

Outgoing the shadows: estimating the impact of bureaucracy simplification and tax cut on formality and investment *

Joana C. M. Monteiro

DAI Brasil

Juliano J. Assunção †

Department of Economics

Pontifical Catholic University of Rio de Janeiro, PUC-Rio

Abstract

The paper evaluates the impact of a program of bureaucracy simplification and tax reduction on the formality of small firms in Brazil and its consequence to investment. We document an increase of 13 percentage points in formal licensing among retail firms created after the program when compared to firms in non-eligible sectors. The effect is more prominent for medium-sized firms, firms selling to individual customers (in opposition to other firms) and those located in the owner's house. The expanded business formality represents an increase in the amount invested and a change in the composition of the expenditures toward long-run projects.

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Introduction

In most countries, a substantial portion of the GDP is produced by the so-called shadow or underground economic activity. In Latin America, for example, the size of the informal sector relative to official GDP ranges from 25%

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† Address: Rua Marquês de São Vicente, 225/F210, Rio de Janeiro, Brazil, 22453-900. Tel.: +55-21-3114-1078; fax: +55-21-3114-1084. E-mail: juliano@econ.puc-rio.br

to 50%. For OECD countries, underground activities account, on average, for 16% of the GDP (Schneider and Enste, 2000).

A large body of literature addresses the measurement of the shadow economy. Interesting contributions are published in a special issue of the *Economic Journal* (**109**:456, June 1999) and a survey of the different methodologies and main estimates can be found in Schneider and Enste (2000). However, less attention has been devoted to causes and consequences of informality. Empirical evidence about key determinants is still very scattered due, predominantly, to the absence of data. As mentioned by Schneider and Enste (2000), “*gathering information about underground economic activity is difficult, because no one engaged in such activity wants to be identified*”.

The literature on the determinants of formality is based, primarily, on cross-country comparisons. Johnson et al. (1997, 1998) present evidence of a close relationship between the size of the unofficial economy and taxes, quality of public goods, regulatory discretion and corruption. Based on a sample of 69 countries and using an instrumental variable approach, where the linguistic fractionalization, the origins of the legal system, religion and latitude are used as exogenous sources of institutions, Friedman et al. (2000) suggest that bureaucracy, corruption and a weaker legal environment are all determinants of the informal sector, which does not happen with tax rates. Djankov et al (2002), studying 85 countries, show that firms entail in significant entry costs, both in terms of time and monetary fees to registration and licensing, and that stricter regulation of entry is associated with higher levels of corruption and the size of the unofficial economy. Auriol and Warlters (2005), using a sample of 53 countries, also show that the shadow economy decreases with the fixed cost of market entry. An exception in the literature is the paper by Johnson et al. (2000), which considers firm-level data from former Soviet countries and Eastern Europe. They show that underreported sales are associated with corruption but not with either protection payments to the mafia, tax payments or the effectiveness of the court system. In most of the studies above, taxes and bureaucracy appear as important determinants of the informal economy.

This paper evaluates the effects of a new legislation of bureaucracy simplification and tax reduction for small firms in Brazil - the so-called SIMPLES system. The SIMPLES program consists not only of tax reduction but also of red tape cut, a means of bypassing problematic procedures that were increasing the costs of being formal.

Our evidence is based on a special cross-sectional survey of small firms conducted in 1997, less than one year after the implementation of the program. This database along with the implementation of the new taxation in Brazil provides a favorable and unique opportunity for understanding causes and consequences of the unofficial economy. First, the new tax system is restricted

to a subset of sectors. We explore this characteristic using a *difference-in-difference* approach, comparing the legal status of firms in sectors affected and not affected by the reform, created before and after the program. Different from most of the previous studies, our source of econometric identification is a legislation change and not cross-country variation. Thus, restricting the analysis to one single country, our empirical strategy is less subject to other changes on the legal environment than other studies based on cross-country comparisons. Second, we do have data on unofficial firms - more than 75% of the firms in our sample are unlicensed. Different from the study by Johnson et al. (2000), which is about underreporting among formal firms, we investigate the variation in the official registration of firms. Third, we also have detailed data on investment. Therefore, we use the implementation of the SIMPLES system as a means of identifying the impact of formality on investment decisions.

Analyzing the consequences of informality to investment, this paper is also related to the literature on institutional determinants of investment. Belonging to the formal sector is a combination of secure property rights and better contractual capabilities. Unofficial firms face higher risk of expropriation, being subject to the fiscal control, which can impose different types of penalties, or even close the business. They also have limited access to the legal system and, consequently, they are more exposed to the criminal extortion, through corruption or mafia. This lack of well-defined property rights reduces the incentive for investment as documented by Besley (1995), Jacoby et al. (2002) and Cull and Xu (2005). On the other hand, members of the informal economy are systematically excluded by the state from the normal protection of contract enforcement, reducing the access to markets because of higher transaction costs. Firms in the formal sector have better access to suppliers, buyers and credit markets because they have lower contractual costs. The ability to write and enforce contracts is linked with the efficiency of the firms and affects investment incentives (Grossman and Hart, 1986; Hart and Moore, 1990; Hart 1995).

The relationship between informality and investment is ambiguous. While formal firms benefit from better property rights and contractual enforcement, there are also costs of joining and staying in the formal sector. Regularized firms might have fewer resources to invest. Delaying bureaucratic procedures, tax burden and red tape contribute to a reduction the amount of resources available to investment for formal firms. Thus, it is not possible to assert a priori which effect dominates.

Our empirical results are presented in two steps.

In the first part, we show that the SIMPLES program affects the formalization of economic sectors differently. There is an increase of 13 percentage points

in the licensing of retail firms, while the licensing of the other eligible sectors (construction, manufacturing, transportation and service) remains unaffected by the new legislation. Since only 28% of the retailers which started-up before the program is licensed, this result represents a measurable reduction on unregistered firms in the retail trade sector. Although there is little evidence on the subject, case studies also suggest that tax evasion is one major determinant of informality among retailers, while the informality of other sectors due predominantly to labor legislation, product requirements, copyright rules, sanitary restrictions, etc. (Farrel, 2004; Capp, Elstrodt and Jones Jr., 2005). These results hold after a series of robustness checks, accounting for differentiated time effects across groups, the possibility of splitting-ups, measurement errors in the age of the firm and time to formalize. Propensity score matching estimates also reinforce our results.

This first result contributes to a better understanding of the determinants of formality. A joint effort of tax reduction and bureaucracy simplification is found effective in reducing the size of the informal retail sector. Actually, according to Johnson *et al.* (1998), *“what really matters is how regulations and tax rules are actually implemented. If the rules are fine on paper but officials have a great deal of discretion in their interpretation and implementation, this leads to a higher effective burden on business, more corruption, and a greater incentive to move to the unofficial economy.”*

In the second part of the paper, we investigate the relationship between formalization and investment using the introduction of the new SIMPLES system as an instrumental variable for licensing. We find that the percentage of firms investing is not affected by the licensing, while the amount invested is substantially higher for firms in the formal sector. Licensed firms invest R\$ 5,387 more than unlicensed firms, which corresponds to 34% of the average annual revenue.

Examining the composition of the investment, we show that licensed firms have shifted investment from variable factors (tools and other instruments) to fixed factors (building, furniture and equipment, and vehicles). Since the income streams generated from tools and other instruments are more concentrated in the short-run when compared to the other items, this result suggests licensed firms tend to be more forward looking than firms in the informal sector. Regular businesses not only invest more, but also change the composition of the expenditures toward long-run projects. The results are not substantially changed when we control for credit.

These results contribute to the literature of institutional determinants of investment in two directions. First, we reinforce the importance of property rights and contractual costs to shape investment decisions, in an environment where these institutions are associated with an exogenous increase in formal-

ity among firms in our sample (Besley, 1995; Jacoby et al., 2002; Cull and Xu, 2005). However, unlike Acemoglu and Johnson (2005) and Cull and Xu (2005), we are not able to disentangle the two types of effects. Although we have information on credit, we cannot fully characterize changes in the access to input or output markets. In this sense, informality is jointly associated to security in property rights and better contractual capabilities in our analysis, both factors providing more investment incentives. Second, we show that a program of tax cut and red tape reduction in Brazil might have important indirect effects on economic growth, through the channels of formality and investment.

The paper is organized as follows. Section 1 provides the institutional background of the SIMPLES reform. Data are described in Section 2. Section 3 evaluates the effect of SIMPLES on the formal licensing of firms, presenting the identification strategy, the main results for the retail sector, and robustness checks. In Section 4, we investigate the impact of formality on investment. Then, we summarize our main findings in a concluding section.

1 Institutional background: the SIMPLES reform

The SIMPLES system (Sistema Integrado de Pagamento de Impostos e Contribuições das Microempresas e Empresas de Pequeno Porte) was implemented in December, 1996, aiming at simplifications and cuts in the tax burden of Brazilian micro and small enterprises. The system combines six different types of federal taxes and social contributions - namely, IRPJ (corporate income tax), PIS/PASEP (contribution to employees' savings programmes), CSLL (contribution on net profit), COFINS (contribution for financing the social security system), IPI (industrialized products tax) and the employer's social security contribution - into one single and monthly-based rate. This single rate varies from 3% to 5% of the total revenue for microenterprises and from 5.4% to 8.6% for small firms.¹ In the end, the new system represents a reduction in the overall tax burden of up to 8% of the annual revenue.

Many activities are not eligible for the change - those that require professionals with regulated occupations, the financial sector, firms of trading and housing. The SIMPLES law lists some activities which are not directly eligible and are subject to detailed analysis to be included or not in the system. In practice, these firms have the confirmation of the adhesion to the system only after its

¹ These definitions, according to the legislation, are based on the annual revenue. Microenterprises are licensed firms with an annual revenue equal to or lower than R\$ 120,000, while small firms can have an annual revenue up to R\$ 1,200,000. The exchange rate in December of 1996 was US\$ 1 = R\$ 1.0365.

process has been analyzed and approved by the Federal Revenue Department. Table 1 presents the sectors which are clearly eligible for the system, the sectors which are not covered by the legislation, and a third group of sectors about which the legislation is unclear. This latter group was dropped from the analysis.

[Table 1]

By the time the law was enacted and the data were collected the following activities could adhere to the system: retail trade, manufacturing which does not require a professional with regulated occupation, transportation, civil construction and other services which do not require a professional with a regulated occupation.

Comparing eligible and not eligible firms for the new tax system, we are able to adopt an empirical strategy based on counterfactuals, which is presented in section 3.1.

2 Data

We use data on firms gathered by the Urban and Informal Economy Survey (ECINF) conducted by the Brazilian bureau census in October, 1997. The survey comprises about 40,000 of firms located in the Brazilian state capitals and metropolitan areas.

The survey was conducted through a probabilistic sample of households, which were selected in two steps. In the first round, households were selected with probability proportional to the percentage of households which declared the head was occupied in the 1991 Demographic Census. In the second round, households with self-employed or small employer (with less than 5 employees) heads were stratified according to the economic activity and selected with uniform probability in each strata.

The key definition in our analysis is informality. According to Gërkhani (1999), there is a full range of descriptions and concepts - the most common definitions are based on the size of the firm, labor regularization, licensing, tax evasion, among others. Our analysis focuses on a crucial step for a firm to become legal in Brazil, which is the holding of the official licensing, either the state or the municipal document. Official licensing is an essential requirement for firms to be able to print an official invoice for tax purposes. Firms are subject to a series of penalties and fines in case of not having these licenses. Only 24 percent of the firms do hold official licenses in our sample.

Our study pass over all issues about labor informality. The registration of wage workers, for example, is not in focus here and thus we restrict our sample on firms without payroll.

Another characteristic of our sample is that all firms created more than 20 months before the survey are excluded.² Part of our empirical strategy is based on the comparison between firms created before and after the SIMPLES system. Since the survey was collected 10 months after the enactment of the SIMPLES law, we consider the same time window of 10 months to build the set of firms created before the law.

Table 2 presents the variables considered in our study. Basically, we have information about firms and their owners. The dataset has information about the economic activity, location, sales, assets, non-paid workers, main customers (individuals, small and large firms, or government), origin of the financial resources invested, compliance with different governmental registrations and others. About owners, the dataset has information on gender, level of education, age and time when he/she started the business.

[Table 2]

About 40 percent of firms in the sample have not indicated the value of assets. Thus, to avoid losing information, we create a new asset variable with missing points replaced by zero along with a dummy variable indicating firms without information on assets. All other variables are considered exactly as they are available in the survey.

3 The effect of tax reduction and bureaucracy simplification on formal licensing

3.1 Identification strategy

Our empirical analysis aims at providing an evaluation of the implementation of the SIMPLES system to the formality of firms. As mentioned before, the outcome variable is a binary variable indicating the holding of official licensing. Ideally, we would like to compare the probability of eligible firms holding a license after the program with the probability of these firms being formal in the absence of the program. However, we face a typical missing data problem since firms are observed either facing the program or not, but not both.

² Firms with more than 20 months are considered in the robustness checks of section 3.3.

As a consequence, constructing the counterfactual is the central issue in the analysis.

Our main strategy relies on the use of non-eligible firms as a means of building counterfactuals. Since the SIMPLES program was designed for a subset of sectors of the Brazilian economy, we use firms from non-eligible sectors to build a comparison group. In the end, we contrast the responses of eligible firms, which constitute the *treatment group*, with the responses of non-eligible firms in the *comparison group*.

Another important issue in the analysis is the time dimension. Firms in the treatment group might exhibit structural and significant differences with respect to firms in the comparison group, and that is a potential source of problems. These differences can be either observed or non-observed. Observable variables are introduced explicitly into the analysis. Non-observable differences, however, are considered implicitly through time differences.

Although we have only a cross-sectional survey of firms in October, 1997, we introduce a time dimension in our analysis by considering firms created before and after the new legislation, which was implemented in December, 1996. Since the survey was collected 10 months after the implementation of the SIMPLES system, we consider the same time frame of 10 months to build the set of firms created before the program. Therefore, any difference between firms in the treatment and comparison groups that is constant with respect to firm's age is controlled in our strategy.

An underlying assumption in this approach is that formalization is predominantly decided at the creation of the firm. This assumption is not testable in our sample, due to the lack of information. However, based on the 2003 edition of the same survey, table 3 shows strong evidence in this direction³. Almost 90% of the owners of unlicensed firms did not try to formalize their business at the startup. This percentual reduces to 24% for the case of licensed firms. For approximately 3/4 of licensed firms, formalization occurred when they were setting into operation. Therefore, this evidence suggests a strong correlation between current legal status and the formalization attempts at startup.

[Table 3]

The violation of the assumption that formalization is decided at the startup introduces a potential negative bias in our analysis. Eligible firms created before the law still face a decision of formalization afterwards. In other words,

³ ECINF/2003 is a more recent edition of the survey conducted in 1997, with a more comprehensive questionnaire. The new edition was based on the same procedures of the 1997 edition, with the same sample design.

the SIMPLES law might increase the formalization of eligible firms created before December, 1996. Consequently, when we compare eligible firms created after with eligible firms created before the SIMPLES system, we can get a negative bias in the effect of the new tax system on formalization. For example, if all eligible firms become licensed with the new tax system, our strategy would lead us to estimate a wrong impact of 0, since we consider only the picture of October, 1997. In this sense, our estimate can be interpreted as a lower bound for the effect of the SIMPLES system to the formalization.

In summary, our empirical approach is based on a difference-in-difference strategy. The impact of the new SIMPLES system on informality is estimated through the comparisons between firms in eligible and non-eligible sectors, created after and before the new legislation. In this sense, we face the two usual and important assumptions of any difference-in-differences analysis. First, we assume there are common time trends across groups - firm's age has the same effect on eligible and non-eligible firms. Second, we assume there are no systematic changes within groups. We address these issues and other concerns in Section 3.3, which provides several robustness checks.

Descriptive statistics on the observable characteristics of eligible and non-eligible firms and their owners are presented in Table 4. The distribution of the value of the assets and the annual revenue is shown in Figure 1 and 2, respectively. Information on credit and investment is available in Table 10, which is explored later when we specifically discuss consequences of formalization.

[Table 4]

Except for the case of main buyers and owner's education, we do not see important disparities between the treatment and comparison groups. However, greater diversity appears when each sector in the treatment group is taken separately. Considering the value of total assets and annual revenues, for example, firms in the construction and transportation sectors are significantly different from firms in the comparison group. Typically, constructors are heavily concentrated in lower levels of total assets while transportation firms have more valuable assets, probably corresponding to the vehicles. Figures 1 and 2 show that retailers and manufacturers are the closest to firms in the comparison group.

[Figure 1]

[Figure 2]

3.2 Empirical Results

Our starting point is an unconditional analysis with raw data. Table 5 shows the percentage of firms holding official licenses, either the state or the municipal document, in different groups. The first column refers to the whole sample of firms created 10 months before and 10 months after the new tax system. The first two lines refer to the firms in the comparison and in the treatment group, respectively. Then, the treatment group is decomposed with respect to economic sector. Along the columns, the sample is decomposed according to the firm size.

The process of formalization is time consuming. Thus, it is natural to observe a reduction in licensing in the comparison between firms created before and after the SIMPLES program due to the time required to complete all the paperwork involved in the process. In fact, table 5 presents a decrease in the proportion of licensed firms both in the comparison and treatment groups.

[Table 5]

Firms in the comparison group (non-eligibles) experienced a reduction of 4 percentage points in formalization, from 28% to 24%. Firms on the treatment group (eligibles), on the other hand, lowered the licensing rate in 3 percentage points, from 22% to 19%. This first approximation indicates that the new legislation has increased the formalization of eligible firms, on average, in 1 percentage point.

When the treatment group is disaggregated into sectors, significant differences are uncovered. Retailers, for example, expanded licensing in 11 percentage points, from 28% to 39%, suggesting that the SIMPLES program has increased in 15 percentage points the formalization of such firms. This effect for retailers varies substantially with the firm size⁴, being 10, 38 and 17 percentage points for small, medium and large firms, respectively.

However, the results of table 5 might be driven by the characteristics of the firms and their owners. In order to account for such variation, we carry out the analysis with a linear regression. The basic difference-in-differences (DID) estimates of the introduction of SIMPLES on formality of firms is based on the following specification for a firm i :

$$\Pr(Z_i = 1|X_i) = \gamma_T I_i^{\{\text{after}\}} + \gamma_G I_i^{\{\text{eligible}\}} + \gamma_{TG} I_i^{\{\text{after}\}} I_i^{\{\text{eligible}\}} + \beta' X_i, \quad (1)$$

⁴ The size of the firms is defined in terms of the value of the assets. Small firms are those with assets below the 1/3 percentile, medium-sized firms are those between 1/3 and 2/3 percentiles, and large firms are those above the 2/3 percentile.

where Z_i is a binary variable indicating whether firm i is licensed; $I_i^{\{\text{after}\}}$ denotes whether firm i was created after December 1996; $I_i^{\{\text{eligible}\}}$ represents whether firm i is eligible for the SIMPLES; X_i is a vector of observed characteristics; and ε_i is the error term. Notice that equation (1) is a linear probability model, which provides easier interpretations for the marginal effects on the probability of licensing.⁵ The parameter of interest is γ_{TG} . Under the assumption that the selection into eligible firms, conditional on X_i , is independent of the age individual-specific effects of firms, it measures the average effect of the SIMPLES on the licensing of eligible firms.

[Table 6]

Table 6 presents different estimates of equation (1). All regressions control for the whole set of observed characteristics described in Table 2. The first column corresponds to the full sample estimate, while columns 2-6 consider the five sectors in the treatment group taken separately. These columns consider the same control group and the observations of the treatment group from each different sector. For example, in column (2), the sample comprises the whole comparison group plus retailers in the treatment group. Column (3) corresponds to a sample formed by the comparison group and eligible firms from the construction sector, and so on.

The parameters γ_G and γ_T represent the differences in licensing among eligible and non-eligible firms and between firms created after and before the new legislation, respectively. Table 6 shows that the observable variables are capturing all the statistically significant differences between groups, with respect to either eligibility for the program or startup time. All estimated parameters γ_G and γ_T are not significantly different from 0, with the only exception of γ_G for the case of construction.

Considering the whole sample, we do not observe a statistically significant effect of the introduction of SIMPLES on the formality of firms. However, the following columns reveal important heterogeneity in the response of firms belonging to different sectors.

Retail firms present a positive and statistically significant increase of 13 percentage points in licensing. The other sectors do not exhibit any significant response to the new tax program. These differences are in accordance with Farrel (2004) who, based on the research of the McKinsey Global Institute in many developing countries, suggests that “*evasion varies by sector and by the nature of the business: informal retailers tend to avoid paying value-added*”

⁵ As a matter of fact, our results do not change (quantitatively or qualitatively) if we use a *probit model*. Moreover, the percentage of predicted values outside the $[0, 1]$ interval is not high (around 10% of the sample).

taxes, informal food processors to ignore product quality and health regulations, and informal construction firms to underreport the number of employees and hours worked.”

The formalization of firms in the construction sector is considerably low and not affected by red tape or tax rates, as suggested in column 3 of table 6. The sector, as it appears in our sample, is mostly dispersed, comprised by small firms attending individual customers. This dispersion increases the costs of fiscalization, even with 98% of firms located out of the owner’s house. Indeed, only 11% of the firms created before the program are licensed at the moment of the survey. The same seems to occur for firms in the service sector of our sample. (Capp, Elstrodt and Jones Jr., 2005)

Table 6 also shows that tax burden and bureaucracy are not the main deterrents of formality among firms in the manufacturing or transportation sectors. Capp, Elstrodt and Jones Jr. (2005) document a significant change in the Brazilian labor force from agriculture to manufacturing, construction and transportation between 1992 and 2002. The authors argue that the informality in these sectors is more related to labor regulations than to tax burden.

[Table 7]

Tax avoidance and red tape costs appear as significant determinants of informality to firms operating only in the retail trade sector. The profile of the retailers at the margin of becoming formal is presented in table 7, which decomposes the effect for the retailers according to different groups of firms.

Considering the size of the firm, table 7 shows a positive and statistically significant effect of 35 percentage points for medium-sized retailers. This result is quite similar to the 38 percentage points computed from table 5, with raw data.

The type of the firm’s clientele is another important factor which interact with taxation and bureaucracy as determinants of informality. The incidence of the program is more prominent in retailers that sell predominantly to individual customers. Firms which have other firms and government as main buyers are not affected by the tax cuts and simplifications, since they already need, presumably, to issue official tax invoices. The Brazilian legislation requires a official tax invoice to each purchase of the government. Private firms, on the other hand, are induced by the legislation of value-added tax to require the official tax invoice (De Paula and Scheinkman, 2006).

In terms of location, retailers located at an owner’s house are more influenced by the new tax system. Location interact with tax avoidance and red tape costs because of fiscalization. Firms located out of the owner’s house are more

exposed to fiscal control.

3.3 Testing for pitfalls

The results of the previous section suggest that SIMPLES increased the proportion of licensed retailers by 13 percentage points. However, our empirical strategy is subject to caveats that are addressed below. The objective is to reduce the chance of having our results generated by other reasons not related to the changes in the tax legislation. The estimates are presented in table 8.

[Table 8]

Accounting for different time effects across groups

An important weakness of the DID methodology is the assumption that aggregate shocks have no differential effect across the comparison and treatment groups. For example, the two groups might have experienced distinct time trends, and the impact estimated in table 6 could be associated with differences in firm age rather than with the SIMPLES program.

In order to account for this possibility, we re-estimate equation (1) considering a different time window. Originally, our results were generated considering firms created 10 months before and 10 months after December 1996. In column (2) of table 8, we report the same exercise considering firms created 10 months before and 10 months after December 1995, a month with no significant change in the tax legislation. If our results are due to differences in time trends across groups, we expect also a positive and significant result in this case. The results related to 1995 are not significantly different from zero, with a p-value of 0.67.

Splitting-up

The SIMPLES system was restricted to small and microenterprises - firms with an annual revenue below a threshold of R\$ 120,000. Since it implies a tax reduction, there might be an incentive for larger firms to split up. If licensing is more frequent among firms reacting this way, we could observe an increase in the number of formal firms created after the new system due to a change in the composition of firms.

However, this sort of bias seems to be of second order and negligible in our sample. First, less than 1% of firms created before SIMPLES had an annual

revenue above R\$ 120,000. This proportion remained unchanged after SIMPLES.

Second, when we restrict the analysis to households which own only one firm, the result remains unaltered, as shown in column (3) of table 8. The underlying assumption behind this exercise is that ownership of the new firms stays within the household. If this is the case, restricting the sample to households with only one firm creates a reduction in the composition bias. As the results remain the same, it seems that this effect is negligible in our case.

Measurement error in the age of the firm

A crucial variable in our analysis is the reported age of the firm. Firms are classified as created before or after the SIMPLES system if the owner reports an age above or below 10 months, respectively. This can be a potential problem as long as multiples of 12 months are focal answers.

[Figure 3]

Figure 3 shows spikes in the percentage of firms with reported age of 12, 18 and 24 months. In particular, one third of firms with less than 24 months reported exactly 12 months or 24 months. However, notice that the reported age of firms with less than 6 months is more uniformly distributed.

Therefore, in order to account for potential biases related to this measurement error, column (4) of table 8 reports an estimate of equation (1) excluding 1,056 firms (44% of the sample) aged between 7 months and 14 months. Again, the result is virtually the same: SIMPLES increases by 13 percentage points the probability of holding a formal license.

Time to formalize

Finally, the last column of table 8 considers a potential negative bias due to the fact that the process of formalization is time-consuming. Firms might start to operate without holding formal licenses, processing the paperwork to regularize their status concomitantly. Therefore, the effect of SIMPLES on the formalization of young firms could be underestimated. Actually, when we discard those firms aged below 4 months (and firms above 16 months to keep the symmetry), we get a small increase in the estimated effect, which becomes 15 percentage points. This suggests that the bias due to the time to formalize is negative, as expected, but not economically important.

3.4 Propensity Score Matching

The DID estimator is also subject to the specification of a linear functional form, which is not necessarily true. Thus, we also estimate the effect of the SIMPLES on formality using propensity score matching. Propensity score matching reduces the bias created when the linear model behind the DID estimates is not adequate. We consider the same set of observables X used in the DID analysis to make the results comparable.

[Table 9]

The estimates are provided in table 9. Each column considers a sample including all firms in the comparison group and firms from the respective sector in the treatment group. We proceed likewise in the DID analysis.

The results suggest an even stronger effect of 21 percentage points of the new SIMPLES system on the formality of retail firms. Notice that table 9 shows no significant difference between the average regarding the licensing of firms in the treatment group and in the comparison group that were created before SIMPLES. However, considering those created after the program, table 9 presents positive and statistically significant differences for firms in the retail trade and in service sectors. Licensing of firms in the construction, manufacturing and transportation sectors is not affected by the SIMPLES, which is also consistent with the DID analysis. Results for the retail sector are robust to the functional form specification.

4 The effect of formal licensing on investment

This section evaluates the impact of increased business formality on investment decisions. After some theoretical discussion, the previous analysis is used as a means of identifying the impact of business formality on investment. In particular, we consider the introduction of the SIMPLES system as an instrumental variable for licensing in the regressions of investment.

4.1 Theoretical considerations

Many factors contribute to a systematic relationship between informality and investment. Operating in the underground has important economic costs. Extralegal businesses lack property rights, access to public infrastructure and law

enforcement, having to hide their activities from the authorities. All of these factors might have remarkable consequences on investment.

The enactment of the SIMPLES system, as shown in the previous sections, has represented an increase in the number of licensed firms which, in turn, is an important step towards business formalization. By joining the formal sector, firms face a different economic environment which might affect their choices. Here, we present alternative channels through which formalization affects investment decisions.

The first channel is related to property rights. Firms in the formal sector have a better assignment of property rights. The state bureaucracy does not recognize unlicensed firms, determining high transaction costs of selling the firm. As a consequence, there is less incentive to undertake investments that increase the market value of the firm. On the other hand, firms operating in the underground are subject to legal penalties, usually facing the risk of expropriation. Firms with better property rights have more incentive to invest because they have a higher probability of appropriating the benefits of their investments (Besley, 1995; Jacoby et al., 2002; Cull and Xu, 2005).

A second channel regards contract capabilities and market access (Grossman and Hart, 1986; Hart and Moore, 1990; Hart 1995). Informal firms incur higher costs (usually prohibitive) for having contracts enforced by law. Thus, they might have limited contracting capabilities with new clients and suppliers, reducing incentive for investment either by increasing the costs of inputs or hindering the market size for selling products. Also, limited contracting capacity has implications for credit access. Lending institutions, anticipating high enforcement costs, may decide to restrict credit supply, imposing limitations on investment financing (Ghosh Mookherjee and Ray, 2000).

Notice that the explanations based on property rights and contractual capabilities, in the end, establish that firms in the formal sector have longer horizons for their investment plans when compared to firms in the informal sector. Thus, firms that joined the formal sector after the implementation of the SIMPLES system are also more prone to undertake long-run investments.

A third channel is provided by state regulation which, in opposition to the arguments above, might establish a negative link between licensing and investment. The act of obtaining licenses itself is already costly and time-consuming. Djankov et al (2002), considering data from 85 countries, show that, on average, the number of procedures required to start-up is 10, taking 47 business days (without considering unofficial delays) and costing 47% of the annual per capita income. In addition, regularized firms pay taxes and need to record a (possibly large) set of operations properly. Such firms are also subject to formal rules which might impose other types of costs - labor legislation, en-

vironmental restrictions, sanitary requirements, etc. All these factors, which represent costs of belonging to the formal sector, absorb resources that could be used in investment.

In summary, the relationship between belonging to the formal sector and investment is ambiguous. Next, we use the changes in the tax system promoted by the introduction of the SIMPLES system as a source of exogenous variation to estimate the effect of licensing on investment.

4.2 Empirical Evidence

Table 10 presents some descriptive statistics on credit and investment, splitting our sample in different ways. The first column shows the percentage of firms which have used any source of credit in the period of three months prior to the survey. The second column is also a binary variable indicating whether the firm undertook any kind of investment in the year prior to the survey, while the last column depicts the average amount invested.

[Table 10]

Eligible firms, when compared to non-eligible ones, present a higher percentage of credit use. Although the percentage of firms which invested is pretty similar between the two groups, the amount invested is substantially higher for eligible firms. Contrasting the existence or not of licensing across firms, we observe higher credit and investment rates as well as higher amounts invested by licensed firms.

The comparison between firms created before and after the SIMPLES system shows a different picture with respect to credit and investment. In the case of investment, we do see an increase both in the rate and in the amount for eligible firms. However, considering the case of credit, the result is, surprisingly, the opposite.

In any case, the results of table 10 represent correlations rather than causal relationships and also can be affected by unobserved heterogeneity. Therefore, we proceed to the systematic analysis of the impact of formal licensing on investment.

Table 11 depicts OLS and instrumental variable (IV) estimates for the regressions of the three variables of credit and investment on licensing of firms, considering the following (second-stage) specification:

$$Y_i = \alpha Z_i + \gamma' \tilde{X}_i + \nu_i, \quad (2)$$

where Y_i represents credit or investment depending on the case, Z_i is a binary variable indicating whether firm i is licensed, and \tilde{X}_i is the same set of control variables described in table 2, X_i , augmented by the dummies $I_i^{\{\text{after}\}}$ and $I_i^{\{\text{eligible}\}}$. For the IV estimates, we use the enactment of the SIMPLES system as a source of exogenous variation for the licensing of retail firms, considering the interaction $I_i^{\{\text{after}\}} I_i^{\{\text{eligible}\}}$ as the instrumental variable. The first-stage regression is the same specification of equation (1), estimated in column (2) of table 6.

Our identification assumption is that, given the set of observed variables in \tilde{X}_i , the launching of the SIMPLES program affects investment only through its effect on formalization. Notice that the vector \tilde{X}_i contains information about the owner, characteristics of the firm, state dummies, capturing also differences between eligible and non-eligible firms, and between firms created after and before the new system. The implementation of the program is exogenous to the firms in our sample. As pointed out in section 3.3, a series of potential pitfalls appear to be of second-order in our case. On the other hand, section 3 also shows that the creation of the new tax system substantially increased licensing among retailers. Thus, we assume that the interaction $I_i^{\{\text{after}\}} I_i^{\{\text{eligible}\}}$ is a valid instrument for licensing.

The theoretical discussion suggests that it is not possible, a priori, to establish a direction for the bias when comparing OLS to IV estimates. The bias can be positive or negative, depending on the relationship between non-observed determinants of investment and licensing.

[Table 11]

The OLS estimates show that licensing is positively (6.1%) related to credit, significant at 6%. When licensing is instrumented, its effect becomes stronger (21%) and significant at 2%. This result suggests that the OLS estimate is negatively biased. For example, firms in the formal sector might need to fulfill a set of requirements which hinder incentive for investment and credit demand. When we introduce the instrument, this effect is reduced and we can see a clearer relationship between licensing and credit.

Considering investment, columns (2) and (3) suggest there is no effect of licensing on the decision to invest, although columns (4) and (5) show a positive and significant effect on the amount invested, even after conditioning on credit. Although formalization seems not able to change the decision to invest or not, these results suggest a positive effect for those firms already investing. On average, column (4) shows that licensed firms invest R\$ 5,387 more, which represents, for firms in our sample, 34% of the average annual revenue.

Part of this effect might be related to a better credit access of firms in the formal sector. However, even controlling for credit, we still have an increase of R\$ 4,956, significant at 8%. Thus, licensing is important for investment not only because it provides access to credit, but also because it is associated with other issues mentioned before, such as the enlargement in the planning horizon of the firm.

Similarly to the case of credit, the effect of licensing on investment becomes stronger when the variable of licensing is instrumented, indicating that the OLS bias is negative. The OLS analysis of the relationship between licensing and investment considers a set of formal firms which invest less because of the costs of operating officially. When an exogenous source of variation in licensing is taken into account, we are able to estimate a consistent effect of formalization on investment.

Next, we take advantage of our data, disaggregating investment into broad categories: (i) buildings, tents or trailers; (ii) tools and other instruments; (iii) machines; (iv) furniture and equipment; (v) vehicles and (vi) others. Results from OLS and IV (with and without the credit variable) are presented in tables 12 and 13.

[Table 12]

[Table 13]

Table 12 shows the effect of licensing on the decision to invest in each category, while table 13 presents the same effect on the amount invested. The IV estimates, as in the previous analysis, consider the enactment of the SIMPLES system as an instrument for licensing. In this way, the first-stage equation is again similar to the equation depicted in column (2) of table 6.

We notice that the inclusion of the credit variable does not substantially affect the results. The comparison between OLS and IV estimates in both tables, similarly to what happens in table 11, indicates that the instrumental variable is adjusting a bias that was attenuating the results toward zero.

The general pattern depicted in table 12 is that licensing has shifted the decision of investment from tools and other instruments to buildings, tents and trailers; furniture and equipment; and vehicles. In the case of the amount invested, table 13 shows a reduction in tools and other instruments and an increase in buildings, tents or trailers.

In terms of our theoretical considerations, the results of tables 12 and 13 might be explained either by the enlargement in the horizon of the firms or by the

improvements in the access to new buyers and new suppliers. We do know, as suggested in Section 3, that changes in the tax legislation have affected the decision of firms in the retail sector to join the formal sector. As a result, two effects might happen concomitantly. First, the payoff of undertaking long-run versus short-run investment could be increased, explaining the reduction in the acquisition of new tools and other instruments to favor improvements in buildings, furniture and equipment. Second, new firms in the formal sector have improved ability to write contracts with new suppliers and new customers, affecting the chances of profitable expansions. Accessing a larger set of suppliers and customers, licensed firms improve their possibilities of negotiating inputs and outputs. Either way, licensing has not only a positive impact on investment, but also changes the composition of such expenses towards long-run projects.

Conclusion

The paper evaluates the impact of bureaucracy simplification and tax reduction on the formality of firms, and its consequence for investment. Using the enactment of a new tax system designed for small firms, the SIMPLES system, as a source of exogenous reduction in the effective tax burden, we document an increase of 13 percentage points in licensing among firms in the retail sector. Moreover, using the launching of SIMPLES as an instrument for licensing, we find a positive and statistically significant effect of formality on the amount invested by retailers and a shift of such inversions toward long-run projects.

The first part of the paper is dedicated to documenting the impact of the new tax system on the probability of licensing among firms and to validating an instrumental variable for licensing to be used in the second part of the paper. We find that tax burden and bureaucracy constitute important obstacles to the regularization of retailers. This result is an important contribution to understanding the causes of informality, since the empirical evidence currently available reports correlations rather than causal effects. Although we do not face a completely randomized experiment, our results are robust to a series of robustness checks and sensitivity analysis. Also, the main results are reinforced in the propensity score matching approach. We find that not only has the enactment of the SIMPLES system increased the proportion of licensed firms in the retail sector, but also that it is a valid instrument for licensing.

In the second part of the paper, we assess the impact of licensing on investment. Our results point to a positive and economically significant relationship between licensing and investment. The IV estimates show an increase in the amount invested equivalent to one third of the annual revenue of retail firms. Additionally, these firms change investment composition toward long-run in-

puts.

In summary, our evidence suggests that the state regulations prior to the SIMPLES system created obstacles to the regularization of firms and an adverse environment for investment. Facing a simpler tax system with lower red tape and tax rates, retail firms obtain licenses more frequently, which enhance incentives for investment.

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Table 1 - Composition of the treatment and comparison groups

Eligible economic activities (number of firms in the sample)

Retail Trade (1202): vegetable products (12), beverage, meat and food (576), garment and accessories (191), decoration articles (18), books and magazines (34), construction material (31), home appliance, machines and electric supplies (36), transport equipment (40), pharmaceuticals and chemistry (52), oil goods (23), supermarkets (6), leisure articles (183).

Civil construction (604)

Manufacturing (566): ware, construction material and ceramics (27), metallic instruments (59), wood objects (28), bamboo, wicker and agave manufacturing (4), furniture (42), paper goods (4), rubber goods manufacturing (1), leather goods manufacturing (1), plastic goods manufacturing (3), textile goods manufacturing (16), garment manufacturing (173), shoes manufacturing (20), food manufacturing (76), printing and editing (30), medical material and hygiene products manufacturing (82).

Transportation (816): cargo transportation (90), people transportation (431), charter freight (292), maritime freight (2), air transportation (1).

Other services (1480): loading (10), food (944), furniture restoration (29), plumber and electricians (41), sewing (202), clothes rental, film laboratory (24), laundering, pressing and dyeing (65), gardening, TV installation (24), entertainment articles renting (131), tourism (10).

Non-Eligible economic activities (number of firms in the sample)

Comparison group (1487): machines manufacturing (18), home appliance and electric supplies manufacturing (23), transport equipment manufacturing (5), chemistry products manufacturing (1), cleaning and cosmetics manufacturing (5), cleaning companies (3), banks and financial institutions (2), insurance companies (18), housing administration (31), exchange shop (1), state lotteries (1), credit cards and rotating savings companies (4), home appliances restoring (72), mechanic shops (193), watches and precision articles restoring (25), gymnasiums and beauty shops (303), housing and cleaning services (18), security services (31), law services (59), accounting and economics services (38), data processing and business consulting (69), architects, engineers and geologists (26), advertising and event promotion (27), writers, journalists, detectives and statisticians (6), machines and rural labor renting services (6), commercial representation and foreign trade offices (90), tools and equipments renting; leasing and marketing offices (35), lottery shops (7), port services (6), employment and training agency; authors' property rights office; telecommunications services (24), hospitals, foundations, welfare and social securities services (6), clubs and sport associations (6), clinics, hospitals and laboratories (45), odontological services (12), colleges, universities and educational courses (270).

Excluded sectors: homemade textile articles, homemade cooking on order, beverage manufacturing, tobacco and cigarettes manufacturing, water reclamation, distribution and supply, peddler, produce fair, telecommunication companies, TV and radio stations, photography, filming and translation, ateliers of painting, decoration and design, cars renting, parkings, traffic engineering services and towing, social assistance centers, cultural centers, museums and parks, religion centers, communities associations, vets, notary, lottery shop, brothel and hunting, non-defined activities, non-declared activities.

Table 2 - Data description

Dependent variables	Obs.	Mean	Std. Dev.	Minimum	Maximum
Firm holds the official license	5559	0.24	0.43	0	1
Credit granted in the last three months	5764	0.05	0.22	0	1
Decision to invest	3883	0.39	0.49	0	1
Amount invested	5758	1052.21	4469.29	0	96000
Characteristics of the owner					
Has primary education level	5764	0.55	0.50	0	1
Has secondary education level	5764	0.28	0.45	0	1
Has completed College or University	5764	0.09	0.29	0	1
Age	5764	34.81	11.56	10	87
Gender	5764	0.64	0.48	0	1
Lives on his/her own house	5764	0.75	0.43	0	1
Has other job	5764	0.11	0.31	0	1
Characteristics of the firm					
Total assets	5764	3086.19	11582.97	0	406000
Do not declare assets	5764	0.33	0.47	0	1
Annual revenue	5737	861.96	2304.22	0	75000
Located out of owner's house	5764	0.61	0.49	0	1
Sells to other firms and government	5764	0.11	0.32	0	1
Startup was financed by the owner	5764	0.53	0.50	0	1
Number of non-paid employees	5764	0.05	0.30	0	4
Number of relatives employed	5764	0.14	0.43	0	5

Source: ECINF/1997

Table 3 - Obstacles and attempt of formalization at the startup, 2003

	Unlicensed firms	Licensed firms	Total
Firms with obstacles to formalize at the startup	316,610 4.1%	449,728 17.9%	766,338 7.5%
Firms without obstacles to formalize at the startup	590,806 7.7%	1,438,968 57.4%	2,029,774 19.9%
Firms which did not try to formalize at the startup	6,771,162 88.0%	607,988 24.3%	7,379,150 72.3%
Total	7,695,819 75.4%	2,506,809 24.6%	10,202,628

Source: ECINF/2003

(1) Each cell in the table presents two numbers - the number of firms in that position and the percentage with respect to the total of each column (except the last line).

(2) All statistics are expanded through the sample weights. The total sample used in the table comprises 47,196 firms.

(3) The table shows that 88% of the owners of unlicensed firms did not try to formalize at the startup. On the other hand, 75.3% (17.9%+57.4%) of licensed firms engaged in the formalization process at the startup.

Table 4 - Descriptive statistics by sector

	Comparison group	Treatment group	Sectors in the treatment group				
			Retail Trade	Construction	Manufacturing	Transportation	Service
Percentage of firms located out of owner's house	58%	63%	64%	98%	42%	99%	44%
Percentage of firms selling to other firms and government	21%	10%	11%	4%	23%	29%	5%
Percentage of firms whose owner lives on his/her own house	68%	73%	78%	80%	67%	72%	69%
Percentage of firms whose owner has other job	15%	10%	10%	6%	6%	9%	11%
Percentage of firms whose startup was financed by the owner	40%	48%	67%	25%	52%	60%	56%
Percentage of male owners	58%	58%	59%	99%	58%	98%	48%
Average age of the owner	34	35	36	33	36	35	38
Percentage of owners with primary school	37%	65%	55%	83%	66%	61%	64%
Percentage of owners with secondary school	32%	23%	30%	8%	20%	26%	23%
Percentage of owners with college	28%	5%	8%	1%	9%	5%	4%

Source: ECINF/1997

(1) Each cell in the table shows the average of the each variable in the line, for each group of firms. The first two columns correspond to the comparison group (non-eligible firms) and the treatment group (eligible firms), while the following five columns disaggregate the treatment group into economic sectors.

(2) Except for the variables related to the main buyers and owner's education, there is no large difference between the averages of the comparison and treatment groups. However, the disaggregation into sectors uncover important discrepancies with respect to the firms in the comparison group - retail trade and manufacturing are the closest.

Table 5 - Percentage firms holding official (state or municipal) licenses

	Created before or after SIMPLES	Total	Small firms	Medium firms	Large firms	Firms without information on assets
Comparison group	before	28%	17%	39%	44%	23%
	after	24%	3%	27%	53%	21%
Treatment group	before	22%	9%	24%	51%	13%
	after	19%	10%	25%	43%	12%
Retail trade	before	28%	29%	33%	33%	23%
	after	39%	25%	59%	59%	26%
Construction	before	11%	2%	2%	27%	3%
	after	5%	0%	13%	10%	1%
Manufacturing	before	39%	6%	13%	66%	40%
	after	14%	0%	7%	47%	9%
Transportation	before	43%	36%	38%	54%	26%
	after	44%	25%	41%	65%	24%
Service	before	25%	6%	21%	53%	15%
	after	20%	12%	21%	34%	18%

Source: ECINF/1997

(1) Each number in the table refers to the percentage of licensed firms in each group.

(2) Raw difference-in-difference estimates can be obtained as follows. Firms in the comparison group created after the SIMPLES program experienced a decrease in licensing of 4 percentage points, from 28% to 24%. Firms in the whole treatment group, however, had a reduction of 3 percentage points. Subtracting these two numbers, (19%-22%) - (24%-28%), the difference-in-difference estimate for the impact of the SIMPLES on formalization is 1 percentage point. Computing the same for retailers, we get an impact of 15 percentage points.

(3) In the last 4 columns, the sample is divided according to firm's assets. Small firms are those with assets below the 1/3 percentile, medium-sized firms are those between 1/3 and 2/3 percentiles, and large firms are those above the 2/3 percentile.

Table 6 - Difference-in-Differences Estimates

Probability of Holding a License	All sectors (1)	Retail Trade (2)	Construction (3)	Manufacturing (4)	Transportation (5)	Service (6)
Eligible created after SIMPLES (γ_{TG})	0.029 (0.49)	0.131*** (0.00)	0.004 (0.90)	-0.187 (0.11)	0.048 (0.49)	0.02 (0.60)
Eligible (γ_G)	0.008 (0.88)	0.036 (0.42)	-0.201*** 0.00	0.155 (0.14)	0.046 (0.59)	0.05 (0.39)
Created after SIMPLES (γ_T)	-0.053 0.14	-0.055 (0.13)	-0.055 (0.13)	-0.054 (0.16)	-0.044 (0.22)	-0.05 (0.18)
Constant	-0.038 0.65	0.028 (0.86)	-0.056 (0.60)	-0.216** (0.01)	-0.239** (0.02)	-0.104* (0.09)
Characteristics of the owner	Yes	Yes	Yes	Yes	Yes	Yes
Characteristics of the firm	Yes	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5536	2357	2033	1773	2242	2871
R-squared	0.16	0.17	0.23	0.22	0.21	0.20
% of predicted values within [0,1]	94%	96%	67%	86%	90%	93%

Note: Robust p-values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

(1) Each column in the table represents the least square estimate of equation (1) in the text considering different treatment groups. The complete sample is presented in column (1). Columns (2) to (6), on the other hand, depict the estimates for the five economic sectors in the treatment group. The sample used in each of the columns (2) to (6) comprises the whole set of non-eligible firms and the set of eligible firms in the correspondent sector.

(2) All specifications control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets, do not declare assets, annual revenue, located out of owner's house, sells to other firms and government, startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

(3) The parameter of primary interest is γ_{TG} which measures the average effect of the SIMPLES program on eligible firms. Non significant γ_G and γ_T estimates suggest that the set of observed variables captures structural differences with respect to both eligibility or startup time, with the exception of the construction sector.

Table 7 - Decomposition of the Effect on Retailers

Probability of Holding Official License	Size of the firm				Main buyers		Located in owner's home?	
	Without assets (1)	Small (2)	Medium (3)	Large (4)	Individuals (5)	Firms and government (6)	Yes (7)	No (8)
Eligible created after SIMPLES (Y_{TG})	-0.004 (0.96)	-0.001 (0.99)	0.355*** (0.00)	0.154 (0.35)	0.146*** (0.01)	-0.054 (0.76)	0.175** (0.02)	0.117* (0.10)
Eligible (Y_G)	0 (1.00)	0.247** (0.05)	-0.054 (0.58)	-0.051 (0.63)	0.053 (0.19)	-0.061 (0.74)	0.056 (0.18)	0.027 (0.68)
Created after SIMPLES (Y_T)	-0.048 (0.49)	-0.077* (0.06)	-0.035 (0.62)	0.009 (0.94)	-0.061 (0.12)	-0.026 (0.82)	-0.048 (0.18)	-0.083 (0.15)
Constant	-0.09 (0.54)	0.113 (0.30)	-0.28 (0.19)	0.416 (0.27)	0.098 (0.51)	-0.191 (0.61)	0.106 (0.26)	0.209 (0.18)
Characteristics of the owner	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Characteristics of the firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	911	541	499	406	2060	297	1084	1273
R-squared	0.15	0.35	0.29	0.19	0.23	0.18	0.14	0.17
% of predicted values within [0, 1]	95%	88%	83%	93%	95%	79%	97%	98%

Note: Robust p-values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

(1) Each column in the table represents the least square estimate of equation (1) in the text considering different subsamples and only retailers in the treatment group. Columns (1) to (4) present the results for different firm sizes. In columns (5) and (6) firms are divided according to the type of main buyers, while in columns (7) and (8) firms are classified with respect to their location.

(2) All specifications control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets (columns 5-8), do not declare assets (columns 5-8), annual revenue, located out of owner's house (columns 1-6), sells to other firms and government (columns 1-4 and 7-8), startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

Table 8 - Robustness Checkings

Probability of Holding Official License	Retail Trade (1)	Year before (2)	Splitting-up (3)	Memory / focus on 12 months (4)	Time to formalize (5)
Eligible created after SIMPLES (Y_{TG})	0.131*** (0.00)	-0.033 (0.67)	0.141*** (0.00)	0.131** (0.05)	0.151** (0.02)
Eligible (Y_G)	0.036 (0.42)	0.042 (0.43)	0 (1.00)	0.08 (0.23)	0.027 (0.68)
Created after SIMPLES (Y_T)	-0.055 (0.13)	0.069 (0.19)	-0.058 (0.12)	-0.076 (0.17)	-0.043 (0.42)
Constant	0.028 (0.86)	0.132 (0.54)	-0.004 (0.98)	-0.064 (0.70)	0.042 (0.74)
Characteristics of the owner	Yes	Yes	Yes	Yes	Yes
Characteristics of the firm	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Observations	2357	1415	2248	1301	1450
R-squared	0.17	0.18	0.15	0.15	0.21

Note: Robust p-values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

(1) Each column in the table represents the least square estimate of equation (1) in the text considering different contexts for the sake of robustness. The regression for the retail trade sector is reproduced from table 6 in column (1). Columns (2) to (5) refer to different falsification tests that are explained in section 3.3 in the text.

(2) All specifications control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets, do not declare assets, annual revenue, located out of owner's house, sells to other firms and government, startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

Table 9 - Propensity score matching estimates

		Observations in the treatment group	Observations in the comparison group	Average licensing in the treatment group	Average licensing in the comparison group	Average effect	t statistics
Retail Trade	before	312	359	0.311	0.308	0.003	0.835
	after	359	512	0.430	0.214	0.216	3.240
Construction	before	179	318	0.040	0.225	-0.185	-1.609
	after	176	462	0.625	0.125	0.500	-0.547
Manufacturing	before	102	344	0.204	0.216	-0.012	-0.033
	after	134	493	0.165	0.195	-0.030	-0.583
Transportation	before	327	220	0.402	0.443	-0.041	-0.475
	after	324	455	0.364	0.280	0.084	0.800
Service	before	446	353	0.230	0.227	0.004	0.672
	after	591	485	0.262	0.179	0.083	3.152

Note: Propensity score estimated as probit model, where dependent variable is whether or not program enters neighborhood. Gaussian kernel, bandwidth 0.06, bootstrapped standard errors.

(1) The estimation of the propensity score control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets, do not declare assets, annual revenue, located out of owner's house, sells to other firms and government, startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

Table 10 - Descriptive statistics of credit and investment

		Credit	Decision to Invest	Amount Invested
Eligible Firms	All	7.5%	39.0%	1497.65
	Created before SIMPLES	8.9%	23.9%	960.73
	Created after SIMPLES	6.3%	51.9%	1962.09
Non-eligible Firms	All	4.3%	40.0%	1062.4
	Created before SIMPLES	3.1%	30.4%	803.21
	Created after SIMPLES	5.3%	47.2%	1258.43
Only Firms with Official License				
Eligible Firms	All	8.6%	46.4%	1457.16
	Created before SIMPLES	9.1%	24.7%	387.99
	Created after SIMPLES	8.3%	57.9%	2024.93
Non-eligible Firms	All	8.3%	46.6%	2103.76
	Created before SIMPLES	4.6%	39.8%	1075.92
	Created after SIMPLES	11.2%	51.7%	2883.5
Only Firms without Official License				
Eligible Firms	All	4.6%	32.4%	731.42
	Created before SIMPLES	5.2%	18.0%	244.35
	Created after SIMPLES	4.1%	45.1%	1165.49
Non-eligible Firms	All	3.2%	37.3%	581.42
	Created before SIMPLES	2.9%	25.2%	440.46
	Created after SIMPLES	3.4%	46.1%	683.99

Source: ECINF/1997

Table 11 - Effect of licensing on credit and investment

Dependent variable	Credit	Decision to Invest		Amount Invested	
	(1)	(2)	(3)	(4)	(5)
<i>Panel (i): OLS Estimates</i>					
Licensing	0.061* (0.06)	0.064 (0.19)	0.038 (0.35)	1,025.91** (0.01)	802.08*** (0.01)
Credit Use			0.422*** 0.00		3,682.04** (0.04)
Observations	1451	1451	1451	1449	1449
R-squared	0.12	0.12	0.15	0.14	0.21
<i>Panel (ii): Instrumental Variables Estimates</i>					
Licensing	0.210** (0.02)	0.286 (0.42)	0.222 (0.53)	5,387.80** (0.05)	4,956.60* (0.08)
Credit Use			0.376*** (0.00)		2,627.60 (0.21)
Observations	1451	1451	1451	1449	1449
R-squared	0.04	0.08	0.12	0.12	0.17

Note: Robust p-values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions consider whole set of control variables with owner's characteristics, firm characteristics and state dummies.

(1) Each panel represents the estimates of equation (2) in the text considering different dependent variables - credit use in the previous three months, whether or not the firm invested in the previous year, and the amount invested. Panel (i) shows OLS estimates and panel (ii) presents the estimation of the second-stage regression of credit and investment on licensing. Columns (3) and (5) controls for credit use.

(2) All specifications control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets, do not declare assets, annual revenue, located out of owner's house, sells to other firms and government, startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

Table 12 - Effect of licensing on the decision of investing

	Buildings, tents or trailers	Tools and other instruments	Machines	Furniture and equipments	Vehicles	Others
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel (i): OLS Estimates (without Credit)</i>						
Licensing	0.003 (0.82)	-0.025 (0.33)	0.024 (0.47)	0.105*** (0.00)	0.029 (0.23)	0.035** (0.03)
Observations	1256	1256	1256	1256	1256	1256
R-squared	0.06	0.06	0.06	0.10	0.09	0.07
<i>Panel (ii): Instrumental Variables Estimates (without Credit)</i>						
Licensing	0.146* (0.09)	-0.489*** (0.00)	0.043 (0.71)	0.342** (0.03)	0.092** (0.02)	0.077 (0.27)
Observations	1256	1256	1256	1256	1256	1256
R-squared	0.06	0.06	0.06	0.08	0.06	0.06
<i>Panel (iii): Instrumental Variables Estimates (Conditioning on Credit)</i>						
Licensing	0.148* (0.07)	-0.527*** (0.00)	0.045 (0.71)	0.362** (0.04)	0.069* (0.05)	0.059 (0.45)
Credit Use	0.01 (0.71)	0.192* (0.09)	0.006 (0.92)	-0.038 (0.66)	0.101 (0.29)	0.088 (0.28)
Observations	1256	1256	1256	1256	1256	1256
R-squared	0.06	0.07	0.06	0.08	0.10	0.08

Note: Robust p-values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions consider whole set of control variables with owner's characteristics, firm characteristics and state dummies.

(1) Each panel represents the estimates of equation (2) in the text considering different types of investment. Panel (i) shows OLS estimates and panels (ii)-(iii) present the estimation of the second-stage regression of investment components on licensing. Results on panel (ii) do not control for credit, which is introduced in panel (iii).

(2) All specifications control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets, do not declare assets, annual revenue, located out of owner's house, sells to other firms and government, startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

Table 13 - Effect of licensing on the amount invested

	Buildings, tents or trailers	Tools and other instruments	Machines	Furniture and equipments	Vehicles	Others
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel (i): OLS Estimates (without Credit)</i>						
Licensing	-7.55 (0.93)	53.59 (0.49)	-8.79 (0.82)	346.68** (0.02)	196.43* (0.07)	158.84 (0.21)
Observations	1256	1256	1256	1256	1256	1256
R-squared	0.04	0.08	0.05	0.08	0.06	0.08
<i>Panel (ii): Instrumental Variables Estimates (without Credit)</i>						
Licensing	1,186.04** (0.05)	-193.30** (0.04)	189.13 (0.24)	612.59 (0.40)	337.72 (0.38)	3.41 (0.99)
Observations	1256	1256	1256	1256	1256	1256
R-squared	0.02	0.02	0.01	0.07	0.06	0.07
<i>Panel (iii): Instrumental Variables Estimates (Conditioning on Credit)</i>						
Licensing	1,141.80** (0.03)	-247.73** (0.01)	200.53 (0.25)	731.11 (0.35)	276.45 (0.50)	-204.00 (0.44)
Credit Use	280.27 (0.46)	212.92** (0.02)	-20.245 (0.85)	-399.39 (0.18)	331.91 (0.35)	905.55 (0.26)
Observations	1256	1256	1256	1256	1256	1256
R-squared	0.03	0.02	0.01	0.07	0.06	0.10

Note: Robust p-values in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions consider whole set of control variables with owner's characteristics, firm characteristics and state dummies.

(1) Each panel represents the estimates of equation (2) in the text considering different types of investment. Panel (i) shows OLS estimates and panels (ii)-(iii) present the estimation of the second-stage regression of investment components on licensing. Results on panel (ii) do not control for credit, which is introduced in panel (iii).

(2) All specifications control for (i) *characteristics of the owner*: primary education level, secondary education level, completed College or University, age, gender, lives on his/her own house, has other job ; (ii) *characteristics of the firm*: total assets, do not declare assets, annual revenue, located out of owner's house, sells to other firms and government, startup was financed by the owner, number of non-paid employees, number of relatives employed; and (iii) 27 state dummies.

Figure 1 - Density of the Value of Total Assets (in log)

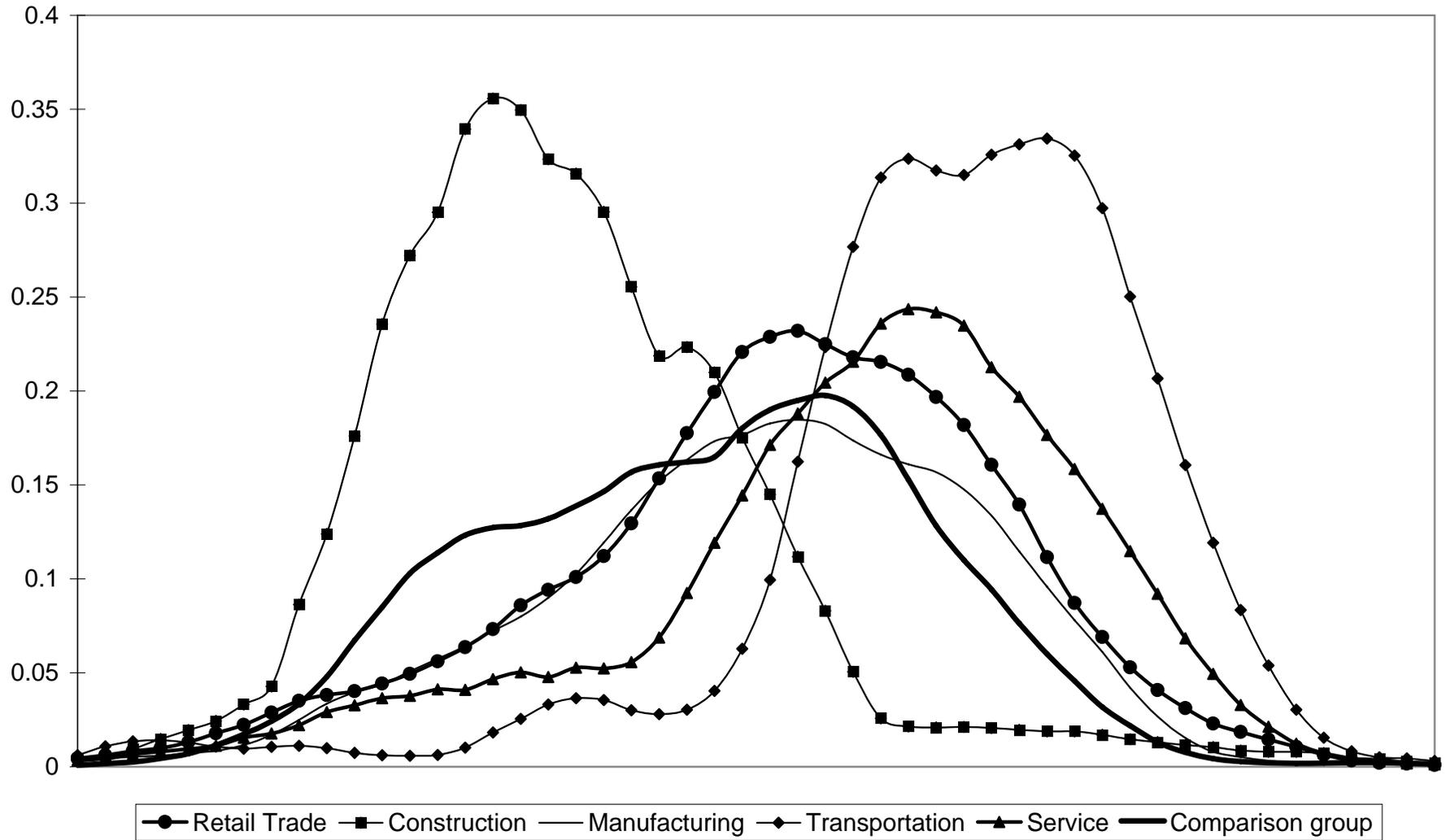


Figure 2 - Density of the Annual Revenue (in log)

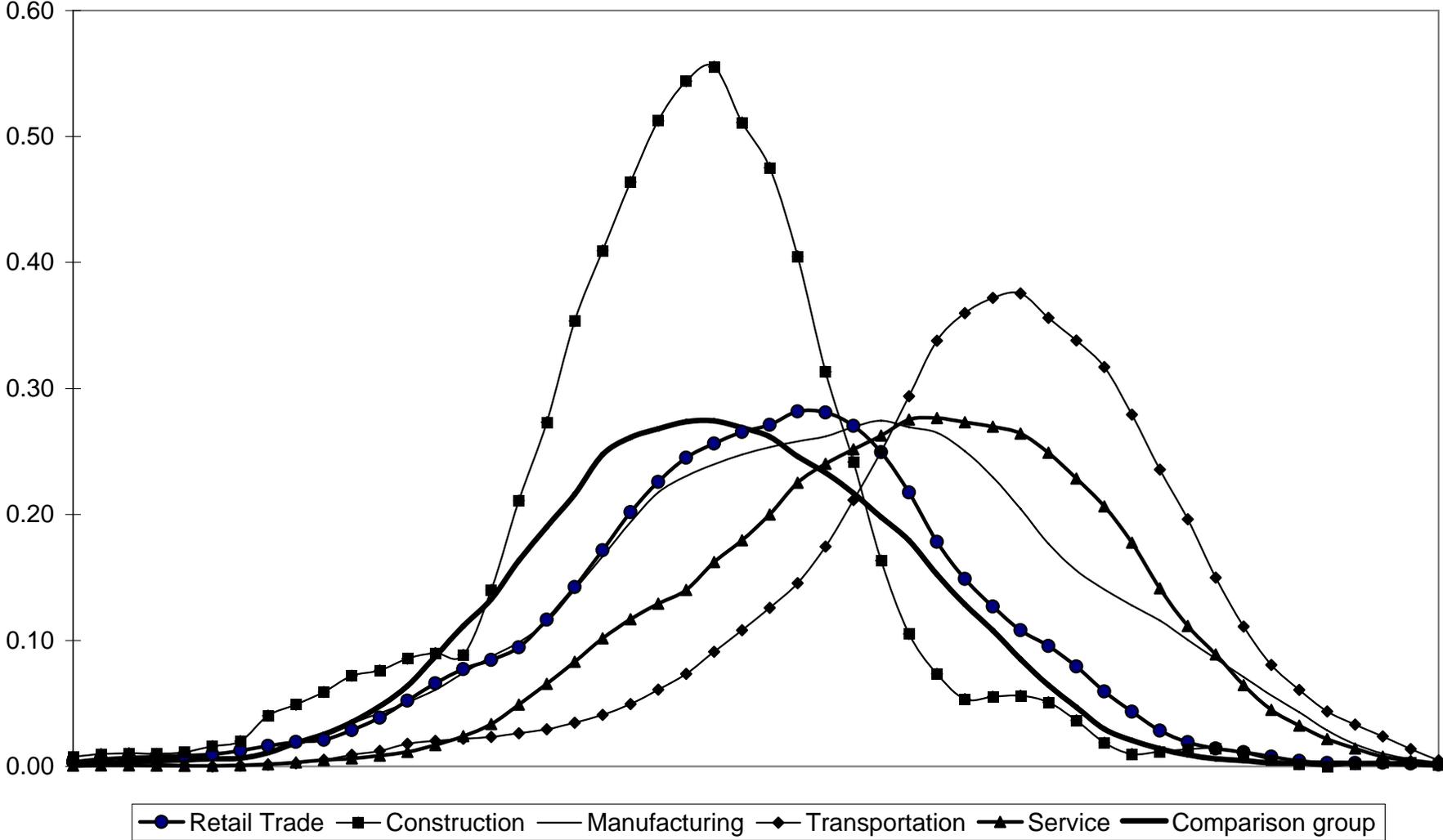


Figure 3 - Distribution of Firm's Age

