

# Firms' Informality and Networks in Mexico: A Cross Section Analysis

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## ABSTRACT

Many governments have lower taxes and simplify regulatory requirements as a way to reduce the number of small firms operating in an informal manner. However, the impact has been slim. We postulate that the informal networks in which many of these firms operate can explain this result. To support our claim, we first build a theoretical model to describe why informality not only depends on the regulatory costs. Next, we use the 2012 Mexican National Survey of Microenterprises to show that its financial networks, and how formal its commercial partners are—once potential endogeneity is accounted for—features that are correlated with how firms are managed. While those that wish to avoid the administrative and/or financial burden of regulation may well be induced to become more formal if regulatory costs are reduced, for many others it is not necessarily regulatory costs, but rather, the benefits to be reaped by becoming formal.

**Keywords:** informality, networks, microenterprises, Mexico.

**Jel Classification:** O17, D2, G2

## Informalidad y redes en empresas mexicanas: un análisis de corte transversal

## RESUMEN

En aras de reducir la informalidad empresarial se han reducido impuestos y se han simplificado los trámites para abrir una empresa. Sin embargo, el impacto es muy bajo. En este trabajo postulamos que parte de la explicación de este resultado obedece a las redes informales en las que se hayan insertas muchas empresas informales. Para apoyar esta hipótesis, primero construimos un modelo teórico para describir por qué la informalidad no sólo depende de los costos regulatorios. Luego, utilizamos la Encuesta Nacional de Microempresas de México 2012 para mostrar que el grado de formalidad/informalidad de las redes financieras y comerciales de la empresa son —una vez atendida la potencial endogeneidad— otro conjunto de características que están correlacionadas con la forma en que se manejan las empresas. Mientras que aquellos que desean evitar la carga administrativa y/o financiera de la regulación pueden verse inducidos a volverse formales

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si se reducen los costos de la regulación, para muchos otros no se trata necesariamente de costos regulatorios, sino más bien de los beneficios que se cosechan al hacerse formales.

**Palabras clave:** informalidad, redes, microempresas, México.

**Clasificación JEL:** O17, D2, G2

## 1. INTRODUCTION

Official statistics reported that during the 1991-2014 period, total factor productivity in Mexico declined by an average annual rate of 0.33 percent. Furthermore, the McKinsey Global Institute (Bolio et al., 2014) reported that for the 1999-2009 period labor productivity in big and law-abiding enterprises in Mexico increased by 5 percent each year. In contrast to this result, smaller firms with low levels of labor regulation compliance—the vast majority of firms in the country—observed a 6 percent productivity drop per year during the same period.

According to Busso, Fazio and Levy (2012), high rates of informal employment are usually correlated with low productivity-growth rates. Four reasons are frequently cited to explain such correlation: (a) informal workers are usually employed by firms that have little access to markets and services (Perry et al., 2007; Straub, 2005); (b) most of these informal workers are employed in firms that do not invest in training, use obsolete technologies, and are unable to benefit from economies of scale and scope (Amaral & Quintin, 2006, Pagés, 2010; Perry et al., 2007); (c) most of these firms work in economic sectors characterized by heavy competition (Banerjee & Duflo, 2005; Jeong & Townsend, 2007); and (d) more productive workers want to work with people similar to them and they are usually found in firms that do not fit the characteristics described above (Amaral & Quintin, 2006; Galdon, Saavedra-Chanduví, & Chong, 2007).

Reasons (a) to (c) suggest that the link between informal employment and slow productivity growth is not straightforward; it depends on the characteristics of the employer. Following research by Djankov et al. (2003), Perry et al. (2007) and McKenzie and Woodruff (2015), the owners' entrepreneurial skills and their ability to access markets at competitive prices influence the rate at which productivity grows. While entrepreneurial skills are likely to be correlated with some characteristics of the owner (e.g. education and experience), the ability to access markets is more likely to be correlated with the quantity and quality of the goods and services sold by the firm and with the financial standing of the firm. In this regard, the firm's accounting procedures and its use of legal invoices may help increase such access since both are sources of soft information regarding quantity and quality of the goods and services sold and the firm's financial strength. Nevertheless, the vast majority of firms in less developed countries—including Mexico—do not provide legal invoices or have sophisticated accounting

procedures (La Porta and Shleifer, 2014). Thus, it is possible that workers' low productivity is correlated with being employed in firms that operate in an informal manner.

A large number of authors assert that the most important determinants of informality are regulations, taxation and, more generally, the quality of the law and its enforcement (Johnson, Kauffman & Shleifer, 1997, Johnson, Kauffman, MacMillan & Woodruff, 2000; Schneider & Enste, 2000; Inchauste, Gradstein & Dabla-Norris, 2005). Accordingly, many governments of less developed countries have reduced costly regulations and administrative procedures. Such measures, however, have done little to reduce informality. In the case of Mexico, for example, a federal program was put in place in 2004 to reduce the number of procedures required to register a firm. It led to an increase of only 4 percent in firm registration. Furthermore, Kaplan, Piedra, and Seira (2006) report that this increase was only temporary and according to Bruhn (2011) it did not come from unregistered firms. For the case of Sri Lanka, de Mel, McKenzie and Woodruff (2010) carried out an experiment in which the reimbursement of the registration cost was considered. When compared to the control group, they found there was no statistical effect of such reimbursement.

A reason that might explain why these changes in regulation had a small impact is the heterogeneity of informal businesses that policymakers confront. According to Djankov et al. (2003), there are three categories of informal businesses: unofficial enterprises, subsistence enterprises, and underground firms<sup>1</sup>. The first type of firm -usually a small or medium size- arises from a desire to avoid or lessen the administrative and/or financial burden of regulation, and hence in their case, deregulation and simplification may lead to increased formalization. For subsistence firms, on the other hand, a tax reduction may not be very beneficial if the firm was opened as a last resort by otherwise unemployed workers and/or if the likelihood of obtaining the benefits attached to formality are too small. Following Hussmanns (2004) the latter may happen because (i) many of these firms are not legally independent entities from individuals or households that own them; (ii) it is very difficult to differentiate the productive activities of such firms from their owners' other activities; and (iii) it is very difficult to ascertain the profitability of these firms.

As the above description suggests, subsistence firms are likely to belong to the microenterprise sector. In the case of Mexico, 95 percent of all economic units are in this sector and provide jobs to approximately 45 percent of the labor force. The vast majority of these firms are not registered with the fiscal authority, many do not provide receipts and, some hire workers in an informal manner. Thus, within this business strata, many forms of informality are apparent as suggested by La Porta and Shleifer (2014).

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<sup>1</sup> Underground firms are largely devoted to criminal activities. They lie beyond the scope of this paper.

If we knew why some microenterprises operate in a formal manner and others do not, it would be possible to search for the right policies to increase the number of formal firms—and as theory would indicate—to give a boost to productivity. To this end, Section II of this paper presents a model—based on the work of Straub (2005)—where the entrepreneur's choice regarding how to manage the firm—formal or informal—is a voluntary decision, as suggested by Perry, et al. (2007), Cardenas and Rozo (2009), and De Soto (1989). Briefly, our model assumes that the firm needs financing and there are two available sources: banks and money lenders. The former is costly since the business needs to be registered, pay taxes, and the loan size increases if the potential borrower has commercial links with formal firms. On the other hand, access to informal financing depends on an entrepreneur's reputation. Such information is costly acquired by informal money lenders and its cost increases with the number of informal sources of lending that are available. Furthermore, while trying to monitor how much effort the entrepreneurs put into the project, informal lenders reduce the firm's productivity.

According to our model, the tax rate, the registration cost, the firm size, the number of commercial linkages with other formal firms, and the number of informal sources of lending might explain why some firms are informal and others decide to become formal. Next, we empirically test our results. For this purpose, in Sections III and IV we describe the data and the methodology used to examine whether our theoretical results can be rejected by the data. Using probabilistic methods, we find that the size and age of the firm, the owner's expected profitability of the firm, and the tax regime are all factors that are correlated with the entrepreneur's decision regarding how to run the firm. These are conventional results. However, we also find that the reason why the firm was started, its financial networks, and how formal its commercial partners are—once endogeneity is considered—are another set of features that are correlated with how firms are managed. While registration costs matter, a comparison of the standardized marginal effects suggest that an increase in formal commercial networks would bring about a larger increase in the number of firms that would become part of the formal sector. Finally, in Section V, we state our conclusions.

## 2. A SIMPLE MODEL

Consider an entrepreneur who has assets worth  $A$  and wants to undertake a project for which it requires resources amounting to  $I$ , being  $I > A$ . The entrepreneur has two potential sources of funding: financial institutions and informal money lenders. Loans from informal sources typically have two distinctive features: they are short-term and although family members and friends (the most common source of informal lending in Mexico) usually do not charge an explicit interest rate, they may interfere in the daily running of the borrowing firm—e.g. requiring that a relative be hired. Thus, we will assume that funding from informal lenders is conducive to a lower productivity.

To borrow from a financial institution, however, the firm needs to have legal records and income statements (i.e. it must be a formal firm) and it would help if it has commercial links with other firms that borrow from banks. To describe the entrepreneur's decision regarding whether to operate a formal firm or not, we describe two possible scenarios.

**Scenario 1: The owner decides to operate the firm in a formal manner.**

a) Incentive to put effort into the project:

To undertake the project, the firm requires financing that is procured with a probability of  $P_F$ . Assuming the loan was granted, the project's profitability after taxes may be denoted by  $(1 + P_A)(1 - \tau)R_E$ , with  $R_E$  denoting the rate of gross return,  $P_A$  the rate at which the return increases thanks to the effort being exerted and  $\tau$  the tax rate. Since total effort (denoted by  $\beta I$ ) reduces the utility of the entrepreneur, its expected utility will be  $(1 + P_A)P_F R_E I(1 - \tau) - \beta I$ . Thus, effort will be exerted if:

$$\begin{aligned} (1 + P_A)P_F R_E I(1 - \tau) &\geq P_F R_E I(1 - \tau) + \beta I \\ P_F P_A R_E (1 - \tau) &\geq \beta \dots\dots (i) \end{aligned}$$

b) Incentive to lend:

To supply information regarding its financial status, the firm needs to be registered with the tax authority for which it must pay a fixed cost of  $C$ . Thus, the financial institution will lend an amount of  $I - (A - C)$  if the project is perceived by the financial institution to be profitable and the firm has a good credit standing. We will assume that the firm's reputation—denoted by  $n$ —is a continuous variable within the interval  $(0, 1)$  and increases in accordance to its commercial links to other formal firms.

If the financial institution expects a return of  $nR_F I$ , then the financial institution will lend the amount requested by the firm if:

$$nR_F I \geq I - (A - C)$$

Since gross profits of the project ( $RI$ ) are split between the firm ( $R_E I$ ) and the financial institution ( $R_F I$ ), applying equation (i) it must hold that:

$$n \left( RI - \frac{\beta I}{P_F P_A} \right) \geq I - A + C$$

Hence:

$$I = \frac{A - C}{(1 - nR) + \frac{n\beta}{P_F P_A}} \dots\dots (ii)$$

So if the owner decides to put effort and operate the firm in a formal manner, the expected after-tax profitability of its firm  $\pi^f$  can be described by:

$$\pi^f = [(1 + P_A)R_E I - I](1 - \tau)$$

Introducing equation (ii)

$$\pi^f = ((1 + P_A)R_E - 1) \left[ \frac{(A - C)(1 - \tau)}{(1 - nR) + \frac{n\beta}{P_A P_F}} \right] \dots\dots (*)$$

Consequently, the firm’s expected profitability will increase in accordance with the size of its assets (A), the probability of being financed by an institution ( $P_A$ ), the rate of productivity associated to effort ( $P_F$ ) and the firm’s good reputation ( $n$ ) that leads to a higher investment. Further, a decline in registration costs and on the tax rate will also lead to an increase in its profitability.

**Scenario 2: The owner decides to operate the firm in an informal manner.**

a) Incentive to put effort into the project:

In this scenario, the owner will seek funding in the informal market and its likelihood of obtaining a loan ( $P_{INF}$ ) will depend on its personal reputation. Assuming the loan was granted, if the entrepreneur decides to put effort into the project, its profit rate will be denoted by  $(1 + P_B)R_E$  where  $0 < P_B < P_A$ . In this situation, the entrepreneur will exert effort only if he expects a higher utility:

$$P_{INF} [(1 + P_B)R_E I - R_E I] \geq \beta I.$$

Thereby, the minimum rate of return necessary to put effort into the project will be:

$$R_E = \frac{\beta}{P_{inf} P_B} \dots (iii)$$

b) Incentive to lend:

As the number of informal lenders ( $z$ ) used in the past increases, the potential lender will expect a lower rate of return because it is more costly to learn the credit history of the borrower. We will denote the expected return of the lender by  $x(R_F I)$ , where  $x = x(z)$  and  $x'(z) < 0$ . Thus, the moneylender will grant a loan if  $xR_F I$  equals at least  $(I - A)$ .

As before, since gross profits of the project are split between the firm and the informal lender, applying equation (iii) it must hold that:

$$x \left( RI - \frac{\beta I}{P_{inf} P_B} \right) = I - A$$

$$I = \frac{AP_{inf} P_B}{P_{inf} P_B - x(RP_{inf} P_B - \beta)} \dots (iv)$$

So if the owner decides to put effort and operate the firm in an informal manner, the expected profitability of its firm  $\pi^{inf}$  can be described by:

$$\pi^{inf} = (1 + P_B)R_E I - I$$

Introducing equation (iii)

$$\pi^{inf} = ((1 + P_B)R_E - 1) \left[ \frac{AP_B P_{inf}}{P_{inf} P_B - x(RP_{inf} P_B - \beta)} \right] \dots (**)$$

Comparing expected profits in both scenarios—i.e. equations (\*) and (\*\*)—it can be shown that there is a critical value for the size of assets (A) above which it is beneficial for the entrepreneur to become formal. Furthermore, if the tax rate ( $\tau$ ) or the fixed cost (C) paid to become a formal firm are reduced, the incentive to become a formal firm would increase. Our model also suggests that networks matter. Thus, as the firm has more commercial linkages with other formal firms (a higher n) the profitability of becoming formal will also increase. As far as the number of informal lenders (z) available to the entrepreneur is concerned, our model suggests that an increase in such figure will lead to an increase in the profitability of becoming a formal firm.

Our theoretical model suggests that the decision to operate in a formal or informal manner depends on how much profits the entrepreneur expects to earn under each scenario. However, the data on data on profits is scant and not very good. Given this limitation, we will replace profits with variables that indirectly shape the expected profitability.

### 3. SOME BASIC DATA

To ascertain the empirical validity of the claims just made, we used the 2012 Mexican National Survey of Microenterprises (ENAMIN). The survey took place between October 2012 and January 2013, provides information about 27,000 microenterprises, and was designed to be representative nationwide. Microenterprises are defined as firms that employ less than sixteen workers, or ones that engaged in transportation, trade, services, construction, or mining employing less than eleven workers.

Forty-five percent of the owners of microbusinesses reported having worked always alone and 18 percent reported not having any workers during the 2011-2012 period. In addition to these, 24 percent reported having only one worker and 8 percent reported having two workers. Thus, 95 percent of all microenterprises had less than three workers and 63 percent of these workers were family members or business partners. Only 23 percent of all microenterprises hired paid-workers. Given the predominance of owners and family partners, informal hiring does not appear to be the most relevant feature of this type of firm in Mexico.

The vast majority of these firms, however, carried out their transactions in an informal manner. The aforementioned survey allows two ways to measure such informality: (i) the type of sales slips (none, receipts, or legal invoices) issued by microenterprises, and (ii) how firms kept track of their transactions (do not carry any accounting, uses a notebook, or hires an accountant). However, since innovations in the tax system and access to computer technology may reduce the need to hire an accountant, the type of sales slip issued might be a better way to measure informality. The National Survey admits three possible answers to its question about which type of sales slip firms issue: (i) none, (ii) receipts with no legal validity, and (iii) invoices<sup>2</sup>. To consider these answers, we build the “sales slip” variable which will three possible values, the highest being assigned to firms that issue legal invoices. Table 1 shows that only 8 percent of the respondents issued invoices and 9 percent issued receipts – a sales slip that could not be used for tax purposes.

How informal the firm is in its daily operations may be related to the reason why the owner decided to start a business (Vivarelli, 2013). For example, if it was opened while the owner was looking for a job, she/he is very unlikely to spend money on registrations, learning how to fill out tax forms, or hiring an accountant, since such a “necessity entrepreneur” is probably setting up a temporary means of earning money, and hence less motivated to invest in the business. To differentiate between “necessity entrepreneurs” and “innovative Schumpeterian entrepreneurs,” the survey asked which was the most important reason for starting the business. We merged the thirteen possible survey responses into five categories and sorted them according to their “entrepreneurial” weighting, so that the higher the value, the more likely the respondent could be considered to be a “Schumpeterian innovative entrepreneur.” The “motive” variable in Table 1 pertains to the possible reasons for opening a firm.

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<sup>2</sup> The survey accepted another possible response: “I do not want to answer.” Since this option was chosen by only 0.7% of the respondents, for the sake of simplicity, we decided to merge respondents giving the aforesaid answer with those who chose the “none” option. There was no statistical difference between having three possible answers and having four.

Table 1. Basic Variables

Variable	Definition	Values of the variable				
		1	2	3	4	5
<b>Sales slip</b>	Sales receipt delivered to buyers or goods and services provided to microenterprises?					
	1. None	20,689	2,253	2,033	--	--
	2. Receipt					
	3. legal invoice					
<b>Motive</b>	Reason for opening a business:					
	1. Other reason					
	2. Only way of making money; had neither proper education nor opportunities of getting a job.					
	3. To complement family income; jobs do not pay sufficiently; need a flexible schedule.	2,712	4,122	12,543	1,583	4,015
	4. Family tradition; overqualified for a job.					
	5. Had money and found an opportunity; wanted to use professional career or technical expertise.					
<b>Accounting</b>	In this business accounting is....					
	1. Refuses to answer.					
	2. Do not carry any accounting.	91	15,580	775	4,641	3,888
	3. Uses a cashing machine.					
	4. Uses a notebook					
	5. Hires an accountant.					

Source: ENAMIN.

During the period in which the survey was carried out, very small firms could pay taxes without having to issue legally valid invoices when selling goods or services. This special tax system was implemented to reduce the cost of becoming formal. To benefit from this special scheme, firms had to be registered with a local or federal authority, draw their customers from the general public, and have annual sales below two million pesos<sup>3</sup>. To consider this preferential regime, we created the variable "Repeco" - that takes a value of one if the firm fulfills all three requirements and zero if otherwise.

Industry-specific characteristics such as the intensity of competition, economies of scale, and entry barriers can have an impact on entry, growth, and exit. Given this heterogeneity, the incentives for operating a formal firm may differ according to the sector to which it belongs. To allow for this possibility, we included two dummy

<sup>3</sup> This was equivalent to \$151,000 at the market exchange rate and \$100,000 at purchasing power parity. Only 10 percent of our sample could have been eligible for this special tax system.

variables: *duc*, which has a value of one if the microenterprise is in the commerce sector, and *dum*, which has a value of one if it belongs to the manufacturing sector<sup>4</sup>.

#### 4. HYPOTHESES, METHODOLOGY, AND RESULTS

According to Vivarelli (2013), the reason why the firm was started may help explain how it is being managed. Considering the particular order “motive” and “sales slip” have in our database, we expect to find a positive correlation between them. Further, since formal firms pay taxes, which type of sales slip the firm will issue may be correlated with its expected profitability— a variable that will be proxied with the 2011 state-level GDP growth (labeled “Growth 2011”) and for which we expect a positive correlation with “sales slip.” Finally, we also need to include the distortion that could occur due to the aforementioned special tax system the government implemented. Since the special tax system reduced the cost of being formal, we expect—following our theoretical model—to find a positive correlation between “Repeco” and the “sales-slip” variable.

In accordance with our model, firm’s formality may be correlated with how many sources of informal credit have been used by the entrepreneur and on the commercial networks that the firm and its owner belong to. Since the Survey does not provide information about the quantity of informal credit sources used by the entrepreneurs, we will assume that the sources of informal loans used will decline as the amount of banking credit—in the city where the entrepreneur lives—increases. Based on this assumption, we created the variable “CrebanLL” to measure the average per capita banking credit in each of Mexico’s thirty- two states during the period 2008-2012. Our model would suggest a positive correlation between “CrebanLL” and “sales slip”— i.e. a larger volume of per capita bank credit in the region where the firm is located correlates with a higher degree of formality.

Our model also suggests that as the firm becomes larger the likelihood of becoming more formal also increases. To test this hypothesis, we used two variables as proxies for size, the first of which, labeled “employment,” measures the average number of workers hired by the firm. According to Perry, et al. (2007, p. 150), “While most microenterprises are informal, formality rates increase quite rapidly when firms incorporate paid employees” - a claim that is borne out by data for Mexico, Brazil, and Colombia. The introduction of the aforesaid “employment” variable resulted in the loss of 63 percent of the survey data because the vast majority of entrepreneurs were working alone. Even though this loss could lead to some bias in our results, this subsample is worthy of consideration since it included only those microenterprises that were less likely to be regarded as temporary occupations. A second proxy we used for size was “sales per worker,” a variable that

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<sup>4</sup> Fifteen percent of our sample belonged to the manufacturing sector, 39 percent to the commerce sector, and 46 percent to the service sector.

measures the microenterprise's total sales divided by the number of people—including the owner—working in the business. While the sample loss is much lower, it comes at the cost of reliability since income data is less reliable than employment data.

Bearing in mind that the dependent variable—i.e. the type of sales slip issued—has a particular ordering, and considering the results of the likelihood ratio test, we used a generalized ordered probit to test our hypotheses<sup>5</sup>, showing our first results in Tables 2 and 3 below. The data presented in the left-hand box in Table 2 suggests that firms were more likely to operate in a formal manner when owners were less likely to be “necessity entrepreneurs,” when the firm had higher growth expectations, and when there were lower formalization costs (“Repeco”)<sup>6</sup>. Furthermore, the results reported in the right-hand box of the same table indicates that a larger volume of per capita bank credit in the region where the microenterprises are located correlates with a higher degree of formality. Finally, results in Table 3 show that the correlation between the size of the firm and the type of sales slip it issues is positive, as expected.

Results reported in Tables 2 and 3 are consistent with our theoretical model and with the economic literature. However, our model shows that a firm's formality participation is also correlated with the commercial networks to which the firm belongs. According to our model, the reputation of the firm grows with its business links to formal firms, and, thereby—following equation (\*)—its incentive to be a formal firm also increases. Thus, the interaction of informal firms with formal buyers of their goods and services, or with formal suppliers, may have a bearing on the firm's optimal level of informality. To ascertain whether this is indeed the case, we considered the destination—i.e. the general public, small trade or small factories, government, big trade or big factories—of the goods and services sold by the microenterprise. We also considered the type of firms—i.e. trade or small factories, and big factories—who were providing inputs to the firm. Both variables, respectively labeled “output buyer” and “input seller,” were ranked in ascending order in accordance with their probable degree of formality<sup>7</sup>. Table 4 shows that 90 percent of all microenterprises sold their goods and services to the general public and bought 67 percent of their inputs from big firms, while only 9 percent of the microbusinesses that bought inputs from trade or big factories issued invoices.

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<sup>5</sup> This methodology is also consistent with the notion that informality is not a solution, but rather an option on a continuum of participatory possibilities (Perry et al., 2007).

<sup>6</sup> In Table 2 et seq. we report estimations drawn from the survey sample. We obtain very similar results using the expanded sample, and will be happy to provide the estimations stemming from the latter upon request.

<sup>7</sup> We will assume that big factories are more likely to be a formal firm compared to small factories. Such assumption is made because the ENAMIN (2012) does not provide such information.

Table 2. What makes firms to move from Informality to Formality

	Estimation 1		Estimation 2	
	Coefficient (P> z )	Marginal Impact (P> z )	Coefficient (P> z )	Marginal Impact (P> z )
<b>State 1: sales slip=1</b>				
Motive	0.126 (0.000)	-0.030 (0.000)	0.127 (0.000)	-0.030 (0.000)
CrebanLL			0.634 (0.000)	-0.152 (0.000)
Growth2011	0.024 (0.000)	-0.005 (0.000)	0.021 (0.000)	-0.005 (0.000)
age	0.006 (0.000)	-0.001 (0.000)	0.006 (0.000)	-0.001 (0.000)
Repeco	0.959 (0.000)	-0.307 (0.000)	0.966 (0.000)	-0.309 (0.000)
duc	-0.038 (0.070)	0.009 (0.069)	-0.035 (0.097)	0.008 (0.096)
dum	-0.108 (0.000)	0.025 (0.000)	-0.100 (0.001)	0.023 (0.000)
<b>State 2: sales slip=2</b>				
Motive	0.128 (0.000)	0.013 (0.000)	0.130 (0.000)	0.013 (0.000)
CrebanLL			0.689 (0.000)	0.634 (0.000)
Growth2011	0.025 (0.000)	0.002 (0.000)	0.023 (0.000)	0.002 (0.002)
age	0.009 (0.000)	0.000 (0.003)	0.009 (0.000)	0.000 (0.003)
Repeco	0.753 (0.000)	0.159 (0.000)	0.761 (0.000)	0.160 (0.000)
duc	-0.380 (0.000)	0.037 (0.000)	-0.377 (0.000)	0.037 (0.000)
dum	-0.152 (0.000)	-0.007 (0.148)	-0.146 (0.000)	-0.005 (0.230)
<b>State 3: sales slip=3</b>				
Motive		0.017 (0.000)		0.016 (0.000)
CrebanLL				0.089 (0.000)
Growth2011		0.003 (0.000)		0.003 (0.000)
age		0.001 (0.000)		0.001 (0.000)
Repeco		0.146 (0.000)		0.148 (0.000)
duc		-0.046 (0.000)		-0.046 (0.000)
dum		-0.018 (0.000)		-0.017 (0.000)
	1. We included a constant in the estimation. We do not report its parameter or significance. 2. N= 24,975; Prob>chi2 = 0.0000; Pseudo R2= 0.075		1. We included a constant in the estimation. We do not report its parameter or significance. 2. N= 24,975; Prob>chi2 = 0.0000; Pseudo R2= 0.077	

**Table 3. Do Size Matter?**

	Estimation 1		Estimation 2	
	Coeff. (P> z )	MgImpact (P> z )	Coeff. (P> z )	MgImpact (P> z )
<b>State 1: Sales slip=1</b>				
Motive	0.120 (0.000)	-0.038 (0.000)	0.099 (0.000)	-0.021 (0.000)
CrebanLL	0.699 (0.000)	-0.225 (0.000)	0.611 (0.000)	-0.132 (0.000)
Growth2011	0.015 (0.007)	-0.005 (0.007)	0.016 (0.000)	-0.003 (0.000)
age	0.007 (0.000)	-0.002 (0.000)	0.005 (0.000)	-0.001 (0.000)
Employment	0.246 (0.000)	-0.079 (0.000)		
sales per worker			0.289 (0.000)	-0.062 (0.000)
repeco	0.752 (0.000)	-0.270 (0.000)	0.918 (0.000)	-0.271 (0.000)
duc	-0.082 (0.011)	0.026 (0.010)	-0.004 (0.847)	0.000 (0.847)
dum	-0.062 (0.147)	0.019 (0.141)	-0.034 (0.297)	0.007 (0.290)
<b>State 2: Sales slip=2</b>				
Motive	0.117 (0.000)	0.015 (0.000)	0.104 (0.000)	0.011 (0.000)
CrebanLL	0.746 (0.000)	0.074 (0.051)	0.621 (0.000)	0.074 (0.000)
Growth2011	0.016 (0.014)	0.001 (0.235)	0.018 (0.001)	0.001 (0.013)
age	0.009 (0.000)	0.001 (0.070)	0.008 (0.000)	0.0004 (0.009)
Employment	0.257 (0.000)	0.028 (0.000)		
sales per worker			0.331 (0.000)	0.031 (0.000)
Repeco	0.497 (0.000)	0.150 (0.000)	0.757 (0.000)	0.158 (0.000)
duc	-0.324 (0.000)	0.036 (0.000)	-0.414 (0.000)	0.035 (0.000)
dum	-0.115 (0.018)	0.002 (0.808)	-0.092 (0.021)	0.000 (0.894)
<b>State 3: Sales slip=3</b>				
Motive		0.024 (0.000)		0.009 (0.000)
CrebanLL		0.150 (0.000)		0.057 (0.000)
Growth2011		0.003 (0.014)		0.001 (0.001)
age		0.001 (0.000)		0.000 (0.000)
Employment		0.051 (0.000)		
sales per worker				0.030 (0.000)
repeco		0.119 (0.000)		0.113 (0.000)
duc		-0.062 (0.000)		-0.036 (0.000)
dum		-0.022 (0.013)		-0.008 (0.015)
	1. We included a constant in the estimation. 2. N= 9,306; Prob>chi2 = 0.0000; Pseudo R2= 0.108.		1. We included a constant in the estimation. 2. N= 22,671; Prob>chi2 = 0.0000; Pseudo R2= 0.143.	

**Table 4. Commercial Links of Microenterprises**

They buy from				
Issuance of sales slip	General public	Trade or small factory	Trade or big factory	Total
None	0	5,936	9,584	15,520
receipt	0	411	1,366	1,777
Legal invoice	0	307	1,091	1,398
Total	0	6,654	12,041	18,695
They sell to				
Issuance of sales slip	General public	Trade or small factory	Government, trade or big factory	Total
None	17,585	515	1,195	19,295
receipt	1,846	101	166	2,113
Legal invoice	1,323	125	360	1,808
Total	20,754	741	1,721	23,216

Source: ENAMIN.

In Table 5 we report that the interaction of entrepreneurs with formal input suppliers has a bearing on the firm's optimal level of informality. As already mentioned, this variable "input seller" could be assigned two possible values depending on whether the microenterprise bought its inputs from a small or a large firm. Three estimations are shown depending on whether we use a proxy for microenterprise size, and the results show that, regardless of which (if any) proxy for size was used, microenterprises that buy their supplies from big (and we assume formal) firms are more likely to operate in a formal manner.

To compare the relative impact of each independent variable, in Table 6 we report the standardized value of the marginal impact. Regardless of which type of sales slip is delivered by the firm, the three variables with the highest impact are: firm size (measured by either proxy), Repeco, and input seller. While size appears to be the variable with the higher impact, the relative importance of input seller and Repeco varies according to the state to which the firm belongs. For example, considering mean values of the sample and using the third estimation results, the predicted probability that a firm does not provide sales receipts (state 1) will decline in almost six percentage points in response to a change of one standard deviation of input seller and in seven percentage points to a similar change in Repeco. Once in state 3, however, the predicted probability that a firm provides invoices will increase in almost three percentage points in response to a change of one standard deviation of input seller or to a similar change in Repeco.

**Table 5. Do Networks Matter?**

	Estimation 1	Estimation 2	Estimation 3
	Coefficient (P> z )	Coefficient (P> z )	Coefficient (P> z )
<b>State 1: Sales slip=1</b>			
Motive	0.121 (0.000)	0.095 (0.000)	0.116 (0.000)
CrebanLL	0.632 (0.000)	0.651 (0.000)	0.661 (0.000)
Growth2011	0.017 (0.000)	0.015 (0.002)	0.008 (0.211)
age	0.008 (0.000)	0.006 (0.000)	0.009 (0.000)
input seller	0.419 (0.000)	0.323 (0.000)	0.399 (0.000)
Employment			0.259 (0.000)
sales per worker		0.269 (0.000)	
repeco	0.886 (0.000)	0.820 (0.000)	0.688 (0.000)
duc	-0.153 (0.000)	-0.111 (0.000)	-0.188 (0.000)
dum	-0.094 (0.006)	-0.054 (0.137)	-0.079 (0.101)
<b>State 2: Sales slip=2</b>			
Motive	0.128 (0.000)	0.103 (0.000)	0.116 (0.000)
CrebanLL	0.688 (0.000)	0.673 (0.000)	0.634 (0.000)
Growth2011	0.015 (0.007)	0.014 (0.020)	0.009 (0.232)
age	0.010 (0.000)	0.009 (0.000)	0.011 (0.000)
input seller	0.440 (0.000)	0.352 (0.000)	0.425 (0.000)
Employment			0.268 (0.000)
sales per worker		0.321 (0.000)	
repeco	0.712 (0.000)	0.679 (0.000)	0.442 (0.000)
duc	-0.484 (0.000)	-0.483 (0.000)	-0.422 (0.000)
dum	-0.118 (0.003)	-0.077 (0.079)	-0.114 (0.037)
	<b>Notes:</b> 1. We included a constant in the estimation. 2. N= 18,695; Prob>chi2 = 0.000; Pseudo R2= 0.093.	<b>Notes:</b> 1. We included a constant in the estimation. 2. N= 17,708; Prob>chi2 = 0.000; Pseudo R2= 0.139.	<b>Notes:</b> 1. We included a constant in the estimation. 2. N= 7,289; Prob>chi2 = 0.000; Pseudo R2= 0.124.

Table 6. Marginal Effects once Networks and Size are Included

	Estimation 1	Estimation 2	Estimation 3
	Standard Marginal Effect	Standard Marginal Effect	Standard Marginal Effect
<b>State 1: Sales slip=1</b>			
<b>Pr(Sales slip==1)</b>	<b>84.97%</b>	<b>86.35%</b>	<b>75.85%</b>
Motive	-0.032	-0.024	-0.041
CrebanLL	-0.014	-0.014	-0.020
Growth2011	-0.010	-0.008	-0.006
age	-0.021	-0.017	-0.034
input seller	-0.047	-0.034	-0.060
Employment			-0.118
sales per worker		-0.079	
repeco	-0.064	-0.056	-0.067
duc	0.017	0.012	0.029
Dum	0.008	0.004	0.009
<b>State 2: Sales slip=2</b>			
<b>Pr(Sales slip==2)</b>	<b>9.44%</b>	<b>9.60%</b>	<b>13.67%</b>
Motive	0.016	0.014	0.017
CrebanLL	0.007	0.008	0.009
Growth2011	0.006	0.005	0.002
age	0.008	0.007	0.011
input seller	0.023	0.019	0.023
Employment			0.047
sales per worker		0.041	
repeco	0.039	0.037	0.042
duc	0.009	0.009	0.009
Dum	-0.003	-0.002	-0.001
<b>State 3: Sales slip=3</b>			
<b>Pr(Sales slip==3)</b>	<b>5.59%</b>	<b>4.05%</b>	<b>10.48%</b>
Motive	0.017	0.010	0.024
CrebanLL	0.007	0.006	0.011
Growth2011	0.004	0.003	0.004
age	0.013	0.009	0.023
input seller	0.024	0.015	0.037
Employment			0.071
sales per worker		0.037	
repeco	0.025	0.018	0.025
duc	-0.027	-0.021	-0.037
Dum	-0.005	-0.002	-0.007

Finally, to determine whether the microenterprise's customers have any influence on its degree of formality, we need to take into account the fact that big factories and government entities typically require formal invoices from their suppliers. Given this potential endogeneity, we used an ordered probit with instrumental variables. To design a good instrument, we must consider that government entities and big factories usually buy goods and services of an homogenous quality and in large quantities.

To sell goods and services of high and homogenous quality, microbusinesses may need to have good business practices which according to McKenzie and Woodruff (2015) could be proxy with how firms track their net income flow. Following them, the variable "accounting" (see Table 1) could be considered a good instrument. Nevertheless, according to our data it is not a suitable instrument because it is highly correlated with our dependent variable. Another proxy for better practices could be the price charged by microbusinesses. However, even though it has a low correlation with the dependent variable, it also has a low correlation with the instrumented variable.

Not having a good instrument for business practices, we look for another set of instrumental variables under the assumption that—as stated before—government entities and big factories typically buy large amounts. Three possible instruments were considered. First, the logarithm of the total amount paid by the main buyer of the goods and services sold by the microenterprise ("Log\_sales"). Next, we also considered the expected growth of the regional economy ("Growth2011") and the average regional per capita banking credit ("CrebanLL") under the assumption that as they increased, the likelihood of selling to big firms would also follow a similar path. These three possible instruments have—relative to those variables tested as proxies of better business practices—a lower correlation with the dependent variable and a similar correlation with the instrumented variable.

Table 7 shows the results when using these three instrumental variables. Since there is no post-estimation method to test endogeneity correction when an order probit is being used, we followed Roodman (2009) and included the instrument in the main model once it had been already instrumented. In all three cases, the instruments resulted exogenous. Additionally, to test its relevance we used a linear IV regression which in its first-step shows that these three instruments are neither underidentified nor weak, according to the theoretical values proposed by Stock and Yogo (2005).

Regardless of which instrumental variables we use, our results cannot reject the possibility that the business networks in which the firm participates correlates with the opacity of its transactions. In particular, if buyers of the goods and services produced by the microenterprise are bigger firms or the government, there is an increased likelihood that the microenterprise itself will also be formal, and hence our model's prediction about the importance of networks cannot be rejected. Furthermore, as Table 8 show, the value of the standardized marginal effects suggest that an increase in formal commercial networks has a larger impact relative to a reduction in registration costs. For example,

using the third estimation, the predicted probability that a firm does not provide a sales slip (state 1) will decline in thirty-five percentage points in response to a change of one standard deviation regarding who the buyer is, while it would only decline in four percentage points if the registration cost would decline.

Table 7. Ordered Probit with Instrumental Variables

	Estimation 1	Estimation 2	Estimation 3
	Coefficient (P> z )	Coefficient (P> z )	Coefficient (P> z )
Motive	0.070 (0.000)	0.038 (0.000)	0.043 (0.000)
CrebanLL		0.222 (0.000)	
Growth2011		0.005 (0.010)	
sales per worker	0.184 (0.000)	0.058 (0.000)	0.069 (0.000)
Age	0.005 (0.000)	0.003 (0.000)	0.003 (0.000)
Imput seller	0.221 (0.000)	0.122 (0.000)	0.136 (0.000)
Buyer	1.620 (0.000)	1.852 (0.000)	1.834 (0.000)
Repeco	0.617 (0.000)	0.333 (0.000)	0.375 (0.000)
Duc	-0.127 (0.000)	-0.320 (0.006)	-0.039 (0.003)
Dum	-0.078 (0.003)	-0.048 (0.001)	-0.052 (0.001)
<b>Buyer</b>			
Growth_2011	0.008 (0.000)		0.005 (0.000)
CrebanLL	0.255 (0.000)		0.184 (0.000)
Log_sales		0.035 (0.000)	0.037 (0.000)
Constant	1.130 (0.000)	0.902 (0.000)	0.856 (0.000)
	<b>Notes:</b>	<b>Notes:</b>	<b>Notes:</b>
	1. We included a constant in the estimation.	1. We included a constant in the estimation.	1. We included a constant in the estimation.
	2. N=23,216; Prob>chi2=0.000;	2. N=23,042; Prob>chi2=0.000;	2. N=23,042; Prob>chi2=0.000;
<b>Tests IV Buyer</b>			
Underidentification (Sanderson & Windmeijer, 2016)	Chi-sq (2) 43.37 (0.000)	Chi-sq (1) 159.37 (0.000)	Chi-sq (3) 204.66 (0.000)
Weak identification (Stock and Yogo, 2005)	F(2, 17585) 21.67	F(2, 17484) 159.26	F(2, 17484) 68.18
10% max IV size	19.93	16.38	22.30
15% max IV size	11.59	8.96	12.83
20% max IV size	8.75	6.66	9.54
25% max IV size	7.25	5.53	7.80

**Table 8. Marginal Effects with IVs**

	Estimation 1	Estimation 2	Estimation 3
	Standard Marginal Effect	Standard Marginal Effect	Standard Marginal Effect
<b>State 1: Sales slip=1</b>			
<b>Pr(Sales slip==1)</b>	<b>77.92%</b>	<b>67.06%</b>	<b>68.95%</b>
Motive	-0.024	-0.016	-0.017
CrebanLL		-0.008	
Growth2011		-0.004	
sales per worker	-0.073	-0.028	-0.033
Age	-0.017	-0.011	-0.012
Imput seller	-0.031	-0.021	-0.023
Buyer	-0.262	-0.365	-0.352
Repeco	-0.057	-0.038	-0.041
Duc	0.018	0.006	0.007
Dum	0.008	0.006	0.007
<b>State 2: Sales slip=2</b>			
<b>Pr(Sales slip==2)</b>	<b>10.40%</b>	<b>8.28%</b>	<b>8.90%</b>
Motive	0.008	0.002	0.003
CrebanLL		0.001	
Growth2011		0.001	
sales per worker	0.025	0.004	0.005
Age	0.006	0.001	0.002
Imput seller	0.011	0.003	0.004
Buyer	0.089	0.047	0.056
Repeco	0.019	0.005	0.007
Duc	-0.006	-0.001	-0.001
Dum	-0.003	-0.001	-0.001
<b>State 3: Sales slip=3</b>			
<b>Pr(Sales slip==3)</b>	<b>11.68%</b>	<b>24.66%</b>	<b>22.16%</b>
Motive	0.016	0.014	0.015
CrebanLL		0.007	
Growth2011		0.004	
sales per worker	0.048	0.024	0.028
Age	0.011	0.010	0.010
Imput seller	0.021	0.018	0.019
Buyer	0.173	0.318	0.297
Repeco	0.038	0.033	0.035
Duc	-0.012	-0.005	-0.006
Dum	-0.005	-0.005	-0.006
Buyer			
Growth_2011	0.000		0.000
CrebanLL	0.000		0.000
Log_sales		0.000	0.000

## 5. CONCLUSIONS

Informality is a common feature in less developed countries, being both a cause and a consequence of a precarious institutional framework and widespread poverty—a combination that does not favor economic growth— which may explain why it is so hard to eradicate.

According to many authors, the most important determinants of firms' informality are regulations, taxation, and, more generally, the quality and enforcement of the legal system. Hence, the most common policy recommendation consists of lowering taxes and simplifying regulatory requirements. However, the impact of such measures on firm formalization has been modest. We believe that one of the reasons for such results is that these fiscal and regulatory reforms are not enough: it is necessary to increase the net benefits attached to formalization. To support our claim, we built a theoretical model that helps explain why regulatory costs and the firm's commercial and financial networks may matter. In addition, with the use of the 2012 National Microenterprise Survey we show that—among other variables—the motive for starting the firm, the tax regime and—once endogeneity is tackled—the commercial and financial networks of the firm are attributes that are correlated with the firms' fiscal compliance.

Whether taxes and regulatory costs or potential access to new markets are more important, it may well depend on the type of firm we are dealing with. While those that wish to avoid the administrative and/or financial burden of regulation may well be induced to become more formal if regulatory costs are reduced, for many others it is not necessarily regulatory costs, but rather, the benefits to be reaped by becoming formal.

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