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## **PERFORMANCE AND PRICING STRATEGIES DIFFERENCE BETWEEN INFORMAL AND FORMAL FIRMS IN EMERGING ECONOMY**

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# PERFORMANCE AND PRICING STRATEGIES DIFFERENCE BETWEEN INFORMAL AND FORMAL FIRMS IN EMERGING ECONOMY

## INTRODUCTION

The existence of informal firms is not a novelty *per se*. According to Castells and Portes (1989), the central feature of informal economy is that it is unregulated by the institutions of society, in a legal and social environment in which similar activities are regulated. LaPorta and Schleifer (2008) define informal economy as unofficial economic activity conducted by unregistered firms. Centeno and Portes (2006) claim that an alternative definition of the informal economy would be “transactions where the state neither provides protection nor receives a ‘cut’.” (see other definitions in Godfrey 2011, p. 236-242, Table 1).

Informal economy accounts for, at least, 40% of the GDP in emerging countries and almost 15% in developed countries (Schneider and Williams, 2013). Informal firms represent more the norm than the exception among small and medium-sized enterprises (SMEs) in many developing countries (Assenova and Sorenson, 2017). People at the base of the pyramid (Prahalad, 2005) or emerging markets (Wright *et al.*, 2005; Ulysea, 2018) operate in systems where informal activity predominates (Castells and Portes 1989, de Soto 1989, Schneider 2012).

Despite their prevalence in emerging economies, we know relatively little about informal organizations, such as how being informal affects firm performance (Assenova and Sorenson, 2017). Considering this competing environment with informal and formal firms from the perspective of the formal firms, Piperopoulos *et al.* (2021) have found that the competition from informal firms negatively affects the performance of small formal firms. Assenova and Sorenson (2017) found that entrepreneurs who registered their firms at founding enjoyed greater success in terms of sales and employment, but none was said about the performance of firms that kept informal.

The purpose of this paper is to investigate the performance of informal firms comparing to small formal firms. Using data from *ECINF* survey (The Urban Informal Economy Survey, *Pesquisa de Economia Informal Urbana*), a database produced by the Brazilian Bureau of (IBGE) that includes data from small informal and formal firms (up to five employees), we use the two-stage least-squares methodology to produce robust causal evidence between the formal and informal firms and their both performance and price strategy.

The main contribution of our article is shown that the performance of the informal firms is worse compared with formal firms. Exploring heterogeneities of the sample, we observe that different environment for informal and formal firms (without strong competition, with/without problems of low profitability, without problems of taxes, and without other problems which can be capturing regulation and corruption) does not eliminate this worse performance of informal firms compared with formal firms. We also identify that the choice of price's strategy based on customer value-based (price defined in the negotiation with the consumer observing the attributed value for the product by customer or, in cases of business-to-business subcontracting, customer defines the price that it is willing to pay per unit or batch) can reduce this worse performance. Other price strategies like competition (the price is defined on competitive levels or on anticipation or observed actions of actual or potential competitors) and cost pricing (the firm fix a markup on costs) only produce worse performance than those observed in the initial results.

## The difference of performance between informal and formal firms

The literature does not explicit whether informal and formal firms have different performance. However, the results of some works in the literature about the characteristics that determine the existence of informal firms, leads us to believe that the performance of both the types of firms are affected by these characteristics and produce different result.

Among the characteristics of informal firms which can improve their performance (compared to formal firms) is the fact that informal firms avoid paying taxes and fees (Ordóñez, 2014; Iriyama *et al.*, 2016), benefits from unfair competition (Kettles, 2007), skirt labor, health, and environmental regulations (Blackman, 2000; Perry *et al.*, 2007). The general theme in this literature has been that informality persists because entrepreneurs also hope to avoid the costs associated with corruption and burdensome regulation (e.g., de Soto 1989, Loayza *et al.* 2005, Assenova and Sorenson 2017).

On the other hand, given that exists the possibility of informal firms pays some type of corruption to going unregistered officially (Feige 1999, Loayza *et al.* 2005, Dutta *et al.* 2013, McCann and Bahl 2017), their costs can be more elevated. Thus, this environment of mutual coexistence (several times formal firms are competing with informal firms) affects the performance of firms and the difference of performance them depends on empirical evidence which we do not find in the literature. Therefore, our first hypothesis will be tested is if:

### **H1: The informal and formal firms have different performance**

Prices is one of the most relevant variables used as strategy by firms.<sup>1</sup> In the literature, we can mention the use of price as strategy to avoid the entrance of new competitors (Milgrom and Roberts, 1982). However, when we think on the markets which small firms, like those where informal firms are present competing with formal firms, two types are feasible: perfect competition and monopolistic competition (Roberts, 1987). Two markets which the influence of individual firms on price is reduced if the markets conditions are fully satisfied.

Independent from geographic place (Becker, 2015) which interfere on competition, perfect market competition depends on some characteristics. Among them, that the products are identical, firms cannot influence the market price (price takers), market share has no influence on prices, perfect information for sellers and buyers, perfect mobility of capital and labor, and firms can enter or exit the market without cost. On the other side, monopolistic competition keeps the same characteristics of competitive markets except that the products are not identical.

Small firms cannot have identical products if the strategy of selling is important (for example, verbal eloquence from seller), the geographic of market is different and specific (place where the market is defined, for example, for a party like Carnaval or one week of Formula 1 Grand Prix), and the full information does not occur (for instance, the information about price among buyers). Thus, it is possible that the price competition strategy between small firms is different taking advantage these conditions of market.

Into this perspective, the marketing literature investigated and established possibilities for price competition independent of market which the firm is (Nagle, 1983; Nagle and Hogan, 2006; Hinterhuber and Liozu, 2012a, 2012b, 2014, 2017) that can help on our investigation.

### **Pricing strategy**

Following this literature, firms follow three traditional methods to determine their final selling price:

- 1) Competition-based pricing (Nagle and Hogan, 2006; Hinterhuber, 2008): this method establishes that the price is defined on competitive levels or on anticipation or observed actions of actual or potential competitors. The most important criticism for this method is related to little attention with demand and the difficulty to anticipate the risk of price war.
- 2) Cost-based pricing (Nagle and Holden, 2006; Myers *et al.*, 2002; Simon *et al.*, 2003; Ingenbleek, 2007; Hinterhuber, 2008): this method is based on accounting-data.

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<sup>1</sup> There are other types of strategies used by firms mentioned in the literature. Among them, economies of scale, advertising, and research development costs. Some of them are not accessible for small firms. Others are possible but we do not have information about it in our database.

Basically, the firm fix a markup on costs. The most important criticism for this method is related to little attention with demand (little attention to elasticity) and competitors (for example, new entrants)

- 3) Customer value-based pricing (Cannon and Morgan, 1990; Monroe, 2002; Ingenbleek *et al.*, 2003; Docters *et al.*, 2004; Ingenbleek, 2007; Hinterhuber, 2008): this method is based on perceived value of the product, i.e., the price is determined observing the attributed value for the product by customer or, in cases of business-to-business subcontracting, customer defines the price that it is willing to pay per unit or batch (for example, price defined in the negotiation with the consumer).

Considering them, we define our second hypothesis which will be tested:

**H2: Different pricing strategies impact on performance of informal firms compared to formal firms.**

## DATA

We use the ECINF survey (The Urban Informal Economy Survey - *Pesquisa de Economia Informal Urbana*), a cross section of small firms, which was collected by the Brazilian Bureau of Statistics (IBGE) in 2003. This database is commonly used in the individual level to study labor and informality (Ulyssea, 2018), however there is also rich information about informal and formal firms that were not studied in the firm level before.

This survey was designed to investigate informal firms. Although owners of firms are directly asked whether they are registered with the tax authorities. Thus, it was possible to directly observe firms' status: informal and formal.<sup>2</sup>

The ECINF is designed to be representative at the national level for firms with at most five employees. Although the ECINF survey was also done in 1997, we only use data from 2003. The 1997 survey has serious problems of consistency which prevent its use (see de Paula and Scheinkman (2010) and Ulyssea, 2018). The label and construction of each variable is found in the table 1. The use of each one of them in our empirical exercise is explained in the sequence.

**<Insert Table 1 About Here>**

*Dependent variable:* We use the revenue per hour of firms as proxy of their performance.

Revenue has been broadly used as an alternative to measure firm's performance in several cases such as hotel and lodging industry firms (Chung and Kalnins, 2001; Chang and Sokol, 2020), Hollywood film industry (Mannor, Shamsie and Conlon, 2016), human resource impact (Huselid, 1995; Majumdar, 2007; Jennings, Jennings and Greenwood, 2009; Campbell *et al.*, 2012; Mollick, 2012), impact of founding strategy in high-tech and low-tech firms (Feeser and Willard, 1990) and small firms (Bracker, Keats and Pearson, 1988; Chrisman *et al.*, 2012).

*Independent variable:* We define the difference between *informal and formal firms* by the registration of firms with the tax authorities (formal registration is required for Brazilian firms, *Cadastro Nacional de Pessoa Juridica*, CNPJ).<sup>3</sup> The ECINF survey has a number of formal firms higher than informal firms: 67,493 are informal firms and 2,723 are formal firms.

*Instrumental variable:* Age is a commonly used to approximate experience, though one must account for each individual's number of years spent in school when doing so as this has an impact on the individual's starting qualifications (Patrinos, 2016). Additionally, between the main variables which explain the earning of economic immigrants on long-term in Canada is the age and education (Hou, Picot and Bonikowska, 2015).

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<sup>2</sup> These are self-reported variables and naturally raise measurement error concerns. Nonetheless, IBGE has a long tradition in accurately measuring labor informality, and it has very strict confidentiality clauses, so the information cannot be used for auditing purposes. These features, associated to the high levels of informality observed in the data, increase the confidence that respondents are not systematically underreporting their informality status.

<sup>3</sup> To register a firm in Brazil is a lengthy and costly process. Besides these fixed registration costs, being a formal firm also implies ongoing costs such as taxes and red tape associated to tax payments, as well as other variable costs associated to the labor regulation. The Brazilian position is 124 in 190 countries in Doing Business (2000)

*Control variables and heterogeneities of sample:*

*Firm's characteristics:* We find in the ECINF survey information about the type of difficult faced by firms: firms without difficult, lack of clients, lack of credit, low profitability, lack of water or energy, tax problems, lack of skill workers, lack of raw material, strong competition, lack of infrastructure, lack of capital, lack of management training, and lack of other non-mentioned things. Additionally, we control the time to working for each firm for month. This control is important given that our dependent variable is revenue by hour and without this control we do not know if the effect of our variable of interest comes from denominator or numerator.

A great part of covariates of firms captures the environment which formal and informal firms are presented and was previously describe. For example, tax problems (Ordóñez, 2014; Iriyama *et al.*, 2016), lack of management training, and finally, lack of other non-mentioned things which can be included the bribe (Blackman, 2000; Perry *et al.*, 2007).

*Owner's schooling:* The age of owner can capture the acquired skill for the business though "learning by doing" if we control the difference of level of schooling: illiterate, reads and writes, some primary education, graduated primary school, some secondary school, graduate secondary school, some college education, graduate college, and ignored schooling.

*Difference of strategies:* We find in the ECINF survey information about the main pricing strategies adopted by firms in the sample. The question used in the survey for that purpose was: "What is the main method you use to price your products or services?". Among the answering alternatives, we have found significance for Competition-based pricing (CmBP), Cost-based pricing (CsBP) and Customer value-based pricing (CVBP).

Table 2 depicts our descriptive statistics. We present statistics (number of observations, average, and standard deviation: SD) for all firms and two sub-samples: informal and formal firms. Table 3 shows the correlation matrix between the variables used here.

<Insert Table 2 and 3 About Here>

### *Statistical analyses*

The total sample firms' average in revenue per hour was 18.10 Reais (the Brazilian currency). The informal firms average was 16.85 and formal forms average was 51,36.

The following variables did not present significant difference between informal and formal firms: Age, Some secondary school, Lack of credit, Low Profitability, Lack of water or energy. All the other non-mentioned variables presented significant variation between informal and formal firms.

In the remaining group of variables that presented significant difference, the following variables presented greater values in **Informal Firms**: Some elementary education (SEE), Firms without difficulties (FwD), Lack of clients (LC), Lack of infrastructure (LI), Lack of capital (LCa), Customer value-based pricing (CVBP). In this same group, the following variables presented greater values in **Formal Firms**: The time to working for each firm for month (HOURS), Some college education (SCE), Tax problems (TxP), Lack of skill workers (LSW), Workers big turnover (WBT), Lack of raw material (LRM), Strong competition (SC), Lack of management training (LMT), Lack of other non-mentioned things (LOT), Competition-based pricing (CmBP), and Cost-based pricing (CsBP).

## **METHODS**

The main challenge in estimating the causal effects of informal firms on the performance of firm because there is a reverse causality problem. The performance of firm may affect the owner's decision about the informality or not.

Thus, the main challenge of this exercise is to credibly find exogenous variation ("variable") in informal firms ( $COV(Informal_i, Variable_i) \neq 0$ ). We explore the change the age of firm's

owner as a source of exogenous variation and apply the instrumental variable approach to estimate the effect of the use of informal firms on the performance of firm. Following a similar argument of Hanushek *et al.* (2015), the beginning of development this experience (with the age of individual) was determined before the individual entered in the labor market. As we also control by formal education of firm's owner, we use the age as specifically proxy of one experience out of formal system. This experience is important. in small business. This experience is acquired from different jobs (like cook, waiter, salesperson, practices which do not demand great skill but learning by doing) that the individual passed that can help on choice of place of her activity.

The correlation between the decision of type of form (informal or formal) and the age of owner may be positive or negative. Positive whether the experience, given the great difficult of register a firm in Brazil, leave the owner choose has an informal firm. Negative, whether the experience leave the owner, with more experience, has less informal firms. The lack of ability is more important for this decision.

Formally, the first-stage linear regression is as follows:

$$1(\text{Informal})_i = \alpha_0 + \alpha_1 \text{Age}_i + \phi' X_i + \alpha_2 1(\text{Sector})_i + \alpha_3 1(\text{State})_i + \varepsilon_i \quad (1)$$

where  $1(\text{Informal})_i$  is a dummy variable with value equal to one if the firm  $i$  is classified as informal and zero otherwise;  $\text{Age}_i$  is the age of firm's owner  $i$ ;  $X_i$  is a set of firm and characteristics of owner controls. The controls for the firms' characteristics are useful to ensure that the informal in the second-stage is not capturing other characteristics of the firm that can be responsible for worse performance. These controls of firms' characteristics are as follows: firms without difficult, lack of clients, lack of credit, lack of water or energy, lack of skill workers, lack of raw material, lack of infrastructure, lack of capital, and lack of management training. The controls for the owner characteristics are about their formal education and they are important because we are using the age of the owner as proxy of experience, so these controls are used aiming to isolate the experience effect (the experience of life). These controls for characteristics of owners are their schooling: some elementary school, some high school, and some college education.  $1(\text{Sector})_i$  is a dummy variable with value equal to one if the firm belongs to the sector  $i$  and this variable aims to capture some regional characteristic that can impact performance.  $1(\text{State})_i$  is a dummy variable with value equal to one if the firm is in the specific state (there are 27 states in Brazil more the DC) and these variables also aim to capture some regional characteristic that can impact performance;  $\varepsilon_i$  is the error term.

The second-stage linear regression is as follows:

$$P_i = \beta_0 + \widehat{\beta}_1 1(\text{Informal})_i + \phi' X_i + \beta_2 1(\text{Sector})_i + \beta_3 1(\text{State})_i + \varepsilon_i \quad (2)$$

where  $P_i$  is the performance of firm  $i$ ; and  $\varepsilon_i$  is the error term. We believe that the age of owner is not correlated with non-observable characteristics of owner that should explain the performance of firm as, for instance, skill, leadership, and sympathy ( $\text{COV}(\text{Age}_i, \varepsilon_i) = 0$ )

The parameter of interest is  $\widehat{\beta}_1$ . Given that  $1(\text{Informal})_i$  is a binary variable, if we apply TSLS directly to equation 2, we make no distinction between discrete, continuous or some mixture for  $1(\text{Informal})_i$  variable. Thus, we opt to follow the methodology established by Wooldridge (2002), control function, to show our results.

Following this methodology, we estimate equation (1) as Probit model as follows:

$$P(\text{Informal}_i = 1 | \text{Age}_i, \phi' X_i, 1(\text{Sector})_i, 1(\text{State})_i) = \varphi(\alpha_0 + \alpha_1 \text{Age}_i + \phi' X_i + \alpha_2 1(\text{Sector})_i + \alpha_3 1(\text{State})_i)$$

where  $\varphi$  is the cumulative normal distribution function.

And save their predict value. In the sequence, we instrumented  $1(\text{Informal})_i$  in equation 2 (linear) by this predict value and to obtain the main results on TSLS.

The results exploring each one of strategies of purchases, price formation, and selling are investigated on sub-samples. For instance, if we explore the purchase's strategy "the firms choose the purchase from small firms", we show one estimate of our main result for firms which choose

the purchase from small firms and other one on firms which choose no purchase from small firms. We have two reasons for it. First, to avoid either the search of a new variable as instrument in the first stage for the interaction between our variable of interest  $1(Informal)_i$  and each variable explored or one good instrument (strong) for all necessary interactions. Second, we do not have problems of efficiency on our estimative when we explore sub-samples given that our original database has a great number of observations.

## RESULTS

Our results are showed considering three divisions (table 4 from top to the bottom). At the top of table, there are the second-stage results of (equation 2). We show the results of constant in the estimate ( $\beta_0$ ) to observe the impact of status of firm (informal or formal) on the average revenue of firms per hour. In the middle of table, we present the first-stage results assuming the predict of status of firms (informal or formal) as instrumental variable following the procedure established by Wooldridge (2002). We also show the F-statistic (excluded instruments) of first stage. Finally, at the bottom of the table, we show the effect of age of owner on definition of status of firm (PROBIT model). Between the columns, there are three divisions. The first group of columns ([1] and [2]) contains the main results. Column [2] has as control the level of schooling of owners and the characteristics of firms and column [1] do not one. In the second group, we show results for some important heterogeneities of sample (columns [3] and [4] for firms with or without tax problems; columns [5] and [6] for firms with or without strong competition; columns [7] and [8] for firms with or without problems of low profitability; columns [9] and [10] for firms with or without other problems non-mentioned as problems previously). Finally, the last group, we show results about difference of price strategies (columns [11] and [12] for firms with or without competition-based pricing; columns [13] and [14] for firms with or without cost-based pricing; columns [15] and [16] for firms with or without customer value-based pricing).

We do not discuss results which the result of age of owner was not significant because it is the base to build our instrumental variable (columns [3], [5], and [9]). We also check if there are underestimating IV standard errors: Lee *et al.* (2021) method to adjust t-statistic statistical significance. We do not observe any difference on results.

**<Insert Table 4 About Here>**

### ***Impact of informality on performance of firms***

In column 2 (main results with control of the level of schooling of owners and the characteristics of firms), the average revenue per hour of firms is 156.35 Reais per hour (the Brazilian currency) and if the status of the firm is informal, this revenue is lower in 139.92 Reais. Thus, the revenue per hour is 16,43 Reais smaller. These results assure that informal and formal firms have different performance (our hypothesis 1 is valid).

By observing the second group of columns (by exploring heterogeneities of sample), we observe that: 1) no situation is capable of changing the worse performance of informal firms in relation to formal firms; 2) the difficulty of profitability (low profitability) produces a difference of performance worse when the firm is confronted with this situation: with problems low profitability the difference is 21,52 Reais per hour (100,16 less 78,64) and without this problem, the difference is 15,71 Reais per hour (154,71 less 139,00); 3) firms not facing with problems (strong competition and other non-mentioned problems in the survey), the difference of performance of informal firms compared with formal firms is better (the negative difference is smaller) having the result of sample as whole as reference: no strong competition produces a difference of 12,88 Reais per hour (90,26 less 77,38) and no other mentioned problems produce a difference of 13,72 Reais per hour (133,20 less 119,48); 4) firms without tax problems

produce a similar difference those found in the main results: 16,73 Reais per hour (154,48 less 137,75).

### **Pricing strategy**

We present the results of performance observing the different pricing strategy in columns 11-16: competition-based pricing (columns 11 and 12), cost-based pricing (columns 13 and 14), and customer value-based pricing (columns 15 and 16).

Even comparing difference of performance, price based on competition (competition-based pricing) provokes a worse difference of performance for informal firms compared to formal firms than when they do not choose this strategy. If informal and formal firms prefer this strategy, its difference of performance is 37,52 Reais per hour (95,50 less 57,98). On the other hand, if they do not choose this strategy, the difference of performance is lower: 12,39 Reais per hour (149,53 less 137,14). The difference of performance is ever not favorable for informal firms. In the same way, price based on margin over cost (customer value-based pricing) produces the similar result. When they choose this strategy, the difference of worse performance is higher (27,05 Reais per hour = 119,73-92,68) than when they do not opt for it (15,65 Reais per hour = 127,50-111,85).

On the other hand, price based on customer negotiation (customer value-based pricing) produces the smallest difference of worse performance between informal and formal firms when this strategy is chosen: 9,64 Reais (125,52-115,88). When the firms do not choose this strategy, the difference of worse performance is 23,70 Reais (187,65-163,95).

By observing the results, different pricing strategies are influencing the difference of performance between informal and formal firms. Our hypothesis 2 is valid. Following the results, the best pricing strategy to reduce the worse difference of performance between informal and formal firms is an environment which the firms chosen to establish price on negotiation with consumers (customer value-based pricing).

## **DISCUSSION AND CONTRIBUTIONS**

Assenova and Sorenson (2017) found that firms that formalize their business earlier have better performance than other firms. Although we do not work with the history of firms, the status of informality of firms is associated with a worse performance when we compared with firms that have the status of formality. Our investigation comparing informal and formal firms permit this affirmation.

On the other hand, Piperopoulos *et al.* (2021) have described that the competition with informal harms the performance of small formal firms. It can occur; however, it is not sufficient to produce a worse performance of formal firms compared to informal firms. As we showed, informal firms ever have worse performance.

By looking our investigation on heterogeneities of sample, we also observe that between formal and informal firms with no tax problem, the worse performance of informal firms compared to formal firms is present. However, taxes cannot be a problem for informal firms given that they do not pay them. Even thus, with this result, it is difficult to believe that no pay taxes without a problem identifiable by different firms (informal or formal) produce any advantage for informal firms in terms of performance as Ordonez (2014) and Iriyama *et al.* (2016) mentioned.

We do not have a specific question on survey about unfair competition. However, we have a question about strong competition. If “strong competition” captures a little the idea of an environment of unfair competition (informal firms with advantage in the same environment of formal firms), looking our results, an environment without strong competition could harm

the performance of informal firms as we observed on Kettles's work (2007). It is the result that we observed. Without strong competition, the difference of performance of informal firms compared with formal firms is worse but the difference is small than those observed for the sample as whole. Additionally, we test the difference of performance of informal and formal firms in distinct environment (formal firms with declared strong competition and informal firms with declared no-strong competition; please see the results on table A1, column [1], in the appendix 1). The results keep the previous result: worse performance of informal firms compared with formal firms.

In the same way, if the question about problems with low profitability in the survey captures a piece of firm's costs (profitability is a result that comes from revenue less costs; low profitability can indicate low revenue or elevated cost), informal and formal firms without a problem of low profitability should produce a performance better. Into this scenario, we observed that informal firms go on with worse performance when compared to formal firms. We test with power (please see table A1, column [2], in the appendix 1), the difference of performance of informal and formal firms in distinct environment (formal firms without declared problems of low profitability and formal firms with declared problems of low profitability). The results also keep the previous result: worse performance of informal firms compared with formal firms.

Finally, given that question of other non-mentioned problems can contain problems related with regulation and corruption (there is not direct question on these problems) and, the difference of performance observed between informal and formal firms is worse into of an environment without these "other non-mentioned problems", we cannot identify clearly any advantage for informal firms compared with formal firms on absence these problems (de Soto 1989, Loayza *et al.* 2005, Feige, 1999, Dutta *et al.*, 2013, Assenova and Sorenson 2017, and McCann and Bahl, 2017). Once again, we test with power (please see table A1, column [4], in the appendix 1), the difference of performance of informal and formal firms in distinct environment (formal firms without declared other non-mentioned problems and formal firms with declared other non-mentioned problems). The results keep the previous result too: worse performance of informal firms compared with formal firms.

It is ever important to show that our results are controlled every time by the existence of lack of credit, capital, skill of workers, and management of firms (see the list of our controls showed in both the methodology and data section). Thus, our hypothesis that the informal and formal firms have different performance is valid. It also is valid for different environment explored on sample.

The second hypothesis has also been confirmed. We can observe that different pricing strategies can impact on performance of informal firms compared to formal firms, especially when pricing strategy is customer value-based pricing (Cannon and Morgan, 1990; Monroe, 2002; Ingenbleek *et al.*, 2003; Docters *et al.*, 2004; Ingenbleek, 2007; Hinterhuber, 2008). The price strategy based on costumer (negotiation about value between sellers and consumers) reduces the difference of (worse) performance between informal and formal firms. As previously, we test with power (please see table A1, column [6] and [7], in the appendix 1), the difference of performance of formal with different price strategies (price competition and cost based) and informal firms with strategy based on value. The results also keep the previous result: worse performance of informal firms compared with formal firms. Although the result of difference of performance is the same, these results are very similar those found in the main results (the difference in the column [6] is 11,05 Reais and the difference in the column [7] is 12,48 Reais).

Thus, we have two basic contributions for the literature of strategy that study informal firms. First, we show that the performance of informal firms is worse than informal firms even when we investigated different environment (without environment of strong competition,

**Table 1 - Panel A:** Label, construction, and source of variables

|                         | <b>Label</b>                              | <b>Construction</b>                                                                                                                                                              | <b>Source</b>                                                      |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Problems faced by firms | <b>Revenue per hour</b>                   | Revenue month of a firm in Reais (Brazilian Real) divided by the number of hours worked per month                                                                                | ECINF survey ( <i>Pesquisa de Economia Informal Urbana</i> , 2003) |
|                         | <b>Informal</b>                           | Dummy variable equal to one if the firm is informal and zero otherwise.                                                                                                          |                                                                    |
|                         | <b>Hours</b>                              | Number of hours worked per month                                                                                                                                                 |                                                                    |
|                         | <b>Firms without difficult</b>            | Firms that claim not having no regional constraints. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                                |                                                                    |
|                         | <b>Lack of clients</b>                    | Firms that claim to have constraint of lack of clients. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                             |                                                                    |
|                         | <b>Lack of credit</b>                     | Firms that claim to have constraint of lack of credit. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                              |                                                                    |
|                         | <b>Low profitability</b>                  | Firms that claim to have constraint of low profit. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                                  |                                                                    |
|                         | <b>Lack of water or energy</b>            | Firms that claim to have constraint of lack of water or electric power sourcing. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.    |                                                                    |
|                         | <b>Tax problems</b>                       | Firms that claim to have constraint of taxes problems. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                              |                                                                    |
|                         | <b>Lack of skill workers</b>              | Firms that claim to have constraint of lack of skilled labor. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                       |                                                                    |
|                         | <b>Lack of raw material</b>               | Firms that claim to have constraint of lack of raw material. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                        |                                                                    |
|                         | <b>Elevated turnover of employees</b>     | Firms that claim to have constraint of high turnover. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                               |                                                                    |
|                         | <b>Strong competition</b>                 | Firms that claim to have constraint of strong competition. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                          |                                                                    |
|                         | <b>Lack of infrastructure</b>             | Firms that claim to have constraint of lack of firm's infrastructure. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.               |                                                                    |
|                         | <b>Lack of capital</b>                    | Firms that claim to have constraint of lack of capital. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                             |                                                                    |
|                         | <b>Lack of management training</b>        | Firms that claim to have constraint of lack of managing training. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                   |                                                                    |
|                         | <b>Lack of other non-mentioned things</b> | Firms that claim to have constraint of lack non-mentioned previously in the survey. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise. |                                                                    |

without tax problems, with/without problems of low profitability, or without other non-identified problems that can hide regulation and corruption). Second, we show that price strategy can reduce the difference of worse performance between informal and formal firms. In this case, the price strategy based on negotiation of value of product close to customers and it can favor more informal firms than formal firms.

## LIMITATIONS

We did not identify precise questions in the survey about issues related to unfair competition, regulation and corruption. With these questions we could dialogue more directly with the literature developed. We seek indirect evidence to dialogue with this literature from the questions we find in the survey. We would also like to follow these firms on time to identify changes. Unfortunately, we only have the survey done for one year (2003).

**Table 1 - Panel B:** Label, construction, and source of variables

|                            |                         |                                     |                                                                                                                                                                                                                     |                                                                          |
|----------------------------|-------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Owner's<br>Characteristics | Pricing firm's strategy | <b>Competition-based pricing</b>    | Firms that establish prices based on the price from competition. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                                                       | ECINF<br>survey<br>( <i>Pesquisa de Economia Informal Urbana</i> , 2003) |
|                            |                         | <b>Cost-based pricing</b>           | Firms that establish prices based on cost plus fixed margin. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                                                           |                                                                          |
|                            |                         | <b>Customer value-based pricing</b> | Firms that establish prices based on negotiation with clients. Dummy variable equal to 1 when firm present this characteristic and equal to zero otherwise.                                                         |                                                                          |
|                            |                         | <b>Age</b>                          | Age of the owner                                                                                                                                                                                                    |                                                                          |
|                            |                         | <b>Schooling</b>                    | Dummy variable equal to one if the owner has one type of declared schooling (some elementary school, some high school, and some college education) and zero otherwise                                               |                                                                          |
| Firm Location              |                         | <b>State dummies</b>                | Dummy variable equal to 1 when the firm is in one of 27 states or DC and equal to zero otherwise.                                                                                                                   |                                                                          |
| Firm sector                |                         | <b>Sector dummies</b>               | Dummy variable equal to 1 when firm belongs an one of sectors f economy and equal to zero otherwise. We use The National Classification of Economic Activities (CNAE) with the first two digits for classification. |                                                                          |

Table 2: Descriptive statistics

| Variable                                 | Total Sample |         |        | Informal Firms |         |        | Formal Firms |         |           |
|------------------------------------------|--------------|---------|--------|----------------|---------|--------|--------------|---------|-----------|
|                                          | Obs.         | Average | SD     | Obs.           | Average | SD     | Obs.         | Average | SD        |
| Informal                                 | 70,152       | 0.963   | 0.187  | -              | -       | -      | -            | -       | -         |
| Revenue per hour (Revenue)               | 70,152       | 18.10   | 30.27  | 67,601         | 16.85   | 28.66  | 2,551        | 51.36   | 47.91     |
| Hours                                    | 70,152       | 190.20  | 149.39 | 67,601         | 189.23  | 150.03 | 2,551        | 215.75  | 128.51*** |
| Age                                      | 70,152       | 37.95   | 13.27  | 67,601         | 38.03   | 13.27  | 2,551        | 35.74   | 12.99     |
| Some elementary school (SES)             | 70,152       | 0.323   | 0.467  | 67,601         | 0.329   | 0.469  | 2,551        | 0.161   | 0.368***  |
| Some high school (SHS)                   | 70,152       | 0.103   | 0.303  | 67,601         | 0.103   | 0.304  | 2,551        | 0.099   | 0.300     |
| Some college education (SCE)             | 70,152       | 0.040   | 0.195  | 67,601         | 0.039   | 0.192  | 2,551        | 0.074   | 0.261***  |
| Firms without difficulties (FwD)         | 70,152       | 0.165   | 0.371  | 67,601         | 0.166   | 0.372  | 2,551        | 0.134   | 0.341***  |
| Lack of clients (LC)                     | 70,152       | 0.461   | 0.498  | 67,601         | 0.463   | 0.499  | 2,551        | 0.412   | 0.492***  |
| Lack of credit (LCr)                     | 70,152       | 0.159   | 0.365  | 67,601         | 0.159   | 0.366  | 2,551        | 0.153   | 0.360     |
| Low profitability (LPr)                  | 70,152       | 0.354   | 0.478  | 67,601         | 0.354   | 0.478  | 2,551        | 0.347   | 0.476     |
| Lack of water or energy (LWE)            | 70,152       | 0.014   | 0.118  | 67,601         | 0.014   | 0.117  | 2,551        | 0.015   | 0.124     |
| Tax problems (TxP)                       | 70,152       | 0.022   | 0.146  | 67,601         | 0.021   | 0.144  | 2,551        | 0.036   | 0.186***  |
| Lack of skill workers (LSW)              | 70,152       | 0.037   | 0.188  | 67,601         | 0.036   | 0.185  | 2,551        | 0.072   | 0.258***  |
| Workers big turnover (WBT)               | 70,152       | 0.009   | 0.094  | 67,601         | 0.009   | 0.093  | 2,551        | 0.013   | 0.113***  |
| Lack of raw material (LRM)               | 70,152       | 0.016   | 0.124  | 67,601         | 0.015   | 0.123  | 2,551        | 0.020   | 0.140***  |
| Strong competition (SC)                  | 70,152       | 0.423   | 0.494  | 67,601         | 0.421   | 0.494  | 2,551        | 0.461   | 0.499***  |
| Lack of infrastructure (LI)              | 70,152       | 0.095   | 0.294  | 67,601         | 0.097   | 0.296  | 2,551        | 0.047   | 0.213***  |
| Lack of capital (LCa)                    | 70,152       | 0.292   | 0.455  | 67,601         | 0.293   | 0.455  | 2,551        | 0.268   | 0.443***  |
| Lack of management training (LMT)        | 70,152       | 0.034   | 0.180  | 67,601         | 0.033   | 0.179  | 2,551        | 0.047   | 0.212***  |
| Lack of other non-mentioned things (LOT) | 70,152       | 0.081   | 0.273  | 67,601         | 0.080   | 0.272  | 2,551        | 0.110   | 0.313***  |
| Competition-based pricing (CmBP)         | 70,152       | 0.260   | 0.438  | 67,601         | 0.259   | 0.438  | 2,551        | 0.274   | 0.446***  |
| Cost-based pricing (CsBP)                | 70,152       | 0.221   | 0.415  | 67,601         | 0.217   | 0.412  | 2,551        | 0.326   | 0.468***  |
| Customer value-based pricing (CVBP)      | 70,152       | 0.337   | 0.473  | 67,601         | 0.343   | 0.475  | 2,551        | 0.177   | 0.382***  |

Note: t-statistic: \*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels

Table 3: Correlation Matrix

|            | Informal | Revenue | Age    | Illiterate | SPE    | SSS    | SCE    | FwD    | LC     | LCr    | LPr    | LWE    | TxP    | LSW    | WBT    | LRM    | SC     | LI     | LCa    |
|------------|----------|---------|--------|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Informal   | 1.000    | -       | -      | -          | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| Revenue    | -0.134   | 1.000   | -      | -          | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| Age        | 0.030    | -0.037  | 1.000  | -          | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| Illiterate | 0.035    | -0.036  | 0.173  | 1.000      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| SES        | 0.070    | -0.067  | 0.063  | -0.151     | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| SHS        | 0.002    | -0.004  | -0.166 | -0.074     | -0.233 | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| SCE        | -0.038   | 0.049   | -0.072 | -0.045     | -0.141 | -0.069 | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| FwD        | 0.014    | 0.015   | -0.011 | -0.025     | -0.020 | -0.010 | 0.019  | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| LC         | 0.018    | -0.061  | 0.064  | 0.046      | 0.062  | -0.016 | -0.029 | -0.410 | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| LCr        | 0.005    | 0.003   | -0.030 | -0.008     | 0.004  | 0.013  | -0.002 | -0.193 | 0.065  | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      | -      |
| LPr        | 0.005    | -0.001  | 0.021  | 0.030      | 0.027  | 0.016  | -0.034 | -0.329 | 0.190  | 0.137  | 1.000  | -      | -      | -      | -      | -      | -      | -      | -      |
| LWE        | -0.001   | -0.005  | -0.019 | 0.003      | 0.009  | 0.004  | 0.000  | -0.053 | -0.003 | 0.052  | 0.052  | 1.000  | -      | -      | -      | -      | -      | -      | -      |
| TxP        | -0.020   | 0.024   | -0.026 | -0.014     | -0.003 | 0.002  | 0.013  | -0.067 | -0.024 | 0.047  | 0.016  | 0.044  | 1.000  | -      | -      | -      | -      | -      | -      |
| LSW        | -0.036   | 0.048   | -0.044 | -0.026     | -0.043 | 0.007  | 0.025  | -0.088 | -0.041 | 0.068  | 0.040  | 0.045  | 0.058  | 1.000  | -      | -      | -      | -      | -      |
| WBT        | -0.012   | 0.021   | -0.022 | -0.010     | -0.011 | 0.003  | 0.008  | -0.042 | -0.007 | 0.027  | 0.028  | 0.028  | 0.047  | 0.251  | 1.000  | -      | -      | -      | -      |
| LRM        | -0.008   | 0.013   | -0.001 | 0.020      | 0.006  | -0.005 | -0.002 | -0.056 | -0.014 | 0.054  | 0.048  | 0.046  | 0.049  | 0.089  | 0.052  | 1.000  | -      | -      | -      |
| SC         | -0.015   | -0.003  | -0.001 | -0.007     | 0.025  | -0.001 | -0.022 | -0.380 | 0.210  | 0.088  | 0.206  | 0.020  | 0.041  | 0.016  | 0.026  | 0.014  | 1.000  | -      | -      |
| LI         | 0.027    | -0.018  | -0.019 | 0.004      | 0.014  | 0.018  | -0.012 | -0.144 | 0.021  | 0.149  | 0.077  | 0.050  | 0.032  | 0.053  | 0.025  | 0.070  | 0.033  | 1.000  | -      |
| LCa        | 0.011    | -0.006  | -0.034 | 0.000      | 0.015  | 0.025  | -0.007 | -0.285 | 0.055  | 0.263  | 0.180  | 0.066  | 0.043  | 0.087  | 0.046  | 0.050  | 0.108  | 0.213  | 1.000  |
| LMT        | -0.018   | 0.044   | -0.047 | -0.022     | -0.024 | 0.017  | 0.014  | -0.084 | 0.003  | 0.138  | 0.080  | 0.059  | 0.082  | 0.198  | 0.126  | 0.078  | 0.078  | 0.153  | 0.156  |
| LOT        | -0.027   | 0.027   | 0.012  | 0.001      | -0.030 | -0.012 | 0.028  | -0.133 | -0.097 | -0.050 | -0.062 | 0.019  | -0.005 | -0.003 | -0.002 | -0.015 | -0.087 | -0.038 | -0.074 |
| CmBP       | -0.009   | -0.007  | -0.029 | 0.005      | -0.007 | 0.013  | -0.006 | -0.025 | 0.002  | 0.019  | 0.034  | 0.029  | 0.024  | -0.002 | 0.000  | -0.010 | 0.055  | 0.032  | 0.052  |
| CsBP       | -0.052   | 0.036   | 0.000  | -0.021     | -0.001 | 0.020  | 0.000  | -0.014 | -0.046 | 0.061  | 0.024  | 0.027  | 0.001  | 0.032  | 0.011  | 0.039  | -0.031 | 0.037  | 0.063  |
| CVBP       | 0.071    | -0.055  | 0.022  | 0.029      | 0.055  | -0.022 | -0.017 | 0.012  | 0.085  | -0.032 | .052   | -0.045 | -0.034 | -0.008 | -0.013 | -0.018 | -0.012 | -0.014 | -0.062 |

**Table 4:** Difference of performance between formal and informal firms

|                                     | Dependent variable: Revenue per hour     |                          |                      |                        |                        |                        |                       |                        |                      |                        |                      |
|-------------------------------------|------------------------------------------|--------------------------|----------------------|------------------------|------------------------|------------------------|-----------------------|------------------------|----------------------|------------------------|----------------------|
|                                     | Main results                             |                          | Heterogeneities      |                        |                        |                        |                       |                        |                      |                        | Price str            |
|                                     |                                          |                          | Tax problems         |                        | Strong competition     |                        | Low profitability     |                        | Other problems       |                        | Compet               |
|                                     |                                          |                          | Yes                  | No                     | Yes                    | No                     | Yes                   | No                     | Yes                  | No                     | pricing              |
|                                     | [1]                                      | [2]                      | [3]                  | [4]                    | [5]                    | [6]                    | [7]                   | [8]                    | [9]                  | [10]                   | [11]                 |
|                                     | <i>SECOND-STAGE</i>                      |                          |                      |                        |                        |                        |                       |                        |                      |                        |                      |
|                                     | <i>IV</i>                                |                          |                      |                        |                        |                        |                       |                        |                      |                        |                      |
| Informal? (Yes/No)                  | -120.82***<br>(18.41)                    | -139.92***<br>(26.69)    | -74.92***<br>(16.72) | -137.75***<br>(24.91)  | -163.48***<br>(22.58)  | -77.38***<br>(24.15)   | -78.64***<br>(21.36)  | -139.00***<br>(28.23)  | -93.32**<br>(41.66)  | -119.48***<br>(16.98)  | -57.98*<br>(17.70)   |
| p-value                             | 0.000                                    | 0.000                    | 0.000                | 0.000                  | 0.000                  | 0.001                  | 0.000                 | 0.000                  | 0.025                | 0.000                  | 0.001                |
| Constant                            | 134.47***<br>(18.29)                     | 156.35***<br>(26.34)     | 62.83***<br>(13.79)  | 154.48***<br>(24.65)   | 182.89***<br>(22.18)   | 90.26***<br>(24.25)    | 100.16***<br>(37.39)  | 154.71***<br>(27.75)   | 115.78***<br>(41.38) | 133.20***<br>(16.74)   | 95.50***<br>(18.04)  |
| p-value                             | 0.000                                    | 0.000                    | 0.000                | 0.000                  | 0.000                  | 0.000                  | 0.000                 | 0.000                  | 0.005                | 0.000                  | 0.000                |
|                                     | <i>FIRST-STAGE for Informal (Yes/No)</i> |                          |                      |                        |                        |                        |                       |                        |                      |                        |                      |
| Predict of informal                 | 1.01***<br>(0.153)                       | 0.73***<br>(0.12)        | 1.48***<br>(0.26)    | 0.79***<br>(0.132)     | 1.05***<br>(0.14)      | 0.80***<br>(0.21)      | 1.14***<br>(0.22)     | 0.74***<br>(0.13)      | 0.86***<br>(0.30)    | 0.98***<br>(0.12)      | 1.18***<br>(0.172)   |
| p-value                             | 0.000                                    | 0.000                    | 0.000                | 0.000                  | 0.000                  | 0.000                  | 0.000                 | 0.000                  | 0.005                | 0.000                  | 0.000                |
| F-Statistics (Excluded instruments) | F(1, 70105)<br>43.40***                  | F( 1, 70092)<br>33.12*** | F(1,697)<br>31.63*** | F(1,68563)<br>35.81*** | F(1,29611)<br>52.23*** | F(1,40428)<br>14.05*** | F(1,4559)<br>26.65*** | F(1,64385)<br>29.29*** | F(1,24776)<br>7.92** | F(1,45252)<br>63.42*** | F(1,174)<br>47.19*** |
|                                     | <i>PROBIT: for informal (Yes/No)</i>     |                          |                      |                        |                        |                        |                       |                        |                      |                        |                      |
| Age of owner                        | 0.003**<br>(0.001)                       | 0.003***<br>(0.001)      | -0.005<br>(0.004)    | 0.003***<br>(0.001)    | 0.001<br>(0.001)       | 0.005***<br>(0.0009)   | 0.01**<br>(0.004)     | 0.002**<br>(0.001)     | 0.0009<br>(0.003)    | 0.004***<br>(0.001)    | 0.004***<br>(0.0008) |
| p-value                             | 0.029                                    | 0.006                    | 0.255                | 0.007                  | 0.59                   | 0.000                  | 0.011                 | 0.023                  | 0.785                | 0.003                  | 0.000                |
| Owner's schooling?                  | No                                       | Yes                      | Yes                  | Yes                    | Yes                    | Yes                    | Yes                   | Yes                    | Yes                  | Yes                    | Yes                  |
| Firms' characteristics?             | No                                       | Yes                      | Yes                  | Yes                    | Yes                    | Yes                    | Yes                   | Yes                    | Yes                  | Yes                    | Yes                  |
| State dummies?                      | Yes                                      | Yes                      | Yes                  | Yes                    | Yes                    | Yes                    | Yes                   | Yes                    | Yes                  | Yes                    | Yes                  |
| Sector dummies?                     | Yes                                      | Yes                      | Yes                  | Yes                    | Yes                    | Yes                    | Yes                   | Yes                    | Yes                  | Yes                    | Yes                  |
| Observations                        | 70,146                                   |                          | 731                  | 68617                  | 29664                  | 40482                  | 4601                  | 64439                  | 24828                | 45306                  | 17548                |

**Note:** Standard errors are presented in parentheses and are clustered at the regional level; t-statistic: \*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively; a) Owner's schooling: no schooling, some high school, and some college education; b) Firms' characteristics: firms without difficult, lack of clients, lack of credit, lack of water or energy, lack of skill workers, lack of management training.

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