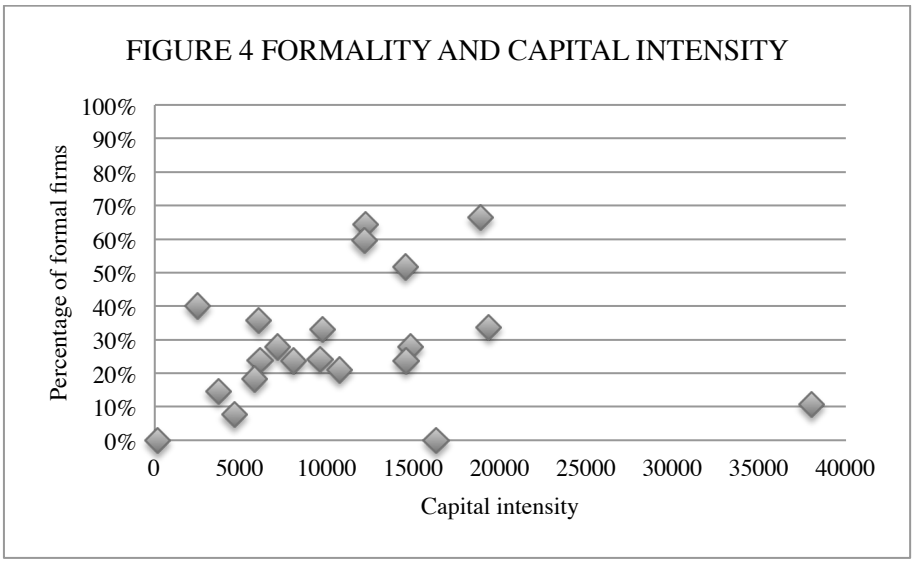


Note: Based on 5825 responses to the question: "Why do you not have a loan?"

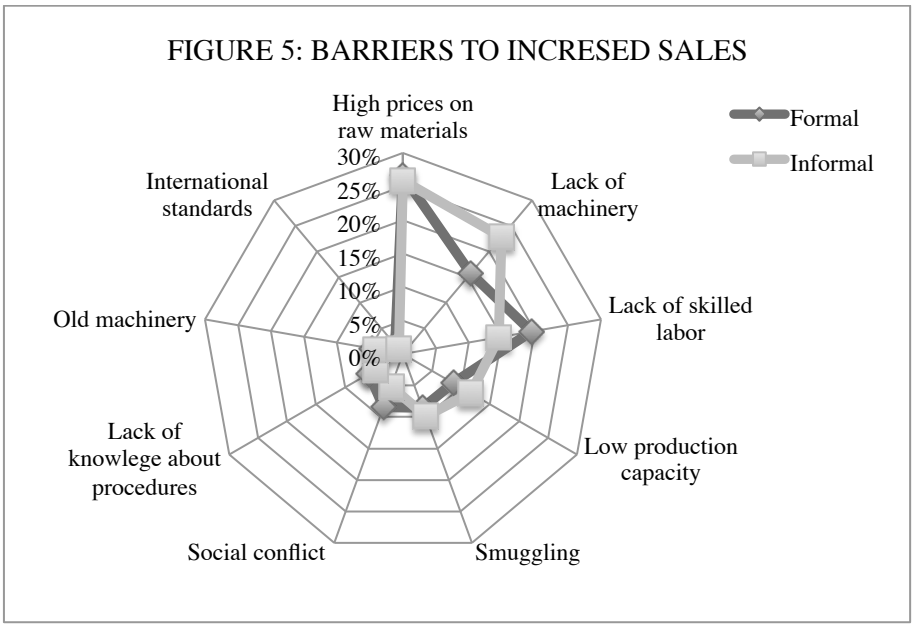
The dataset contains firms in 21 different sectors classified according to the *International Standard Industrial Classification of All Economic Activities, Rev.4* (United Nations Statistics Division, 2016). Table (A.5) in the appendix shows the descriptive statistics of manufacturing firms. Manufacturing of wearing apparel constitutes the largest part of our sample, followed by manufacturing of food products and manufacture of fabricated metal products. '

The rate of formality varies greatly between the different sectors (see Table (A.5) in the appendix). Formality rates of over 50 per cent are found in four industries, the largest of them the printing and reproduction of recorded media. Industries with higher capital intensity tend to have a higher percentage rate of formal firms, with the exception of the manufacturing of wearing apparel.

Figure (4) shows a correlation between the rate of formality and capital intensity (measured as average capital per employee) in the different sectors. Industries with higher capital intensity tend to have a higher percentage of formal firms. The figure also shows an outlier, the sector of wearing apparel, characterized by a low degree of formality, 10,63 per cent and high capital intensity.



High prices on raw materials is the most common reason stated for not increasing sales for both informal and formal firms (Figure 4). Despite this we find no correlation between percentage spent on raw materials (in comparison to total costs) and revenue. Informal and formal firms report similar challenges for increasing sales. Informal firms do however more often report lack of machinery, as an obstacle to increased sales while lack of skilled labour is more common among the formal firms.



Note: Based on 8646 responses to the question: "What are the barriers to increased sales?"

5. Methodology

We estimate the relationship between annual revenue and being formal using the following baseline equation:

$$logrevenue_i = \beta_0 + \beta_1 formal_i + \beta_2 labour_i + \beta_3 labour^2{}_i + \beta_4 logcapital_i + \beta_5 femaleowner_i + \beta_6 loan_i + \varepsilon_i \quad (2)$$

Where the dependent variable is *logrevenue*, which is a measure of the logarithmic value of annual revenue, and *formal* is a dummy variable equal to 1 if the firm has a tax number and 0 if the firm lacks tax number. Logarithmic transformation is done for revenue to achieve an approximation to a normal distribution. The coefficient of interest is the estimated relationship between being formal and revenue of firms.

Most preferably we would use profit as a dependent variable as this would be the most important measure of firm performance. The sample offers several variables for both fixed and flexible costs with the exception of the number of observations reporting salaries and days worked. Because of the limitation in estimating profit we choose to use the second best option of firm performance, annual revenue.

Our hypothesis is that formality has a positive association with firm revenue, all other things being equal.

The other independent variables are: *labour*; the number of people working in the firm independent of position, *logcapital*; the log of total value of machines and equipment. Logarithmic transformation is done for capital to approximate a normal distribution. *Femaleowner* is a dummy variable equal to 1 if the owner or owners are only female. The independent variable *loan* is a dummy equal to 1 if the firm has a loan. The error term, ε, is assumed to be normally distributed.

Since the dataset does not provide information on hours or days worked, it is assumed that all labour categories are contributing equally to the firms' activities and we do not differentiate between positions in the firm. A squared variable of labour is added to the regression to

capture the diminishing marginal productivity of labour. We expect labour to be positively correlated with revenue.

We use total value of machines to represent capital per firm. By using *logcapital* as the total value of machines we control for the differences in output and value of output due to the access to better physical factors of production. The assumption is that a machine with higher quality and/or higher output would also be self-assessed as more valuable and that the value of machines in the sample can be used to represent capital.

We expect that having only female owners have an effect on annual revenue. To control for the difference in revenue attributable to the difference between women and men we add *femaleowner*. Theory suggests that women in Bolivia might choose to be informal due to lifestyle demand; their greater need of being flexible due to household and childcare responsibilities. Our hypothesis is that if a firm has a female owner, it will probably have a negative effect on revenue since most families do not have access to day-care services and the family member's primary responsibility for the children might therefore work fewer days and hours (Andersen & Muriel 2007; World Bank 2009)

Loan is included as a measure of access to financial capital among firms.

Both formal and informal firms might have incentives to avoid reporting their true value of annual revenues and sales. This could cause their financial statements to underrepresent the true profitability (World Bank 2007). Since only 27 per cent of respondents in the survey engage in bookkeeping, an estimation of the total sales over a whole year might contain errors because respondents cannot recall all payments. Furthermore, a lack of separation between private and firm economy means some of the firm assets and outputs might be used for private purposes and are therefore not accounted for in the financial statement. This could lead to an underestimation of the annual revenue and/or an overestimation of costs. When we subtract all four cost categories presented in Table (A.4) (in the appendix) from the revenue a substantial part (33 per cent) of the firms show a negative or break-even result. Notably, this is the result without having subtracted the cost of labour. We assume eventual false estimations are random and do not influence our regression.

Robust standard errors are clustered at the sector level. Revenues for firms within the same sectors may be correlated since they are subject to similar environmental and production characteristics.

In our second regression, we use *formal* as a dependent variable to understand the effects of the explanatory variables in equation (3) below on formality. Our hypothesis is that education has a positive effect on formality while the percentage of female workers might be negatively correlated with formality.

$$formal_i = \beta_0 + \beta_1 education_i + \beta_2 age_i + \beta_3 femalelabour_i + \beta_4 years_i + \varepsilon_i \qquad (3)$$

Our first dependent variable *education*, takes a value from 1-4 depending on the level of education of the owner. 1 = courses for adults with duration less than a year, 2 = primary education, 3 = secondary education, 4 = higher education. Based on our theoretical framework previously discussed, we would expect education to be positively correlated with the probability that a company is formal. *Age* describes the age of the respondent. *Femalelabour* is a variable based on the percentage of total workforce in the firm that are females. We expect this variable to be consistent with previous findings discussed in the literature showing a negative association with formality. *Years* is the number of years the firm has been active. (For a full list of variables see Table (A.1) in the appendix.)

6. Empirical Results and Analysis

The OLS estimation with revenue as dependent variable is presented in Table (3) in the appendix[1]. The results are divided into five different models where several explanatory variables have been added gradually. The estimates show a positive correlation between formality and revenue. Formal firms are predicted to have 23 per cent higher revenue when all control variables are added. The results are economically and statistically significant.

To control for fixed factors that might be correlated with revenue we first introduce fixed effects for departments, in model (4) and in model (5) we introduce fixed effects for sectors.

[1] Due to missing values for annual revenue the observations amount to 6469 firms.

Adding these fixed effects increases the positive coefficient between formality and revenue, as seen in model (5). A formal firm is expected to have higher revenue. After controlling for departments and sectors in model (5) the effect of formality on revenue increases by 4,5 percentage points resulting in a 27,5 per cent estimated revenue for formal firms.

TABLE 3: REVENUE AND FORMALITY

Log revenue	(1)	(2)	(3)	(4)	(5)
Formal	0.230***	0.224***	0.223***	0.261***	0.275***
	(0.0509)	(0.0481)	(0.0481)	(0.0489)	(0.0364)
Labour	0.282***	0.274***	0.271***	0.261***	0.262***
	(0.0142)	(0.0122)	(0.0123)	(0.0129)	(0.0140)
Labour^2	-0.0104***	-0.00970***	-0.00952***	-0.00904***	-0.00927***
	(0.000965)	(0.000846)	(0.000866)	(0.000961)	(0.00102)
Log capital	0.342***	0.321***	0.315***	0.317***	0.320***
	(0.0180)	(0.0125)	(0.0108)	(0.0106)	(0.0134)
Female owner		-0.236***	-0.239***	-0.217***	-0.155***
		(0.0526)	(0.0511)	(0.0438)	(0.0503)
Loan			0.0979**	0.0950**	0.0968***
			(0.0375)	(0.0341)	(0.0337)
Constant	7.665***	7.938***	7.949***	7.977***	7.933***
	(0.201)	(0.141)	(0.133)	(0.123)	(0.109)
Department FE	No	No	No	Yes	Yes
Sector FE	No	No	No	No	Yes
Number of clusters	21	21	21	21	21
R^2	0.518	0.527	0.529	0.540	0.550
Observations	6,469	6,469	6,469	6,469	6,469

Note: The table reports OLS estimates with fixed effects in regression 4 and 5. The unit of observation is the amount of firms that have responded to the questions focused on in the regression. Standard errors are in the parentheses. Standard errors are clustered at the sector level through all regressions.

*** Significant at the 1 per cent level.

** Significant at the 5 per cent level.

Labour also has a positive statistically significant, effect on revenue. In model (5) one additional worker is associated with a 26,2 per cent higher revenue. As the number of workers increases the coefficient of labour decreases. An additional 15 workers have a negative effect on revenue.

Capital is statistically significant and positively correlated with revenue. For every change in capital by one per cent we expect revenue to change by 0,32 per cent, model (5).

The negative effect of having only female owners in model (2) confirms our hypothesis. The variable *femaleowner* has a negative, statistically and economically significant effect on

revenue with 23,6 per cent. When adding more control variables in model (5) the coefficient for female owner decreases, although it continues to have a negative effect on revenue, which would indicate that our results are robust.

Adding the dummy variable in model (3) for whether the firm has a loan, we get an estimated positive, statistically significant coefficient. Firms that have a loan have a 9,68 per cent higher revenue than firms without a loan, model (5).

R-squared increases from 51,8 per cent in model 1, to 55,8 per cent in model (5).

Our linear probability model uses the dummy variable, *formal*, as dependent variable (Table 3)[2]. The results in model (1) illustrate how the probability of a firm being formal increases with 13,6 percentage points for every additional level of education. When controlling for more variables the effect of education on formality decreases but continues to be positive. In model (5) where we have controlled for departments and sectors we notice that the coefficient of education has reduced to 9,23 percentage points. To control for fixed factors that might be correlated with formality, we introduce fixed effects for departments in model (4) and in model (5) we introduce fixed effects for sectors. The results are statistically significant throughout all models.

Our second explanatory variable, *age,* also shows a positive correlation with formality. Older firm owners are more likely to have formal firms. The owner's age is statistically significant and positively correlated but has a very small effect on formality, 0,098 percentage points increase in probability for every additional year of age, model (5).

The variable female labour in model (2) shows that the percentage of female labour is statistically significant at the 1 per cent level and is negatively associated with formality. The larger the share of women in the workforce, the smaller probability the firm has of being formal. The coefficient of *femalelabour* continues to be negatively associated with formality when all control variables are added in model (5). A problem with the linear probability model is that of predicting probabilities that are not contained in the interval 0-1. Therefore we estimate a logit model odds ratio to compare the negative value of *femalelabour*. The logit

[2] Due to missing values, observations amount to 8023 firms.

model confirms that *femalelabour* has a negative coefficient.

The variable *years* has a positive correlation with formality. Operating one more year increases the probability of being formal with 0,172 percentage points when using fixed effects, model (5).

TABLE 4: FORMALITY

Formal	(1)	(2)	(3)	(4)	(5)
Education	0.136***	0.127***	0.127***	0.117***	0.0923***
	(0.00602)	(0.00600)	(0.00600)	(0.00587)	(0.00575)
Age	0.00239***	0.00198***	0.00146***	0.00115***	0.000988**
	(0.000381)	(0.000379)	(0.000440)	(0.000431)	(0.000421)
Female labour		-0.142***	-0.140***	-0.130***	-0.0822***
		(0.0113)	(0.0113)	(0.0111)	(0.0135)
Years			0.00115**	0.00149***	0.00172***
			(0.000490)	(0.000484)	(0.000470)
Constant	-0.252***	-0.152***	-0.143***	-0.194***	-0.165***
	(0.0260)	(0.0270)	(0.0273)	(0.0270)	(0.0304)
Department FE	No	No	No	Yes	Yes
Sector FE	No	No	No	No	Yes
R-squared	0.060	0.079	0.079	0.130	0.198
Observations	8,043	8,023	8,023	8,023	8,023

Notes: The table reports OLS estimates with fixed effects in regression 4 and 5. The unit of observation is the amount of firms that have responded to the questions focused on in the regression. Standard errors are in the parentheses.
*** Significant at the 1 per cent level.
** Significant at the 5 per cent level.

R-squared has increased significantly from 6 per cent in model (1) to 19,8 per cent in model (5) after adding our control variables. Lets not neglect the fact that when we add more variables to the regression R-squared has a capacity of increasing. As can be expected in a linear probability model. There is heteroskedasticity because of the binominal distribution of the error term.

7. Conclusion

The aim of this study has been to map characteristics of formal and informal micro and small firms in Bolivia, and to test if being formal has an effect on revenue. From the results, it can be concluded that being formal has a significant association with firm revenue. This is consistent with our hypothesis, as well as with previous studies.

Although significant associations between formality and firm and individual characteristics are found, this study does not show causal relationships. Thus, the results from the first regression could imply that formal firms have higher revenue because they are formal, or that firms with higher revenue prefer to be formal.

The linear probability regression, with *formal* as dependent variable, show that the education of the owner and the age of the firm increase the probability of a firm being formal. As discussed in the theory section, the cost of information can influence the decision to become formal. Education of the owner in the regression can, in addition to a higher general skill level, also decrease the information cost of formalizing discussed in equation (1). The age of the owner could also decrease the information costs of being formal, since knowledge about procedures may be related to experience. Both the age of the firm owner and the number of years in business of the firm can influence the probability of a firm being a less temporary source of income, and therefore a more likely receiver of investment of time and capital.

As suggested by theory, individuals who cannot find employment elsewhere are more likely to start their own business. This could imply that their activities are based on more short-term engagements while they look for other opportunities. However, the short lifespan of firms could also imply informal firms more often go bankrupt.

In both regressions, being a woman is negatively correlated with both revenue and formality. The coefficients of the female related variables may be overestimated since they also include women's tendency to work fewer paid hours. One possible reason for this is that women have other responsibilities outside of their job, such as taking care of the household and children. The current regressions could suffer from omitted variable bias due to the lack of control for working hours. To further investigate the relationship between women and informality we would need to control for the differences in hours worked by both owners and employees.

Furthermore, we cannot control for other inherent characteristics of firm owners and workers that could be correlated with formality. These could be variables such as knowledge about formalization processes, inclination to entrepreneurship and knowledge about how to run a business, such as marketing and bookkeeping.

The formality of a firm is better expressed in degrees of formality rather than described as exclusively formal or informal. This study defines formality as having a tax number although a fully law abiding firm would be registered at five additional institutions, pay the full Christmas bonus and minimum salary. This suggests that formal, similarly to informal firms, also adjust their degree of participation with government institutions. The study also shows that despite having different characteristics, formal and informal firms face similar challenges in, for example increasing sales and obtaining a loan.

In Bolivia a firm has to include monetary costs of paying taxes, minimum wage, and double Christmas bonuses. But there are also other non-monetary costs of formalization such as loss of flexibility and time taken to learn about, and register with government agencies that are difficult to measure. Also, even if firms would want to become formal they might not afford to do so given their small revenue in comparison to their costs.

In this study, as well as previous studies made on the subject, defining and measuring informality and informal activities provide a challenge to empirical analysis. Cross-sectional data used in this study can uncover important correlations, but do not give opportunities to study causal effects. Additional studies identifying such an effect would certainly be useful for providing policy recommendations for economic development.

References

Andersen, E. L., Muriel, B. 2007, *Informality and productivity in Bolivia: A gender differentiated empirical analysis,* Institute for Advanced Development Studies.

Charmes, J. 2012, "The Informal Economy Worldwide: Trends and Characteristics", *Margin: The Journal of Applied Economic Research,* vol. 6, no. 2, pp. 103-132.

Chen, M.A., Vanek, J. & Carr, M. 2004, *Mainstreaming informal employment and gender in poverty reduction: a handbook for policy-makers and other stakeholders,* WIEGO, London.

Chen, M.A. & World Institute for Development Economics Research 2007, *Rethinking the informal economy: linkages with the formal economy and the formal regulatory environment / [Electronic resource],* United Nations University, World Institute for Development Economics Research, Helsinki, Finland.

Collao, F. R., Matos, M. P., Arroio, A., Zuleta, L. A., Zevallos, E., Adelis, C. F., Graterol, J., Rondón, L. M., Goldstein, E. and Kulfas, M. 2011. *Apoyando a las pymes: políticas de fomento en América Latina y el Caribe,* United Nations, Santiago de Chile.

de Soto, H. 1998, *The other path: The invisible revolution in the third world*, Harper and Row, New York.

The Economist. 2014, *Happily Evo after*. Oct 11th. http://www.economist.com/news/americas /21623707-third-term-non-stick-leader-happily-evo-after [Accessed 1 Jun. 2016].

Estado Plurinacional de Bolivia, 2009, *Plan sectorial de desarrollo productivo con empleo digno*.

FUNDEMPRESA, 2015, *Guía de Trámite para inscribir una Empresa Unipersonal en el Registro de Comercio de Bolivia,* Registro de Comercio de Bolivia.http://www.fundempresa.org.bo/tramites-requisitos-y-formularios/actividades-de-iniciacion/inscripcion-de-comerciante-individual-o-empresa-unipersonal/

Gennaioli, N., La Porta, R., Lopez-de-Silanes, F. & Shleifer, A. 2013, "Human capital in regional development", Quarterly Journal of Economics, vol. 128, no. 1, pp. 105.

Hillenkamp, I., Lapeyre, F. & Lemaître, A. 2014;2013;, *Securing livelihoods: informal economy practices and institutions,* Oxford University Press, Oxford.

ILO, 2013, *Measuring informality: A statistical manual on the informal sector and informal employment,* International Labour Office, Geneva.

ILO 2012, *Statistical update on employment in the informal economy*, International Labour Office. Department of Statistics.

ILO Laborsta, 2012, *Women and men in the informal economy, Statistical picture*, ILO - Department of Statistics, http://laborsta.ilo.org/informal_economy_E.html

Lunde, T., Sakho, Y.S, & Arribas-Banos, M.D. 2009, *Gender Equality as Smart Economics; Choosing Informality,* World Bank Group.

Loayza, N.V. & Rigolini, J. 2006, *Informality Trends And Cycles,* The World Bank.

Maloney, W.F. 2004, "Informality Revisited", *World Development,* vol. 32, no. 7, pp. 1159-1178.

McKenzie, D. & Sakho, Y.S. 2008, Does It Pay Firms To Register For Taxes? The Impact Of Formality On Firm Profitability, The World Bank. pp. 15-24.

McKenzie, D. & Woodruff, C. 2006, "Do Entry Costs Provide an Empirical Basis for Poverty Traps? Evidence from Mexican Microenterprises", Economic Development and Cultural Change, vol. 55, no. 1, pp. 3-42

Mercado, F.A., Ríos, F. 2005, *La informalidad:¿Estrategia de sobrevivencia o forma de vida alternativa?* Instituto de Investigaciones Socio Económicas.

Minesterio de Trabajo, Empleo y Prevision Social, 2015, *Resolución Ministerial No.1031/15*. Estado Plurinacional de Bolivia, La Paz.

Muriel. B. 2014, *Salario mínimo en Bolivia: ¿Quiénes están incluidos y quiénes excluidos?* Inesad. http://inesad.edu.bo/dslm/2014/11/salario-minimo-en-bolivia-quienes-estan-incluidos-y-quienes-excluidos/

NATLEX, 2014, *Ley general del trabajo,* International Labour Office.

Perry, G.E., Arias, O., Fajnzylber, P., Maloney, W.F., Mason, A. & Saavedra-Chanduvi, J. 2007, *Informality: Exit and Exclusion. World Bank Latin American and Caribbean Studies,* World Bank Group.

Porta, R.L. & Shleifer, A. 2008, "The Unofficial Economy and Economic Development", *Brookings Papers on Economic Activity,* vol. 2008, no. 2, pp. 275-363.
Salario Mínimo en Bolivia: ¿Quiénes están Incluidos y Quiénes Excluidos?

Sakho, Y. & World Bank 2009, *Increasing Formality and Productivity of Bolivian Firms: Electronic resource,* World Bank Group, Washington.

Salvatierra, S. 2013. *Banco Sol presta a 91.000 microempresas*. La Razón, June 21st. http://www.la-razon.com/index.php?_url=/suplementos/financiero/BancoSol-presta-microempresas_0_1872412863.html [Accessed 1 Jun. 2016].

Schneider, F. 2005, "Shadow economies around the world: what do we really know?", *European Journal of Political Economy,* vol. 21, no. 3, pp. 598-642

Selby, H.A., Murphy, A.D. & Lorenzen, S.A. 1990, *The Mexican urban household: organizing for self-defense,* 1st edn, University of Texas Press, Austin.

SIN, 2014, *Memoria 2014*, Servicio de Impuestos Nacionales, Estado Plurinacional de Bolivia.

World Bank 2007, *Bolivia: Policies for increasing firms' formality and productivity*. May 17th. http://go.worldbank.org/MYI6G86BR0

World Bank 2009, *Gender in Bolivian Production : Reducing Differences in Formality and Productivity of Firms,* The World Bank, Washington.

World Bank, 2016, *Data by country, GDP growth*., The World Bank. http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/1W?display=default

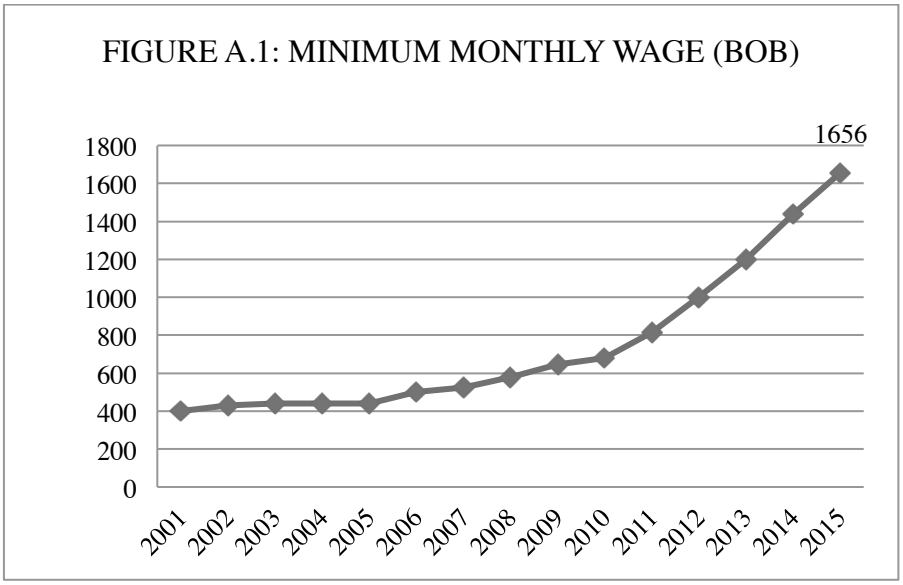
World Bank Group, 2014, *Doing Business 2015, Going Beyond Efficiency 2014*. The World Bank.

UDAPE, 2007, *Informe especial: La informalidad en el mercado laboral urbano 1996–2006*, Unidad de Análisis de Políticas Sociales y Económicas, La Paz.

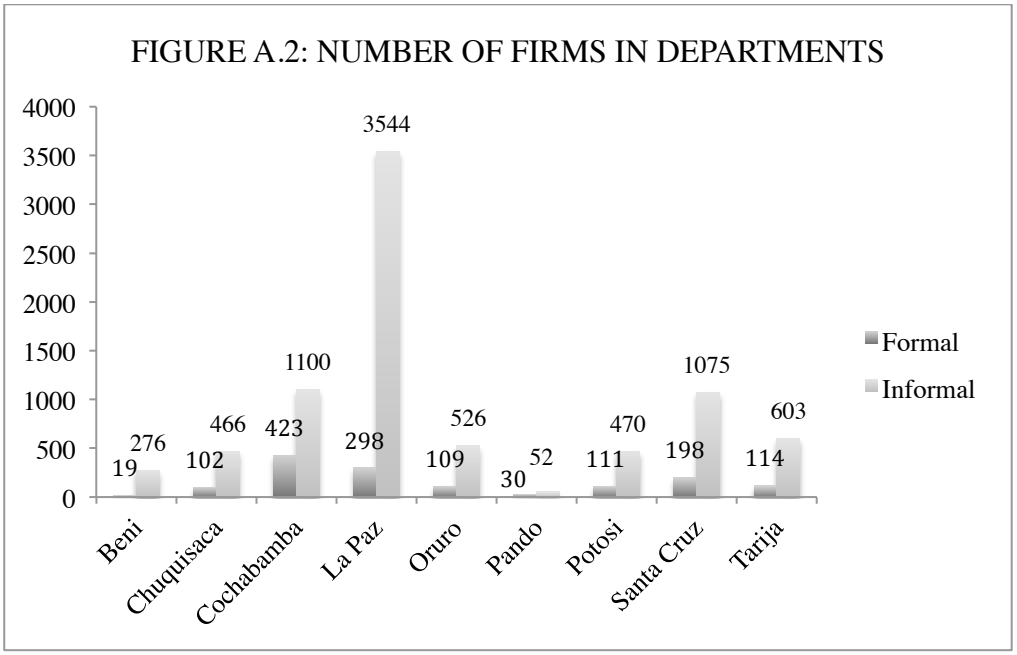
United Nations Statistics Division, 2016**,** *International Standard Industrial Classification of All Economic Activities, Rev.4*, United Nations.

Appendix

Figures



Source: World Bank (2016)



Tables

TABLE A.1: LIST OF VARIABLES

VARIABLE	Obs.	Mean	Std. Dev.	Min	Max
Age	8077	43.15947	12.28931	14	98
Annual revenue	7739	180867.3	371990.6	3975	6300000
Capital	6605	27433.91	93296.1	0	3480000
Education	9516	16.20839	9.264206	0	37
Female labour	8070	.4105164	.4093042	0	1
Female owner	9516	.2941362	.4556774	0	1
Formal	9516	.2062842	.4046581	0	1
Labour	8070	2.720694	2.265839	1	19
Loan	9516	.3865069	.4869746	0	1
Total annual cost	7759	277772.7	781905.7	0	20100000
Years	9516	9.693043	10.85063	0	69

TABLE A.2: EMPLOYMENT IN BOLIVIA

Status in employment	Men	Women	Total
Self-employed			
Formal	4.11%	4.30%	4.20%
Informal	47.75%	42.77%	45.54%
Employees			
Formal	3.66%	4.13%	3.87%
Informal	14.97%	6.11%	11.04%
Family worker			
Formal	0.80%	2.52%	1.56%
Informal	14.98%	34.40%	23.59%
Employer (no salary)			
Formal	2.55%	1.46%	2.07%
Informal	9.98%	3.85%	7.26%
Employer (salary)			
Formal	0.66%	0.36%	0.53%
Informal	0.00%	0.04%	0.02%
Production cooperativist			
Formal	0.24%	0.04%	0.15%
Informal	0.29%	0.02%	0.17%
Total	100%	100%	100%

Notes: Calculations from Encuesta de Hogares, INE 2014. Based on 11893 observations where formality is defined as working for a firm with tax number.

TABLE A.3: STARTING A BUSINESS

No.	Procedure	Time to Complete	Associated Costs
1	Start the application for opening up a business by checking uniqueness of name at the Registry of Commerce.	1 day	78 BOB
2	Register at the National Tax Service to obtain the tax identification number (NIT).	1 day	No charge
3	Obtain a municipal business license from the municipality where the business is located.	5 days	No charge
4	Register the company deed with the Registry of Commerce to obtain legal capacity (Matricula de Comercio).	1 day	260 BOB
5	Register employees for national health insurance (Caja Nacional de Salud).	2 days	15 BOB
6	Register employees at the Ministry of Labor, enrol in the "Registro Obligatorio de Empleadores-ROE".	3 days	80 BOB
7	Register employees with the pensions system (Administradoras de Fondos de Pensiones).	20 days	No charge
	Total Time and Costs	42 days	433 BOB

Source: Servicios de Impuestos Nacionales (2015), Fundempresa (2015).

TABLE A.4: DIFFERENCES BETWEEN FORMAL AND INFORMAL FIRMS

		Mean	Std. Dev.	Min	Max	Observations
Average revenue	Formal	351700.7	620991	6982	6300000	1917
	Informal	124617.3	210335.8	3975	6000000	5822
Average number of employees	Formal	4.15	3.07	1	19	1952
	Informal	2.27	1.7	1	19	6117
Average revenue per employee	Formal	84568	109949.8	131.79	1493610	1917
	Informal	55286.07	66777	570.75	1602660	5822
Monthly operating costs	Formal	19452.01	29251.66	120	557784	1878
	Informal	6310.52	10020.78	120	157800	5439
% of revenue	Formal	5.53%				
	Informal	5.06%				
Annual operating costs	Formal	4178.15	15199,26	30	364000	1585
	Informal	1090.88	2924.61	30	60270	3489
% of revenue	Formal	1.19%				
	Informal	0.88%				
Utilities expensens	Formal	9893.66	26571.5	120	822000	1863.00
	Informal	3791.6	14833.38	108	971820	5520
% of revenue	Formal	2.81%				
	Informal	3.04%				
Cost of raw material	Formal	160698.5	313428.3	3000	4200000	1917
	Informal	59754.61	105626.1	3000	3000000	5822
% of revenue	Formal	45.69%				
	Informal	47.95%				
Average value of capital	Formal	59380.26	168245.1	250	348000	1711
	Informal	16331.84	37125.07	81.14	1200000	4874
Average capital per employee	Formal	14176.26	26876.65	50.69	348500	1711
	Informal	7381.414	14097.59	40.57	280000	4874
Percentage of firms with a loan	Formal	51.81%				9516
	Informal	35.23%				

Notes: All variables are calculated to show the yearly total.

TABLE A.5: MANUFACTURING SECTORS: DESCRIPTIVE STATISTICS

Manufacturing sector	Sector average				
	% formal	Annual Revenue	Firm Size	Capital	Observations
Food products	14.62%	122142.00	2.3	8293.85	1662
Beverages	23.81%	122619.05	2.5	14947.89	84
Textiles	18.24%	97690.53	1.8	10652.07	433
Wearing apparel	10.63%	91543.83	1.8	70271.67	2578
Leather and related products	7.57%	118326.69	2.3	10563.37	251
Products of wood and cork	23.60%	208897.49	2.6	37272.51	517
Paper and paper products	27.78%	160710.39	3.0	44354.52	18
Printing and reproduction of recorded media	66.42%	207769.42	3.1	57845.98	399
Chemicals and chemical products	64.29%	411352.36	5.6	67941.10	14
Basic pharmaceutical products and pharmaceutical preparations	0.00%	37301.30	2.0	310.00	10
Rubber and plastics products	27.78%	183950.62	2.5	17989.08	162
Other non-metallic mineral products	23.56%	212328.77	3.4	27170.32	365
Basic metals	40.00%	769453.20	3.2	8000.00	5
Fabricated metal products, except machinery and equipment	20.98%	186880.24	2.3	24158.35	1311
Computer, electronic and optical products	59.52%	178888.86	3.0	35858.85	42
Electrical equipment	51.67%	351666.67	4.1	59489.18	60
Machinery and equipment	33.70%	328260.87	3.1	59804.22	92
Motor vehicles, trailers and semi-trailers	32.94%	176470.59	2.8	26748.68	170
Other transport equipment	0.00%	176439.14	1.6	25576.78	7
Furniture	24.19%	203488.37	2.9	27848.26	860
Other	35.67%	119957.54	1.9	11410.89	471
Uncategorized	0	215919.00	2.3	0.00	5
Mean	27.59%	212820.77	2.7	29386.71	
Min	0.00%	37301.3	1.6	0.00	
Max	66.42%	769453.2	5.6	70271.67	
Observations	9516	7739	9516	9516	9516