Does Formality Improve Micro-Firm Performance?
Quasi-Experimental Evidence from the
Brazilian SIMPLES program

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Abstract: This paper employs regression discontinuity methods to identify the impact of a reduction of registration costs and taxes on newly born Brazilian micro-firms. The SIMPLES program introduced in November 1996 consolidated multiple taxes and social security contributions into a single payment and reduced taxes for eligible small firms. This provides a quasi-natural experiment that allows us to eliminate many of the endogeneity issues surrounding the impact of formality, measured across several dimensions, on firm performance. We find that SIMPLES had a significant effect on the proportion of firms that have a license to operate, have legal status and pay taxes and social security contributions. Moreover, newly created firms that opt for operating formally achieve higher levels of revenue, employ more workers and are more capital intensive (only for those firms that have employees). The channel through which this occurs is not access to credit.

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I. Introduction

This paper exploits the natural experiment offered by the introduction of a business simplification and tax reduction scheme *SIMPLES*[1] in 1996 in Brazil to examine three questions. First, do registration costs really constitute a barrier to the formalization of micro firms? Second, does formalization improve firm performance measured along several dimensions, including revenues, employment and capital stock? Third, what are the channels through which this occurs?

Starting with De Soto's (1989) seminal "The Other Path" barriers to participating in governmental institutions, and in particular, the very high costs of registering with the government, have often been seen as largely responsible for the presence of large informal sectors in developing countries. Since De Soto found that a firm would need to spend 500 years complying with all necessary red tape in Peru, initiatives, such as the World Bank Doing Business project, have systematically collected data on registration costs for a large set of countries confirming that the burden on firms is, on paper, very onerous. In turn, the inability to become formal could have deleterious effects on performance. As examples, formality offers the firm access to risk pooling mechanisms that may attract more educated paid workers and engage them in a longer relationship with the firm, which in turn makes training and capital goods acquisition more profitable. Formality may be a requirement for access to formal credit markets or Government provided business development services or, as De Paula and Scheinkman (2007) have argued, for subcontracting relations with formal firms.[2] Moreover, to the extent that formality increases the ability of micro-entrepreneurs to establish property rights over their investments, and reduces the risk of being fined by Government inspectors, it creates incentives for operating out of fixed locations rather than in an ambulatory fashion.

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[1] SIMPLES stands for "Sistema Integrado de Pagamento de Impostos e Contribuçoes as Microempresas e Empresas de Pequeno Porte"

[2] Note, however, that formality may also reduce firms' flexibility to fire workers in the presence of negative shocks (see for instance Heckman and Pages, 2004). For Brazilian medium and large firms, Almeida and Carneiro (2005) found that stricter enforcement of labor regulation had a negative impact on firm performance. These findings are more in line with Gerxhani's (2004) and Loayza *et al.'s* (2005) view of informality as a tax-evading activity.

But this said, establishing the existence of high registration costs does not, in itself, establish either that this is why firms do not register, or that not registering is a fundamental determinant of average small firm performance. De Soto's telling anecdotes – e.g. the sidewalk vendor who wishes to pay his taxes as a way of securing quasi-property rights to his pitch – do suggest that high costs of formalization may impede the formalization of micro firms and negatively affect their performance. However, registration costs are only one of the factors that informal firms are likely to consider when undertaking the cost benefit analysis of entering the formal sector and within this calculus registration costs may not be the binding constraint.

For instance, Levenson and Maloney (1998) treat formality broadly construed as participation in the institutions of civil society and argue that, if it operates as a normal input in the production function of firms, it is possible that the intrinsic cost structure of many informal enterprises may never dictate that they grow large enough to need those institutions. Family firms with one employee may not need risk pooling mechanisms, their client base may be neighbors, and their small steady state size may make credit institutions relatively unimportant. The view of the potential irrelevance of formality to many micro firms is supported by recent evidence on Mexico by McKenzie and Woodruff's (2006). Using a survey of informal micro firms they show that the vast majority of them give as the principle reason for not being registered, not that it is too expensive or time consuming to do so (respectively 2% and 8% of surveyed firms), nor that the costs of operating as registered businesses are too high (4% of firms), but that they are too small to make it worth their while (75%). This suggests that, for most small firms, registration costs may be at best a marginal contributor to informality.

In this view, the correlation of formality with productivity is potentially driven by the firm's underlying characteristics not by formality per se. Hence, regressing performance on a formality dummy cannot tell us whether formality is improving performance or, alternatively, whether more productive and better performing firms – e.g.

those belonging to entrepreneurs with higher managerial ability – became formal to gain access to government and private services.

Various approaches have been used to surmount the selection bias issue implicit in the latter view. Fajnzylber et al. (2009) for Mexico employ both matching and traditional control function methods to control for selection into formality using both observables and unobservables. Their results confirm that formality does rise with time in business and size, consistent with it being a normal input, and they find that registering with tax authorities does have an important impact on firms' profits and survival likelihood.

Another approach seeks to exploit the changes in the norms surrounding registration costs and tax rates for small firms. For Mexico where the SARE[3] program created one stop shops to facilitate registration procedures for eligible micro, small and medium firms, Kaplan et al. (2006) use ineligible firms as a control group in a difference in difference context, and show that SARE led to a statistically significant but very small impact on the formalization of existing informal firms: between 4 and 8% increases in the number of new firms created or about 120 new jobs created per municipality. Bruhn (), exploiting the same innovation found a small rise in formalization, but mostly through salaried workers opening formal micro firms.

For Brazil, Monteiro and Assunção (2006) exploit the same administrative simplification and tax reduction program used in the present paper also applying a difference-in-differences approach with ineligible firms as a control group. They find that SIMPLES increased formal licensing among retail firms by 13 percentage points, but that it had no effect on eligible firms from other sectors (construction, manufacturing, transportation and other services). Moreover, using SIMPLES eligibility as an instrumental variable for formality, they show that the latter significantly increases access

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[3] SARE stands for "Sistema de Apertura Rapida de Empresas." It was implemented in selected municipalities and consolidated in single local offices all the federal, state and municipal procedures needed to register a firm, reducing the total duration of the process to at most 48 hours. Kaplan et al. use data both from municipalities where the SARE was actually implemented and, as additional control groups, from other "competing" municipalities which were chosen to participate in SARE but where the program has not yet being launched.

to credit, and alters the amount and composition of investment towards larger and longer-term projects.

Our work builds on and differs from Monteiro and Assuncao in several ways. First, as an empirical approach we exploit the regression discontinuity (RD) induced by the SIMPLES on the probability of becoming formal. In addition to bringing a distinct set of empirical tools to bear, this also allows us attempt to come to terms with the sensitivity of the SIMPLES instrument which for most sectors performed poorly in the first stage regression. Second, we explore the impact of SIMPLES on a wide range of formality dimensions. Third, we employ a local estimator at the time of the policy change to document significant effects in many dimensions of firm performance, including revenues, employment and capital stock. Finally, we explore a broad set of channels through which registration may give rise to improved firm performance.

The paper is structured as follows. Section II describes the SIMPLES program in detail. Section III provides a thorough description of the micro-firm sector in Brazil and characterizes the sample used in the econometric analysis. Section IV describes the RD methodology, and econometric results appear in Section V. Conclusions follow.

II. The SIMPLES Program

In December 1996, the Brazilian Government implemented a new simplified tax system for small firms, the SIMPLES (*Sistema Integrado de Pagamento de Impostos e Contribuçoes as Microempresas e Empresas de Pequeno Porte*). The new national system consolidates in a single payment all federal taxes and social security contributions applicable to micro and small enterprises.[4] Basically, the SIMPLES abridged procedures for the verification and payment of federal, state and municipal taxes. At the Federal level, the system allowed eligible firms to combine six different types of federal taxes and five different social security contributions into a one single monthly payment.[5] As a result, SIMPLES permitted an overall reduction of up to 8% in the tax burden faced by eligible firms (Monteiro and Assunção, 2006). While value added taxes collected at the state and municipal levels – the *Imposto Sobre Circulação de Mercadorias e Prestação de Serviços (ICMS)* and the *Imposto Sobre Serviços* (ISS) – were initially not included in SIMPLES, States and Municipalities can enter into agreements with the Federal Government to transfer to the latter the collection of the corresponding taxes through an increase in the SIMPLES rates.[6]

As for the mechanisms for enrolling in the system, the law established that firms can opt for using SIMPLES either at the time of registering, or in the last weekday of January for those firms already registered under the old system. One important aspect of the new system is that it allowed substituting a fixed (and relatively low) percentage of total invoicing for the standard payroll contribution, which led to a substantial reduction

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[4] Micro-enterprises are defined as having maximum annual revenues of up to roughly $100,000 and small enterprises up to $1,000,000.

[5] The taxes and contributions covered by SIMPLES are: *Imposto de Renda des Pessoas Jurídicas – IRPJ* (corporate income tax); *Imposto sobre Produtos Insutrializados* – IPI (tax on industialized products); *Imposto sobre a Exportação (Export tax); Imposto sobre A Renda relativo a creditos de aplicoes financeiras e ganhos de capital* (tax to profits from financial investments and capital gains); *Imposto sobre a Propriedade Territorial Rural – ITR (*rural property tax); *Contribução para o PIS/PASEP* (employees' savings programmes); *Contribução Social sobre o Lucro – CSLL* (social contributions on net profits); *Contribução para o Financiamiento da Seguridade Social – COFINS* (social security contributions); *Contribução para a Seguridade Social a cargo de Pessoa Jurídica* (employers' social security contributions); and *Contribução para a Seguridade Social relativa aos Empregados* (social security contributions related to employees) – Gonzalez (2006).

[6] Ministerio de Fazenda (2006) and Gonzalez (2006).

in labor costs and hence created a strong incentive to hire new employees and/or legalize already existing labor relationships.[7]

The motivation behind these reductions in direct and indirect taxes was to enable small, unskilled labor-intensive firms to compete more effectively with larger enterprises, for which high tax burdens are more manageable due to scale economies. SIMPLES, however, explicitly excluded all activities that by law require the employment of professionals with regulated occupations. Examples of ineligible activities include the manufacturing of chemical products, machinery and equipment, as well education, health, accounting, insurance and financial services, among others.

III. Data

We employ the Brazilian Survey of the Urban Informal Sector (*Pesquisa Economia Informal Urbana*, ECINF) collected in 1997 and 2003 by the Brazilian Statistical Institute (IBGE, *Instituto Brasileiro de Geografia e Estadística*). This survey is a cross-section representative of all the urban self-employed and micro-firm owners with at most five paid employees, excluding domestic workers. The stratified sampling design (in two stages) allows studying a population of units which are rare, heterogeneous and hard to detect in standard household surveys. Geographically, it covers all of the 26 Brazilian states, as well as the Federal District, and also each of the 10 Metropolitan Areas (Belém, Fortaleza, Recife, Salvador, Belo Horizonte, Vitória, Rio de Janeiro, São Paulo, Curitiba and Porto Alegre) and the municipality of Goiânia. In each of its two waves, ECINF interviewed roughly 50,000 households among which it found more than 40,000 individuals which reported owning a micro-enterprise.

The ECINF offers substantial detail on the main firm and entrepreneur characteristics of Brazilian micro-enterprises such as sector, revenues, profits, employment size, capital stock and time in business. About 28% of Brazilian micro-

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[7] The SIMPLES imposed a contribution based on a fixed percentage of the firms' revenues that is independent on the number of employees and their salaries (González, 2006).

entrepreneurs use their own or their partners', homes to operate their businesses. Their most frequent sectors of activity are retail trade (26% of micro-firms) and personal services (20 percent), followed by construction (15 percent), technical and professional services (11 percent) and manufacturing (11 percent). Respectively 8% and 7% of micro-firms belong to the sectors of hotels and restaurants, and transportation.

Most firms are very small both in terms of revenues and employment. Thus, in 1997 the average and median monthly revenues of Brazilian micro-firms were U$S 1,313 and U$S 454, respectively. Six years later, accompanying the overall stagnation of the Brazilian economy, average and median micro-firm revenues were even lower, at respectively U$S 1109 and U$S 351 (in 1997 prices). Pooling the two surveys, we find that 87% of all Brazilian micro-firms have no paid employees, and 79% have no employees or partners at all. As reported in Table 2, 10% of the surveyed micro-firms have one or two paid employees, and only 3% have between 3 and 5 paid workers. In those firms with at least one paid employee, roughly 22% of all workers are family members, almost two thirds of paid workers are non-registered – *sem carteira assinada* – and only 35% benefit from social security contributions.

As we argued above, one of the main challenges in estimating the impact of formality on firm performance is the possibility that both may be correlated with the entrepreneurs' unobserved managerial ability. In particular, those micro-firm owners that start their business because they have been unable to find other jobs or because their families have been hit by negative external shocks are arguably less likely to have access to good business opportunities that would allow them to stay in business and succeed. Arguably, they are also less likely to incur the costs associated with formalization.

Some evidence in this respect is presented in Table 3, which shows that individuals that became entrepreneurs to escape from unemployment are found less frequently among the owners of firms with operating licenses (21 percent) than among those without licenses (32 percent). Similarly, among licensed formal enterprise owners there are fewer who report having started up to complement their family's income (12%

of licensed firms and 21% of non-licensed), and it is more common to find entrepreneurs that mention independence as the main reason to start their business (28% vs. 17%). On the other hand, Table 3 suggests a higher fraction of licensed enterprises have plans to expand (45 vs. 37% among non-licensed firms) and a lower number intend to abandon their business to search for salaried jobs (6% among licensed firms compared to 13% for non-licensed ones).

Table 3 also shows that only 1 out of 4 licensed business owners made no attempt at regularizing at the time of starting up, while 85% of non-licensed businesses did not try to regularize their firm when they began operating. Thus, the decision of whether to operate formally or informally appears to be made in most cases at the time of startup. To the extent that the decision to operate informally is based on a rational cost-benefit analysis, this suggests that for most firms the former exceed the latter. [8] This could be due either to costly and/or complex registration procedures or to a limited demand among very small business for the government services or the expanded access to markets that are associated with formality at any price. While the data do not allow us to distinguish among these two possible explanations, 72% of the firms that do attempt to register report having no difficulties in the process. This is suggestive, again, that barriers to registration are not the principle drivers of informality.

IV. Did SIMPLES have an impact on formality?

We consider the impact of SIMPLES on several formality dimensions. Following Montiero and Assunção (2006), we begin with whether the firm has a state or county issued license to operate as a business. Being licensed is a basic legal requirement for operating as a business and also for issuing official invoices for tax purposes. As in other countries, firms are subject to a series of penalties in case of not having a government-issued license. As seen in Table 1, the fraction of licensed micro-firms increased only slightly between 1997 and 2003, from 23.5 to 24.2 percent. Nonetheless, when the

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[8] We are grateful to an anonymous referee for pointing this out.

sample is restricted to firms with at least one employee (besides owner), a much larger increase is observed during that period, from 30 to 49 percent.

To exploit the discontinuity presented by the introduction of SIMPLES, we first construct a variable that indicates the time-in-business of the firm, defined as the number of months, at the time the 1997 ECINF survey was collected, October 1997, since the respondent became owner-partner of the micro-firm.[9] By construction this variable has a value of 0 (months) in October 1997. Figure 1 plots on the horizontal axis time-in-business and on the vertical axis average licensing rates for firms for each corresponding age, both for eligible (left panel) and non-eligible (right panel) firms using only the 1997 ECINF. The SIMPLES started in December 1996 and that corresponds to 10 months. Any firm older than that would have been started under the old system.

Looking at a window of one month on either side of the date of SIMPLES implementation, we find a significant jump of roughly 10% in the registration rate for eligible firms (left panel). In fact, those firms born in November 1996 (11 months, vertical line) are the most affected by the SIMPLES, implying that firms may require at least one month for obtaining a license. In the same figures we plot fitted lines with a cubic polynomial for before and after SIMPLES. Looking at the difference between the fitted lines at the time of the introduction of SIMPLES the jump in licensing rates is clear. Moreover, we observe no significant jump around that time for non-eligible firms (right panel).

Note that in both the eligible and ineligible cases, firms born at the time of the 1997 ECINF have higher licensing rates than the general trend. Moreover, if licensing takes a minimum amount of time newly born firms may not be able to register although

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[9] The ECINF asks two questions regarding the date when the respondent became partner or started the firm, depending on whether she/he started as employee or family employee and later became owner-partner, or whether she/he started as owner-partner. From this question we construct the time-in-business variable (in months, from the time of the ECINF in October 1997). Unfortunately, the 1997 ECINF does not ask about the number of years/months that the firm has been operating in the past, before the respondent became part of the firm. Therefore, our time-in-business variable may not reflect the age of the firm, but we assume that the participation of the respondent changed significantly the operation of the firm, and then we can consider that it has actually started "a new firm".

they might do it in the immediate future. For that reason we exclude firms born from August 1997 to October 1997 (i.e. 0 to 2 months). Below we consider a window of 10 months to each side of the cutoff point, which by visual inspection was selected to be November 1996. Using this window we find that 20.8% of eligible firms had acquired a license before SIMPLES, but 25.3%,after. The respective change for non-eligible firms is from 25.2% to 26.8%. The differing magnitudes suggest the appropriateness of a difference-in-differences strategy around the RD.[10]

Our second measure of formality is whether the firm has a legal status (judicial person) of any type. In 1997, only 15% of the micro-enterprises have legal status, a fraction that increases to 43% for those with employees (see Table 1). In 2003, a smaller proportion of firms satisfy this requirement (13 and 40% respectively). Figure 2 shows that at the time of the introduction of the SIMPLES, a significant jump in the proportion of eligible firms with legal status is observed (left panel), while no significant change for non-eligible firms (right panel).

Only those firms that have legal status answered subsequent questions about two other measures of formality, micro-firm registration and registration with tax authorities.[11] In 1997 only about 12 and 13% of micro-enterprises are registered with the micro-firm registry and with the tax authorities respectively, a fraction that increases to 34 and 39% respectively for those with employees (see Table 1). Moreover, in 1997 only 7% report paying any taxes (17% for those with paid employees), and 8% pay social

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[10] One concern is that these changes may be purely capturing differential seasonal effects .To rule this out, we compute the same above percentages for a window generated one year before, as if SIMPLES would have been implemented in November 1995 instead of 1996. In this case eligible firms show licensing rates from 20.3 to 22% for before and after respectively, and non-eligible rates are 24 to 25.9% for before and after respectively. The effect is far smaller for the eligible than what we find in the true SIMPLES period. Similar results can be obtained by using different years (further evidence on this can be found in Monteiro and Assunção (2006). This suggests that SIMPLES indeed induced a discontinuity in the behavior of firms created right after the introduction of the program. In what follows we exploit this discontinuity to evaluate the impact of SIMPLES on formality and that of the latter on firm performance.

[11] In 1997, ECINF asked for the *Registro no Cadastro Geral de Contribuintes* and the respondent had to provide their number or select the options: "don't registered", "unknown" or "non applicable". In 2003, it asked for the *Registro no Cadastro Nacional da Pessoa Juridica*, and the respondent have to answer from the options: "yes", "no", "unknown" or "non applicable".

security contributions (25% for those with paid employees).[12] Figures 3-6 plot the formality rates along these dimensions. In all cases, we observe a jump in the participation rates for eligible firms, although the change is less dramatic that those observed in Figures 1 and 2.

SIMPLES induced a significant change in several formality rates, the more visible being the broader definitions: licensing and legal status. However, the fact that there is such variation across measures confirms that formality is not an all or nothing decision, but rather one made across several dimensions, each of them involving a different set of costs and benefits.

Arguably important among the benefits, is the possibility of gaining access to credit and participating in trade associations (guilds). As observed in Table 1, these dimensions of formality are restricted to respectively 5 and 12% of firms in 1997 (11 and 25% among those with paid employees), and to 6 and 11% in 2003 (13 and 23 for firms with paid workers). Access to credit from formal financial institutions (having received a credit form a bank or a lending institution at most one year before October 1997) is however, much less frequent: 2.5% overall and 5% for those with some paid employees.

V. Measuring the Impact of Formality on Performance

Va. Estimation strategy

In a general linear regression set-up, an outcome variable Y can be expressed as

$$(1) \qquad Y_i = \beta_1 D_i + \beta_2 t_i + \beta_3 X_i + \theta_i + u_i,$$

where i denotes the firm, t denotes time in business, D is a formality indicator, X are exogenous covariates, θ is a firm-specific unobserved component and u is an idiosyncratic error component. Consistent with the program evaluation literature, we will

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[12] All of these formality indicators exhibit slight reductions in 2003.

refer to D as a treatment indicator. The parameter of interest is β_1, the treatment effect. In a naïve OLS framework, estimates of β_1 are likely to be biased because there may exist a correlation between firms that receive the treatment and the unobserved component. The sign of this correlation is not known *a priori*. On the one hand, if owners with conditionally high entrepreneurial ability (high θ) are more likely to be formal, OLS estimates of β_1 will be biased upward. First, their better growth prospects may lead them to place a larger value on having access to markets and government services, for which formality may be a necessity. Second, more successful businesses are more likely to be detected by government inspectors, especially as they grow, which may lead them to formalize in order to avoid paying fines and/or bribes. In both cases, the unobserved component θ would be positively correlated with the formality indicator, which would lead to over-estimating the impact of formality on firm performance.

On the other hand, there are also reasons to expect a negative correlation between θ and the various formality measures that would lead to downward bias in estimates of β_1. First, as shown by Almeida and Carneiro (2005), informality may allow firms greater flexibility in their employment and production decisions which, in turn, could lead them to operate more efficiently. Thus, informal firms would tend to have a higher θ. On the same vein, by reducing operating costs, the avoidance of taxes and regulations that is associated with informality could increase firms' ability to successfully compete with their formal counterparts (see Farrell, 2004, for example). Thanks to their lower costs, informal firms could thus exhibit a better performance than what other firm and entrepreneur characteristics would lead to expect.

The introduction of SIMPLES can be seen as an exogenous policy change that significantly altered the incentives to become formal and hence useful to estimate the impact of formality on micro-firm performance, while avoiding possible biases arising from self-selection into formality. Assuming that formality decisions are made at the time of starting up, one way of identifying such treatment effects is by constructing instrumental variables based on a combination of SIMPLES eligibility and an indicator of

whether firms were created before or after SIMPLES implementation. Monteiro and Assunção (2006) take this approach in a difference-in-difference context. Let *AFTER* be an indicator for whether a firm was created before or after the SIMPLES was implemented (such that $AFTER_i = 1$ if $t_i \leq \bar{t}$ and $AFTER_i = 0$ otherwise, where firms that have been in business for at most $\bar{t}$ months were created after SIMPLES) and ELIG as an indicator for the eligibility status of the firm. The interaction of eligible/non-eligible and before/after indicators (i.e. AFTER×ELIG), is used as an instrument to measure the impact of formality on investment and credit access with the first stage regression:

$$(2) \qquad D_i = \alpha_1 ELIG_i + \alpha_2 AFTER_i + \alpha_3 \left(ELIG_i \times AFTER_i \right) + \alpha_4 X_i + \varepsilon_i.$$

This approach is conceptually sound but, may be giving relatively weak findings in the present context for three reasons. First, and most importantly, as Figures 1-6 reveals, the effect of SIMPLES dissipates as we consider firms born far away from the cutoff point. This determines that the instrument is only valid in a small interval of time around the cutoff point. Second, IV estimation is most effective with a considerable covariation of the instrument and the treatment indicator to approximate OLS-level standard errors and this is not the case here. We can strengthen the instrument by interacting it with other exogenous covariates. By this simple interaction we are able to reduce IV standard errors to one third of its original value. Moreover by artificially increasing the number of instruments we are able to test for the validity of instruments using the Sargan test. Finally, there is some question about the how well the non-eligible population serves as a control group. The 2003 ECINF included a question regarding whether firms that are legally constituted have used the SIMPLES. Whether due to misclassification of their activities, or low law enforcement, or other clerical error, 55 % of non-eligible firms declared to have used the SIMPLES. If not due to clerical or recall errors, this may weaken the validity of the instrument. Together, these factors may explain why, Monteiro and Assunção find a statistically insignificant effect of SIMPLES for all sectors but one.

We take two separate approaches. First, we adopt a RD approach that exploits the sample immediately around the introduction of SIMPLES and in principle, obviates the need for a control group. Second, we revisit the above approach, but adopt a weighting scheme that exploits the higher quality of the instrument near the introduction of SIMPLES and strengthen the instrument using additional covariates.

Regression Discontinuity Approach

As an alternative approach, we interpret the date of introduction of the SIMPLES system as an exogenously induced discontinuity. The RD literature (see Hahn, Todd and Van der Klaauw, 2001 for a discussion and definition of RD, and Van der Klaauw, 2002 for an illustrative application) argues that a local estimate of treatment impact can be obtained by giving heavier weights to observations arbitrarily close to the discontinuity. If, conditional on a set of exogenous covariates, we assume very similar distributions of unobservable characteristics of firms born immediately before and after SIMPLES implementation, the discontinuity that the new system introduces in the factors determining formality can be exploited to provide unbiased estimates of the local average treatment effect of the program (see Imbens and Angrist 1994 for a theoretical discussion on local vs. global treatment effects). In our case the discontinuity affects the probability of receiving the treatment (i.e. we assume that $P[D_i = 1 | t_i = t, X_i = x] = E[D_i | t_i = t, X_i = x]$ has a discontinuity at $t_i = \bar{t}$). Estimating the coefficient β_1 for this interval provides a local treatment effect:

$$\beta_1(X = x) = \frac{\lim_{t \downarrow \bar{t}} E[Y | t, X = x, elig] - \lim_{t \uparrow \bar{t}} E[Y | t, X = x, elig]}{\lim_{t \downarrow \bar{t}} E[D | t, X = x, elig] - \lim_{t \uparrow \bar{t}} E[D | t, X = x, elig]}.$$

This estimator can be obtained by an instrumental variables procedure, where D is instrumented by AFTER, and sampling weights are used to amplify observations close to the cut-off around the date of the introduction of SIMPLES.

A few comments are in order. First, the corresponding inference about the impact of formality is only valid in an arbitrary close (local) interval around the date of SIMPLES introduction. As we noted, the rates of registration decline after the initial jump. This might be due to other factors that shifted down the rate of registration in the economy overall. Or it might also be that the introduction of SIMPLES was accompanied by other programs, such as a substantial information campaign, that was discontinued. While we are interested in whether a program like SIMPLES can have an impact we our primary interest is not explaining the local (short-run) vis-à-vis the global (or long-run) effects, but rather to obtain unbiased estimates of the impact of formality on micro-firm performance. If we focus on the period immediately after the discontinuity, the immediate jump allows us to do this.

Second, strictly speaking, we really are not looking at the impact of formalization on existing informal firms, but rather asking "if this particular informal firm were reborn under the SIMPLES regime, how would its likelihood of registering be increase, and how would its performance vary as a result of registration?" If firms are constrained by the cost of formalization, firms born after SIMPLES might be able to fully develop their growth potential. Provided that in every case we observe the firm performance at the same date (October 1997), we are comparing one firm born before SIMPLES to a comparable counterfactual firm born after SIMPLES.

Strengthening the Difference-in-Differences Approach

As our second approach, we further explore Monteiro and Assunção's approach of employing the ineligibles as a control group, but take several measures to strengthen their instruments. This borrows from our previous exercise. The RD literature argues that a local estimate of treatment impact can be obtained by an instrumental variable design with weights on the instrument arbitrarily close to the break-point. In this case, we would still exploit the control group to control for unrelated factors further away from the break point, but the instrument is constructed where it is strongest.

Vb. Results

The effect of SIMPLES on formality and bandwidth selection

In order to analyze the effect of SIMPLES we consider several firms formality dimensions. We use the 1997 ECINF considering all firms in the 3-20 months window and excluding College graduates entrepreneurs, those younger than 20 years old and older than 65 years old. For the first-stage estimates, we use weighted least squares estimates. The weight scheme is based on a normal kernel with bandwidth of one month (see below for the selection of bandwidth). In this case, the bandwidth corresponds to the standard deviation in months used to standardize the difference in time in business with respect to the break-point of November 1996.

The set of controls X contains the following: gender, age and education of the firm's owner, number of members in the household, a set of dummy variables for reasons for starting a micro-firm. Additionally we include state and industry dummy variables. The estimation is sequentially done first for all micro-firms, second for own-account workers, and third for all firms with at least one employee (besides owner). All specifications include a quadratic polynomial in time-in-business in order to control for potential biases coming from the functional form in the weighting scheme. The inclusion of this or higher order polynomials have little impact on the coefficient estimates.

Table 4 reports the first stage results of the effect of SIMPLES on firm formality. Columns (1)-(3) report a before-after (b-a) estimator of the effect of SIMPLES, by restricting the sample to eligible firms only and reporting the coefficient of AFTER. Columns (4)-(6) use the sample of all firms and show the coefficient of the variable AFTER×ELIG using the difference-in-differences (d-in-d) method.

The SIMPLES tax simplification produced an 11.6% impact on micro-firms' licensing for the eligible firms sample and 7.6% for the sample of all micro-firms. A similar impact is associated with the legal status of the firm (7.5% for b-a; 6.5% for d-in-d). Looking at other dimensions of formality confirms the positive impact of SIMPLES. Micro-firm registration increases by 6.3% in the before-after estimation and 5.7% in the d-in-d procedure. Registration with the tax authorities increases too, although it is only

significant in the b-a estimation, possibly due to the small proportion of registered firms. Firms that pay some of taxes increase by 3.1% and 4.6% for eligible and all micro-firms respectively. Finally, social security contributions increase by 4.3% in for the b-a estimation but there is no significant impact in the d-in-d approach. The effect of SIMPLES in formality is bigger in firms with employees (except for licensing and paid taxes in the b-a approach). In some cases the effect doubles when own-account workers are excluded.

Following Fajnzylber et al. (2009), we sequentially expand the set of covariates to include firm characteristics that may themselves be affected by the formality status. The idea is to control for potential self-selection issues associated with formalization. In particular, we add the capital stock of the firm (set to zero for firms not reporting assets, and including a dummy variable for those firms) and the number of employees (including the owner). A risk involved in these new models is that these covariates are themselves affected by the formality indicator. The results show that the effect of SIMPLES, although reduced, is not changed with the inclusion of these covariates. Adding the capital stock as a new control variable, columns (2) and (5), slightly reduces the coefficient estimates. However, when the number of employees is added in columns (3) and (6), the coefficient estimates reduces by more. This determines that part of the effect of licensing and legal status may operate through an increment in the number of employees.

In non-parametric and semi-parametric estimators the choice of the bandwidth plays an important role. Increasing the bandwidth results in smaller variance, but doing so increases the risk of adding potential bias to the local estimator. In order the check the sensitivity of our estimates to the bandwidth choice we estimate the effect of SIMPLES on licensing and legal status for different bandwidth choices. Figures 7 and 8 present the b-a and d-in-d parameter estimates for the effect of SIMPLES (i.e. the coefficient of AFTER and AFTER×ELIG in Table 4, columns 1 and 4 respectively) in licensing and legal status, respectively, for the sample of all micro-firms, own-account workers, and firms with employees, considering possible bandwidths on the {0.5, 1, 1.5….,5} grid. Note that the coefficient reduces and becomes statistically insignificant as the bandwidth increases. The figures show that for bandwidth values less than 1, the estimated

coefficient has considerable variance, making the estimate statistically insignificant. This pattern suggests that a bandwidth of 1 is optimal (i.e. a normal kernel with standard deviation of 1 month), provided that it has a maximum effect and reasonable variance. Moreover, this analysis confirms that only a local analysis of the effect of SIMPLES about the cutoff point would be appropriate, because if the first stage effects are not statistically significant, no further inference can be made in the second stage.

Although not reported (available form the Authors upon request), the coefficient estimates of the remaining covariates goes in the expected direction, implying that male, older and more educated entrepreneur are more likely to have a registered micro-firm. Labor and capital also increase the probability of licensing, but its inclusion does not wipe out the effect of SIMPLES. In the d-in-d specification, the coefficient of the free standing variable AFTER is not statistically significant in any of our specifications, while ELIG has a negative and significant sign. The categorical variable indicating the reasons for becoming micro-entrepreneur also shows the expected signs (using "didn't find a job" as base category). In particular, those entering voluntarily show a higher likelihood of having a firm with a state issued license. Interestingly the highest effect corresponds to those entering because of family tradition. We also observe some differences among industries. In particular, conditional on everything else, retail trade, transportation and restaurants & lodging have the highest licensing rates, while manufacturing, construction and personal services have the lowest.

The effect of licensing on firm performance

Given the first stage results, we apply a weighted instrumental variable estimation (W2SLS) procedure to get consistent estimates of the effect of formality on different firm performance dimensions. We compare standard WLS results with our preferred W2SLS technique. We report several estimators and three formality dimensions: licensing (Table 5), legal status (Table 6), and paid taxes (Table 7). In the first case, AFTER is the instrumental variable used to instrument formality (b-a estimator), while in the second AFTER×ELIG (d-in-d estimator). In each case, the instruments are interacted with gender and age of the firm-owner to enhance their performance. F-tests on the significance of instruments confirm that in all specifications the instruments are jointly statistically significant at 1% level. Moreover, Sargan tests on the validity of the instruments are performed, and all specifications show that the instruments are valid. We consider the sample of all micro-firms and the sub-sample of firms with at least one-employee[13]. All specifications include the same covariates used in the first stage (including a quadratic polynomial in time in business to capture non-linearity).

Our first outcome of interest is firm's total revenues. Table 5 WLS estimates in logs show that licensed eligible firms have 57% more revenue than non-licensed firms and 70% if only firms with employees are considered. This corresponds to 859 and 1447 *Reais*, respectively, for the revenues in levels.[14] This magnitude is similar to that found in Fajnzylber et al. (2009) estimates for Mexico. However, when instrumented, the effect of licensing actually increases by a factor of six for the complete sample and by a factor of three for the sample with at least one employee. We observe that in both WLS and W2SLS, b-a estimation has similar results than those in the d-in-d procedure. The scaling should not be surprising provided that even with the best set of instruments, the standard errors are considerable higher than those of WLS. Trimming the dependent variable gets similar results but it reduces the coefficient estimates by 10% in logs, and 20% in levels.

An overall bigger effect is found in terms of legal status. Table 6 WLS estimates show that the legal status of the firm increases revenues by 1.2 log points for the whole

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[13] For the sample of own-account workers, Monteiro and Assunção (2006) find no effect of licensing on a set of firm performance variables, except for the retail sector.
[14] One US dollar was roughly equivalent to 1.1 *Reais* in October 1997.

sample, and 0.8 log points for firms with employees. This produces 2877 and 2172 *Reais*, respectively. When instrumented, the impact of SIMPLES increases four-fold in logarithm, but becomes unstable in levels. Only when the dependent variable is trimmed and with the d-in-d approach the impact of legal status becomes statistically significant, implying that having this quality may increase revenues by 1980 and 3110 *Reais* for the complete sample and that with employees respectively.

In the same vein, paying taxes (Table 7) has a positive effect on revenues. In this case, however, standard errors are considerably higher and therefore, although coefficient estimates go in the same direction as licensing and legal status, in many cases they are statistically non-significant. It is worth noticing that the largest effect is observed in logs with an estimated coefficient of 6 or above.

The fact that IV estimates are bigger than least squares seems unexpected at first. However, using the argument discussed in the methodology section, we should conclude that there is a negative correlation between θ, the unobserved entrepreneurial ability, and various formality measures. The magnitude of the standard errors in the IV estimation does not allow us to draw an accurate effect of formalization. However, in many cases, W2SLS estimates have a difference of more than two standard deviations from the WLS estimate. This may be interpreted as the fact that firms with conditionally high growth potential are excluded from formal institutions, possibly because of the high costs associated with them. These results provide strong support for De Soto's (1989) hypothesis exposed in the Introduction.

Vc. What are the channels through which formality affects firm performance?

How are these firms able to achieve such increment in revenues? The following dimensions of firm performance provide a partial answer. First, W2SLS estimates show that licensing has a considerable impact on employment. Licensed firms have on average one employee more than non-licensed firms, more than double the WLS estimate. A similar effect although non-statistically significant is observed for legal status. Moreover, paying taxes increases overall employment by two employees (d-in-d). Given that the majority of firms in the sample are with no or with a few employees, the impact of formalization on this dimension is therefore considerable. Second, the employment increment is almost exclusively given by paid employees. In particular, licensing has a comparable effect on the number of paid employees. This determines that on average the ratio of paid to total employees increases by 25% (47% for the sub-sample of firms with employees). Finally, the capital stock seems to grow only for firms with employees, and in this case, the effects are of the same magnitude of those of revenues.

We explore the effect of formalization on other variables with important policy implications. First, it has been argued that access to credit is mostly restricted because of the lack of formalization, which impedes the firms offering collateral assets. We use the variable Access to Credit, which is a dummy variable for firms that have received a credit from a bank or lending institution in the year before October 1997, as another outcome of interest. In this case, we observe a small effect of licensing on credit access in the WLS estimate and no statistically significant effect in the W2SLS case.

Second, we provide an informal test of De Soto's (1989) argument stating that firms want to get involved with formal institutions to claim property rights. With this purpose in mind, we use a "fixed location" indicator variable, which states whether the firm operates in a fixed location. Our results show that formality (licensing and possibly legal status and taxes) has no effect for the whole sample, but it does on the sub-sample of firms with employees. These coefficient estimates are in line with those of the effect on the firm's capital stock. In this case, formalization is likely to encourage the firm's owner to expand the amount of working capital considerably.

Third, we also test for the hypothesis stating that firms formalize to have access to large clients and suppliers. For doing this we create an indicator variable being 0 if the firm sells to individuals or small firms, and 1 for sales to big firms and the government. As pointed out by an anonymous referee, at the time of the introduction of SIMPLES, the program did not include the VAT. Thus, larger firms have no incentive to buy from micro-firms enrolled in SIMPLES, as they cannot claim tax credits for the taxes paid to those firms. Therefore we cannot test the hypothesis in De Paula and Scheinkman (2007), although we can still study whether formality per se allow small firms to gain access to larger clients. The results show that licensing and paying taxes has no effect on sales to big firms. However, with the d-in-d estimator there is evidence that having a legal status do increase the likelihood of selling to big firms.

VI. Conclusions

Most micro-enterprises in the developing world operate informally. They lack legally mandated operating licenses and seldom pay taxes and social security contributions. To the extent that informality creates obstacles for the enforcement of property rights, and limits access to markets and public services, it could arguably curtail the ability of micro-enterprises to exploit their human and physical resources more effectively. Not surprisingly, efforts to facilitate the formalization of small businesses have become very popular among development practitioners, often with a focus on reducing the time and cost required to obtain government permits and licenses.

Whether the recent emphasis on reducing registration costs is or not appropriate, or sufficient, is not the main question that this paper has intended to address. It is well known that registration costs are only one among many other factors that may affect formality decisions – e.g. tax rates and levels of enforcement, availability of alternative forms of social protection, the quality of services available to formal firms, etc. The question on which this paper has focused is whether and by what measure micro-firm performance could potentially increase if the appropriate incentives were created for

enticing small entrepreneurs to register their businesses. In fact, we have addressed this question by taking advantage of a 1996 Brazilian program – the SIMPLES – which combined the simplification of registration procedures with a considerable reduction of the tax burden carried by micro and small firms, through the consolidation of various taxes and social security contributions in a unique and lower payment.

We have not intended to provide definite answers on whether the SIMPLES program was successful in generating a permanent reduction in the size of the Brazilian informal sector. While our data suggests that a positive answer to this question is debatable, by exploiting a survey of Brazilian micro-enterprises collected less than a year after the launch of SIMPLES, we have established the presence of at least a temporary increase in registration rates around the time of implementation of the program. Using a RD approach, we have used that exogenous jump in registration rates to identify the impact of increased formality levels on the performance of newly born Brazilian micro firms. Thus, by exploring the quasi- natural experiment provided by the implementation of SIMPLES, we have been able to eliminate many of the endogeneity issues surrounding the impact of registration on firm performance – e.g. the bias created by the effect of unobserved managerial ability on both formality and firm performance.

Our results suggest that formality is indeed associated with higher revenue, a higher use of total and paid labor, and with higher levels of capital if they already have employees. Moreover, we have shown that at least in the Brazilian context, formalization does not increase access to credit markets nor provide access to large clients or suppliers.

To be sure, the income and employment generating potential of the micro-firm sector is quite limited anyway, given the low levels of human and physical capital of the majority of micro-entrepreneurs in developing countries. However, what this paper has demonstrated is that efforts to improve the incentives for the formalization of micro-firms are well justified, as the evidence indicates that when faced with increased incentives for operating formally micro-entrepreneurs appear to improve the efficiency with which they employ their scarce resources.

If this is indeed the case, further incentives may be needed to entice small firms to enter the formal sector, including for instance tax reductions, changes in labor market regulations, increases in government enforcement of regulations, and improvements in private and public services available to formal firms – e.g. credit, contract enforcement, technical assistance, etc.

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Table 1: Formality Indicators

	1997	2003	1997	2003
	All		With at least one employee (besides owner)	
License to operate	23.5	24.2	31.0	49.2
Legal status	14.7	13.4	42.9	40.3
Micro-firm Registration	11.6	11.2	34.0	34.4
Registered with Tax Authorities*	13.3	10.6	39.4	32.2
Paid Taxes	6.8	6.1	17.1	15.6
Informal / Paid workers	-	-	63.3	65.0
Paid social security	8.1	7.1	25.1	24.4
Access to Credit	5.2	6.3	11.4	13.1
Participation in Guilds	12.4	11.4	24.6	23.0

Notes: Pooled ECINF 1997 and 2003. Entrepreneurs at least 20 years old. * In 1997, ECINF asked for the *Registro no Cadastro Geral de Contribuintes* and the respondent had to provide their number or select the options: "don't registered", "unknown" or "non applicable". In 2003, it asked for the *Registro no Cadastro Nacional da Pessoa Juridica*, and the respondent has to answer from the options: "yes", "no", "unknown" or "non applicable".

Table 2: Size Distribution and Employment Composition of Brazilian Micro-Enterprises

# Paid Employees	Share of Micro-firm Sector (%)	Family workers/ Total workers (%)	Informal workers / Paid workers (%)	Pay social security (%)
0	86.9	4.2	-	8.0
1	7.3	22.1	71.8	27.8
2	2.9	22.9	61.3	37.3
3	1.5	23.4	51.2	49.5
4	0.9	21.6	43.8	52.6
5	0.5	15.9	45.7	49.0

Notes: Pooled ECINF 1997 and 2003. Entrepreneurs at least 20 years old.

Table 3: Reasons for Starting-up, Firm Prospects and Firm Licensing

Main reason to start a micro-firm	% firms (with License)	% firms (without License)	% firms	Plans for Future	% firms (with License)	% firms (without License)	% firms
Didn't find a job	20.9	32.2	29.6	Expand	45.5	36.6	38.7
Profitable business	2.2	1.2	1.5	Same level	31.2	31.2	31.2
Flexible hours	1.6	2.3	2.1	Change activity, remain independent	9.2	9.5	9.5
Be independent	27.8	17.1	19.6	Find a salaried job	6.5	13.4	11.8
Family tradition	11.0	8.1	8.7	Don't know	7.6	9.3	8.9
To help family income	12.2	20.8	18.8	Difficulties to regularize when starting-up? (2003)	% firms (with License)	% firms (without License)	% firms
Accumulated experience	10.7	8.7	9.2	Yes	18.0	5.1	8.2
Make good deal	10.7	7.6	8.3	No	57.4	10.4	21.7
As a secondary job	2.5	2.1	2.2	Didn't Try	24.7	84.5	70.1

Notes: Pooled ECINF 1997 and 2003 (except for "Difficulties to regularize?" from 2003). Sample restricted to entrepreneurs aged at least 20.

Table 4: First stage results: Effect of SIMPLES on Formality

	Obs.	(1)	(2)	(3)	Obs.	(4)	(5)	(6)
		Eligible firms Before-after (AFTER)				**All micro-firms Difference-in-differences (AFTER×ELIG)**		
License to operate								
All micro-firms	5730	0.116***	0.094***	0.078***	6878	0.071*	0.073*	0.053*
		(0.034)	(0.033)	(0.032)		(0.040)	(0.040)	(0.039)
Own-account workers	4394	0.126***	0.120***	-	5305	0.031	0.035	-
		(0.038)	(0.038)			(0.044)	(0.044)	
At least one employee	1336	0.074	0.027	0.026	1573	0.222**	0.203***	0.137*
		(0.068)	(0.068)	(0.066)		(0.090)	(0.089)	(0.087)
Legal status								
All micro-firms	6079	0.075***	0.051**	0.046**	7302	0.064**	0.064**	0.050**
		(0.022)	(0.021)	(0.020)		(0.027)	(0.026)	(0.025)
Own-account workers	4494	0.041**	0.035*	-	5424	0.025	0.027	-
		(0.019)	(0.019)			(0.022)	(0.022)	
At least one employee	1585	0.129**	0.071	0.083*	1878	0.193***	0.174**	0.148**
		(0.051)	(0.051)	(0.50)		(0.072)	(0.070)	(0.069)
Micro-Firm Registration								
All micro-firms	6079	0.063***	0.044**	0.040**	7302	0.057**	0.057**	0.046**
		(0.020)	(0.020)	(0.019)		(0.025)	(0.024)	(.024)
Own-account workers	4494	0.028*	0.026*	-	5424	0.038**	0.040**	-
		(0.017)	(0.017)			(0.020)	(0.020)	
At least one employee	1585	0.126**	0.078	0.088*	1878	0.101	0.086	0.065
		(0.053)	(0.052)	(0.051)		(0.072)	(0.071)	(0.071)
Controls								
Capital Stock		NO	YES	YES		NO	YES	YES
Number of Employees		NO	NO	YES		NO	NO	YES

(see next page)

Table 4: First stage results: Effect of SIMPLES on Formality (continued)

		Eligible firms Before-after (AFTER)				All micro-firms Difference-in-differences (AFTER×ELIG)		
	Obs.	(1)	(2)	(3)	Obs.	(4)	(5)	(6)
Registered with Tax Authorities								
All micro-firms	6079	0.072***	0.049**	0.044**	7302	0.028	0.028	0.015
		(0.022)	(0.021)	(0.019)		(0.025)	(0.025)	(0.024)
Own-account workers	4494	0.049**	0.044**	-	5424	0.010	0.013	-
		(0.019)	(0.018)			(0.021)	(0.020)	
At least one employee	1585	0.116**	0.064	0.074	1878	0.118	0.097	0.073
		(0.051)	(0.050)	(0.050)		(0.072)	(0.070)	(0.070)
Paid Taxes								
All micro-firms	6079	0.031**	0.024	0.023*	7302	0.046**	0.046**	0.042**
		(0.016)	(0.019)	(0.016)		(0.019)	(0.020)	(0.019)
Own-account workers	4494	0.041**	0.041**	-	5424	0.039**	0.040**	-
		(0.016)	(0.016)			(0.018)	(0.018)	
At least one employee	1585	-.0011	-.029	-0.026	1878	0.093*	0.083*	0.075
		(0.039)	(0.039)	(0.039)		(0.053)	(0.053)	(0.053)
Paid Social Security								
All micro-firms	6079	0.043***	0.029**	0.025*	7302	-0.014	-0.015	-0.024
		(0.015)	(0.014)	(0.014)		(0.018)	(0.018)	(0.017)
Own-account workers	4494	0.0069	0.0052	-	5424	-0.037**	-0.037**	-
		(0.010)	(0.011)			(0.013)	(0.013)	
At least one employee	1585	0.128***	0.075*	0.095**	1878	0.023	0.0023	-0.036
		(0.043)	(0.041)	(0.039)		(0.057)	(0.055)	(0.053)
Controls								
Capital Stock		NO	YES	YES		NO	YES	YES
Number of Employees		NO	NO	YES		NO	NO	YES

Notes: * Statistically significant at 1%, ** 5%, *** 10%. (.) Standard errors. Columns (1)-(3): coefficient of AFTER × ELIGIBLE is reported. Columns (4)-(6): coefficient of AFTER is reported. All samples composed of firms 3-20 months old, with an entrepreneur without College degree and 20-65 years old. Weighted Least Squares estimates with weights based on time in business using a normal kernel with a standard deviation (i.e. bandwidth) of one month, where firms born in November 1996 have a score value 0.

Table 5: Impact of Formality (License to operate) on Firm Performance

	All micro-firms				At least one employee (besides owner)			
	Eligible firms (AFTER)		All micro-firms (AFTER×ELIG)		Eligible firms (AFTER)		All micro-firms (AFTER×ELIG)	
	WLS	W2SLS	WLS	W2SLS	WLS	W2SLS	WLS	W2SLS
Revenues (R$)	859*** (62)	2277* (1305)	735*** (61)	3827** (1558)	1447*** (210)	3762** (1526)	1253*** (178)	4288*** (1322)
Revenues trimmed(§)(R$)	661*** (40)	2238*** (890)	567*** (36)	2984*** (967)	1034*** (112)	1481** (774)	910*** (97)	2302*** (689)
Revenues (log)	0.566*** (0.04)	3.21*** (1.03)	0.554*** (0.03)	3.42*** (1.04)	0.701*** (0.07)	1.94*** (0.54)	0.603*** (0.06)	3.22*** (1.14)
Revenues (log) trimmed(§)	0.529*** (0.04)	3.15*** (1.02)	0.528*** (0.03)	3.14*** (0.97)	0.623*** (0.07)	1.72*** (0.51)	0.534*** (0.06)	2.29*** (0.05)
Employment	0.398** (0.024)	1.03** (0.514)	0.415*** (0.022)	1.29** (0.5349)	0.471*** (0.05)	0.857** (0.36)	0.413*** (0.06)	1.01*** (0.35)
Paid Employment	0.257*** (0.019)	1.09*** (0.436)	0.254*** (0.017)	1.10*** (0.433)	0.470*** (0.059)	1.62*** (0.450)	0.385*** (0.054)	1.44*** (0.403)
Paid Employment / Employment	0.067*** (0.005)	0.246*** (0.110)	0.064*** (0.004)	0.252** (0.111)	0.095*** (0.014)	0.369*** (0.108)	0.075*** (0.013)	0.304*** (0.097)
Fixed Capital (log)	1.08*** (0.109)	0.798 (2.21)	1.07*** (0.100)	-0.166 (2.28)	0.665*** (0.206)	2.09* (1.39)	0.590*** (0.186)	2.50** (1.28)
Access to Credit	0.0189** (0.007)	0.089 (0.15)	0.0212** * (0.007)		-0.007 (0.016)	-0.006 (0.11)	0.0024 (0.015)	-0.171 (0.13)
Fixed Location	0.214*** (0.01)	0.065 (0.23)	0.260*** (0.01)	0.0004 (0.24)	0.309*** (0.03)	0.307* (0.17)	0.310*** (0.02)	0.506*** (0.16)
Sales to Firms	-0.016** (0.008)	-0.103 (0.175)	-0.023 (0.008)	0.079 (0.181)	0.0058 (0.018)	-0.073 (0.118)	0.0099 (0.016)	0.050 (0.108)

Notes: * Statistically significant at 1%, ** 5%, *** 10%. Standard errors in parenthesis. All samples composed of firms 3-20 months old, entrepreneurs without College degree and 20-65 years old. WLS: Weighted Least Squares. W2SLS: Weighted Instrumental Variables Least Squares (endogenous variable: License; instruments: AFTER ×ELIGIBLE interacted with Female and Age in the first two columns, AFTER interacted with Female and Age in the last two columns). Weights based on time in business using a normal kernel with a standard deviation (i.e. bandwidth) of one month, where firms born in November 1996 have a score value 0. (§) Sample is trimmed to 1% at the highest revenues.

Table 6: Impact of Formality (Legal status) on Firm Performance

|	All micro-firms				At least one employee (besides owner)			
	Eligible firms (AFTER)		All micro-firms (AFTER×ELIG)		Eligible firms (AFTER)		All micro-firms (AFTER×ELIG)	
	WLS	W2SLS	WLS	W2SLS	WLS	W2SLS	WLS	W2SLS
Revenues (R$)	2877	-816	2678***	2170	2172***	2486	2084***	4228
	(117)	(3509)	(107)	(2422)	(297)	(6096)	(246)	(3438)
Revenues trimmed(§)(R$)	1861***	432	1827***	1979*	1487	980	1474***	3117*
	(69)	(1913)	(60)	(1277)	(153)	(3021)	(128)	(1657)
Revenues (log)	1.23***	5.87**	1.25***	4.94***	0.804	3.16*	0.831***	4.33**
	(0.055)	(2.17)	(0.049)	(1.47)	(0.078)	(1.89)	(0.066)	(1.43)
Revenues (log) trimmed(§)	1.10***	6.12***	1.15***	4.74***	0.747***	3.49*	0.777***	3.93***
	(0.054)	(2.19)	(0.049)	(1.37)	(0.074)	(1.94)	(0.063)	(1.20)
Employment	1.09***	0.667	1.07***	1.08	0.633	-0.102	0.549***	1.91*
	(0.40)	(1.111)	(0.036)	(0.801)	(0.072)	(1.68)	(0.064)	(0.99)
Paid Employment	0.724***	0.650	0.690***	0.715	0.572***	2.62	0.486***	2.31**
	(0.032)	(0.889)	(0.029)	(0.642)	(0.078)	(2.11)	(0.068)	(1.11)
Paid Employment / Employment	0.169***	0.178	0.168***	0.205	0.105***	0.595	0.093***	0.502**
	(0.008)	(0.216)	(0.007)	(0.160)	(0.017)	(0.481)	(0.015)	(0.250)
Fixed Capital (log)	2.57***	-0.356	2.21***	-3.37	1.33***	-0.056	0.906***	3.94
	(0.160)	(4.58)	(0.145)	(3.56)	(0.232)	(5.27)	(0.207)	(3.01)
Access to Credit	0.061***	0.172	0.056***	-0.287	0.062***	0.007	0.029*	-0.187
	(0.011)	(0.322)	(0.010)	(0.241)	(0.020)	(0.448)	(0.017)	(0.374)
Fixed Location	0.395***	0.252	0.373***	0.160	0.283***	0.574	0.207***	1.18***
	(0.017)	(0.464)	(0.016)	(0.357)	(0.030)	(0.704)	(0.027)	(0.49)
Sales to Firms	0.018	-0.026	0.044***	0.304	0.026	0.547	0.088***	0.463*
	(0.013)	(0.365)	(0.012)	(0.284)	(0.021)	(0.575)	(0.020)	(0.296)

Notes: * Statistically significant at 1%, ** 5%, *** 10%. Standard errors in parenthesis. All samples composed of firms 3-20 months old, entrepreneurs without College degree and 20-65 years old. WLS: Weighted Least Squares. W2SLS: Weighted Instrumental Variables Least Squares (endogenous variable: License; instruments: AFTER ×ELIGIBLE interacted with Female and Age in the first two columns, AFTER interacted with Female and Age in the last two columns). Weights based on time in business using a normal kernel with a standard deviation (i.e. bandwidth) of one month, where firms born in November 1996 have a score value 0. (§) Sample is trimmed to 1% at the highest revenues.

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Table 7: Impact of Formality (Paid taxes) on Firm Performance

|	All micro-firms				At least one employee (besides owner)			
	Eligible firms (AFTER)		All micro-firms (AFTER×ELIG)		Eligible firms (AFTER)		All micro-firms (AFTER×ELIG)	
	WLS	W2SLS	WLS	W2SLS	WLS	W2SLS	WLS	W2SLS
Revenues (R$)	1689	-4993	1636***	250	2074***	-5472	1980***	5101
	(164)	(4601)	(158)	(3929)	(392)	(10019)	(337)	(6688)
Revenues trimmed(§)(R$)	1427***	-1380	1397***	1663	1958***	-624	1886***	5572
	(96)	(2733)	(87)	(2237)	(199)	(5215)	(175)	(4010)
Revenues (log)	0.831***	6.44***	0.873***	6.03***	0.789***	1.92	0.782***	7.48**
	(0.076)	(2.68)	(0.071)	(2.33)	(0.103)	(2.41)	(0.091)	(3.58)
Revenues (log) trimmed(§)	0.806***	7.27***	0.850***	6.14***	0.778***	2.85	0.775***	8.05**
	(0.075)	(3.09)	(0.070)	(2.38)	(0.097)	(2.69)	(0.087)	(4.00)
Employment	0.647***	1.09	0.687***	2.27*	0.375	-2.33	0.363***	2.80
	(0.056)	(1.41)	(0.053)	(1.41)	(0.096)	(2.96)	(0.089)	(2.08)
Paid Employment	0.509***	-0.206	0.510***	0.642	0.483***	0.313	0.417***	3.60
	(0.044)	(1.13)	(0.04)	(1.04)	(0.103)	(2.58)	(0.093)	(2.35)
Paid Employment / Employment	0.131***	0.069	0.131***	0.206	0.116***	0.171	0.098***	0.762*
	(0.011)	(0.269)	(0.010)	(0.260)	(0.023)	(0.571)	(0.021)	(0.516)
Fixed Capital (log)	1.66***	-0.157	1.51***	-6.47	1.26***	-8.75	1.14***	3.69
	(0.219)	(5.51)	(0.205)	(5.70)	(0.305)	(9.94)	(0.282)	(5.66)
Access to Credit	0.041***	0.430	0.032***	-0.522	0.058**	0.367	0.039*	-1.48*
	(0.015)	(0.408)	(0.014)	(0.389)	(0.026)	(0.681)	(0.023)	(0.83)
Fixed Location	0.269***	-0.150	0.308***	0.259	0.254	-0.022	0.227***	2.15*
	(0.023)	(0.594)	(0.023)	(0.572)	(0.040)	(1.02)	(0.037)	(1.15)
Sales to Firms	0.009	-0.136	0.004	0.640	0.049*	0.704	0.055**	1.06
	(0.018)	(0.444)	(0.017)	(0.475)	(0.029)	(0.827)	(0.027)	(0.70)

Notes: * Statistically significant at 1%, ** 5%, *** 10%. Standard errors in parenthesis. All samples composed of firms 3-20 months old, entrepreneurs without College degree and 20-65 years old. WLS: Weighted Least Squares. W2SLS: Weighted Instrumental Variables Least Squares (endogenous variable: License; instruments: AFTER ×ELIGIBLE interacted with Female and Age in the first two columns, AFTER interacted with Female and Age in the last two columns). Weights based on time in business using a normal kernel with a standard deviation (i.e. bandwidth) of one month, where firms born in November 1996 have a score value 0. (§) Sample is trimmed to 1% at the highest revenues.

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Figure 1: Licensed firms, rates
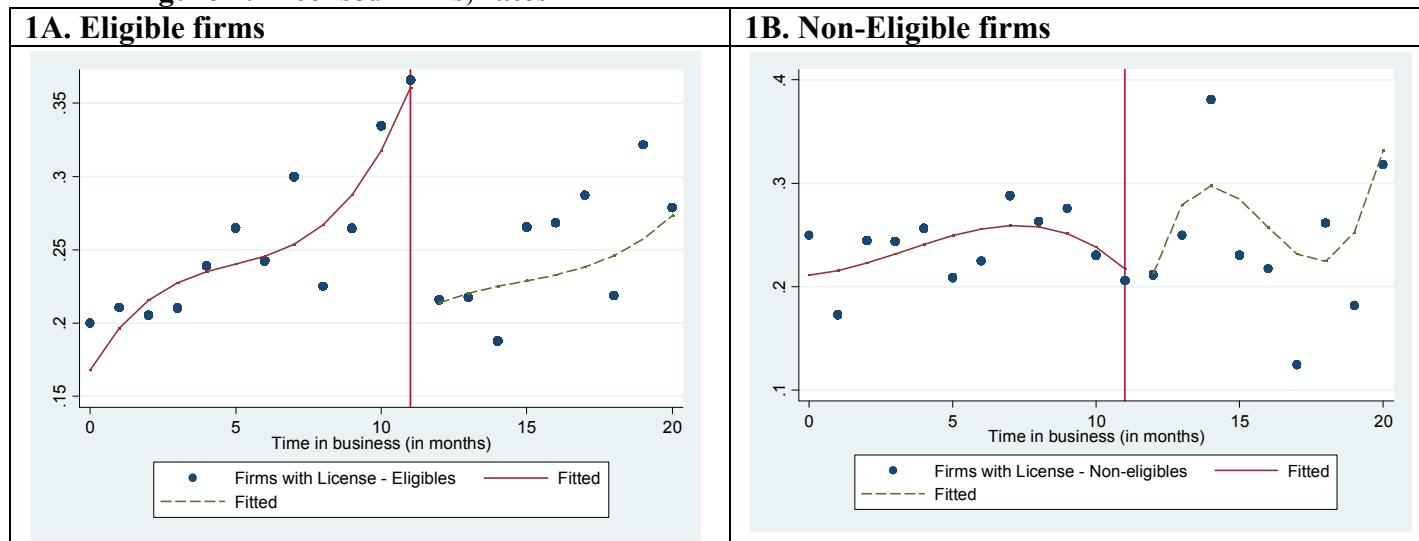
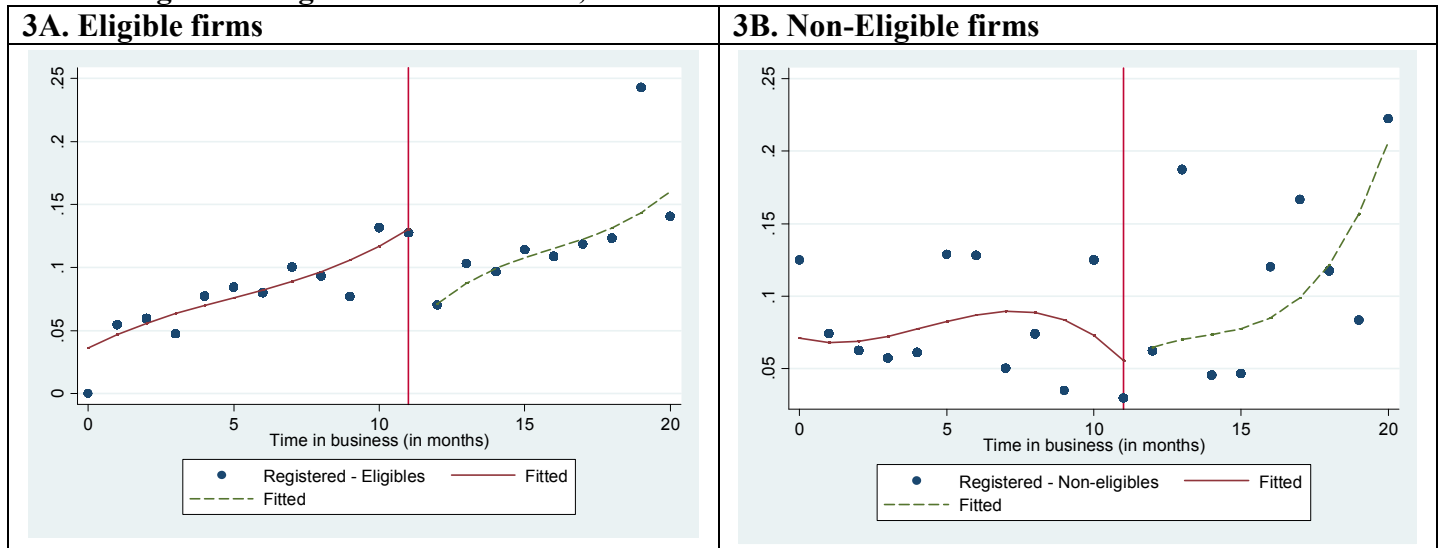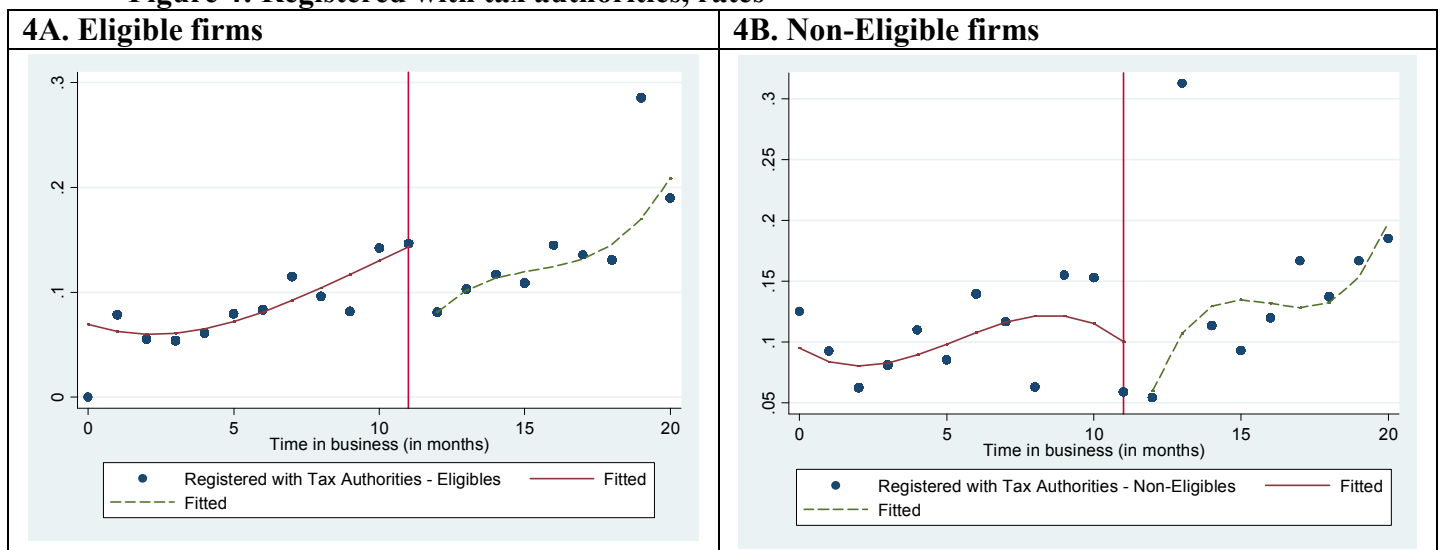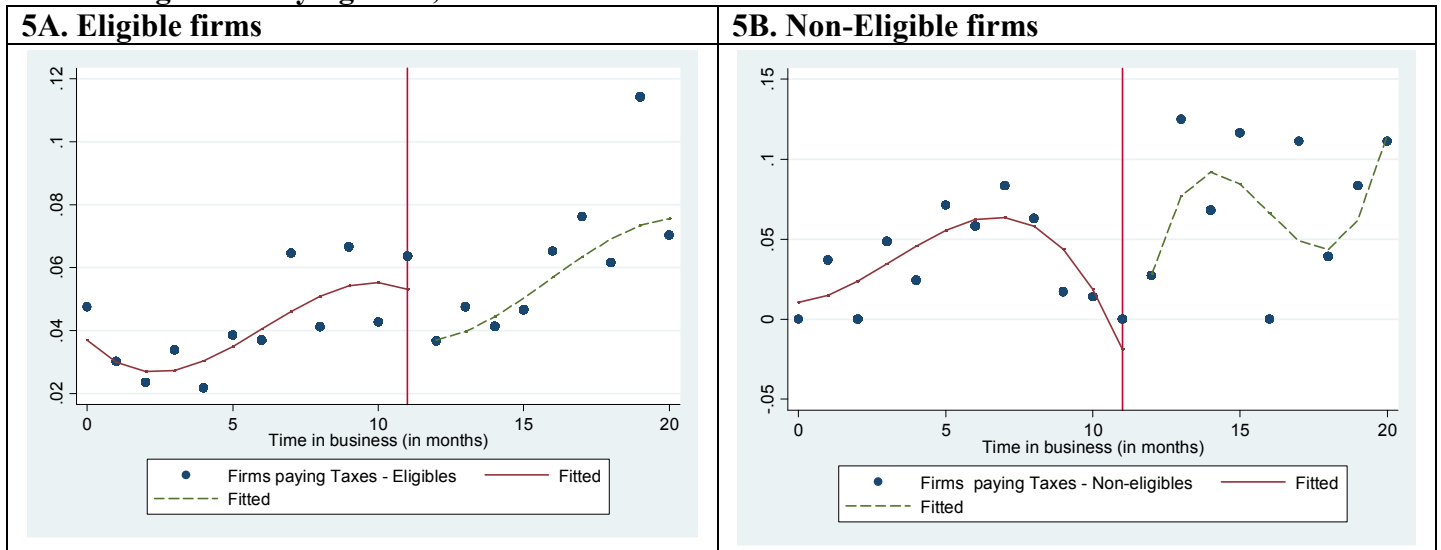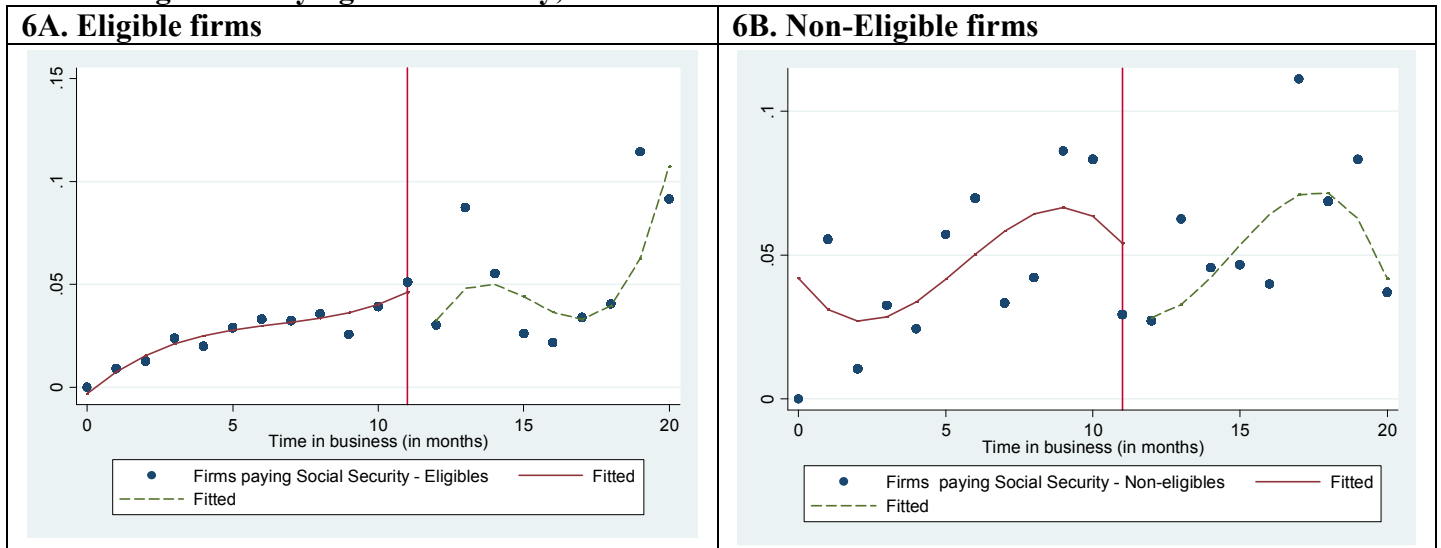| 1A. Eligible firms	1B. Non-Eligible firms

Notes: Authors' calculations using ECINF 1997 with firms born between February 1996
to October 1997. Entrepreneurs without College degree and 20-65 years old.

Figure 2: Legal status, rates
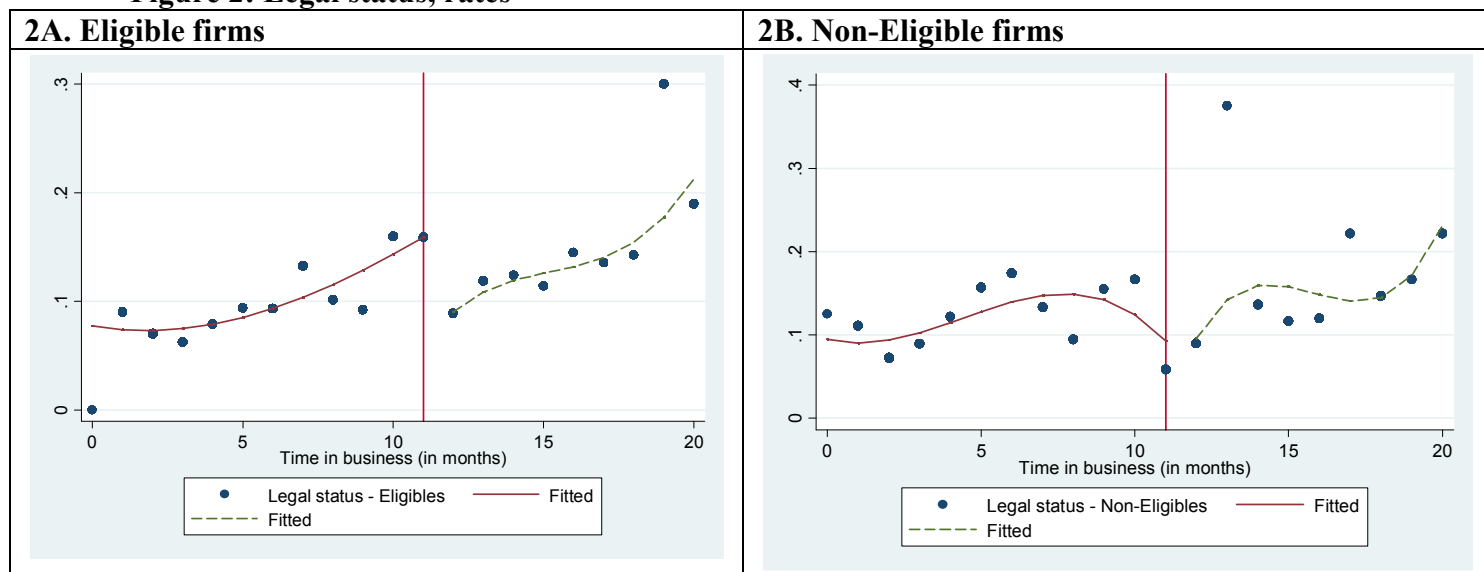
2A. Eligible firms	2B. Non-Eligible firms

Notes: Authors' calculations using ECINF 1997 with firms born between February 1996
to October 1997. Entrepreneurs without College degree and 20-65 years old.

Figure 3: Registered micro-firms, rates

3A. Eligible firms	3B. Non-Eligible firms

Notes: Authors' calculations using ECINF 1997 with firms born between February 1996 to October 1997. Entrepreneurs without College degree and 20-65 years old.

Figure 4: Registered with tax authorities, rates

4A. Eligible firms	4B. Non-Eligible firms

Notes: Authors' calculations using ECINF 1997 with firms born between February 1996 to October 1997. Entrepreneurs without College degree and 20-65 years old.

Figure 5: Paying taxes, rates

5A. Eligible firms	5B. Non-Eligible firms

Notes: Authors' calculations using ECINF 1997 with firms born between February 1996 to October 1997. Entrepreneurs without College degree and 20-65 years old.

Figure 6: Paying social security, rates

6A. Eligible firms	6B. Non-Eligible firms

Notes: Authors' calculations using ECINF 1997 with firms born between February 1996 to October 1997. Entrepreneurs without College degree and 20-65 years old.

Figure 7: First stage results with different bandwidths (License)
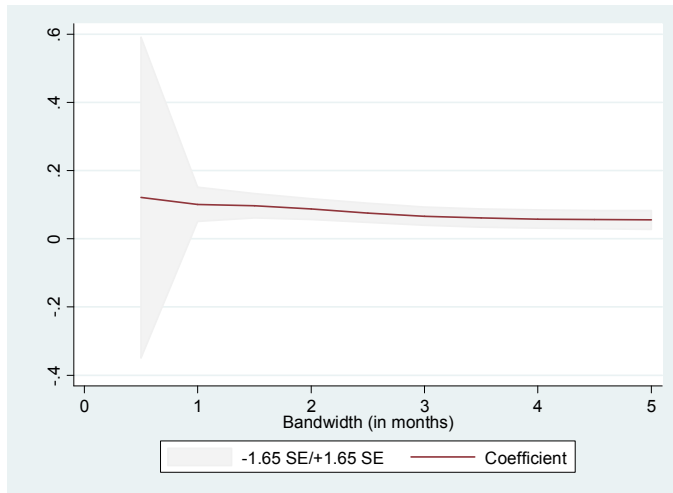
7A – All micro-firms - AFTER	7B – All micro-firms - AFTER x ELIG
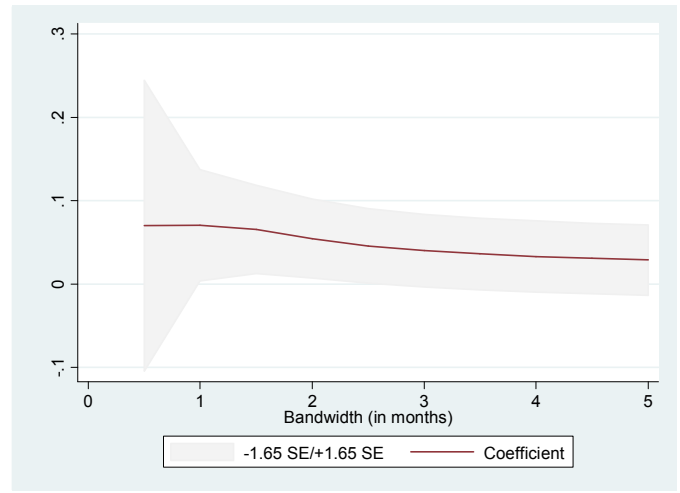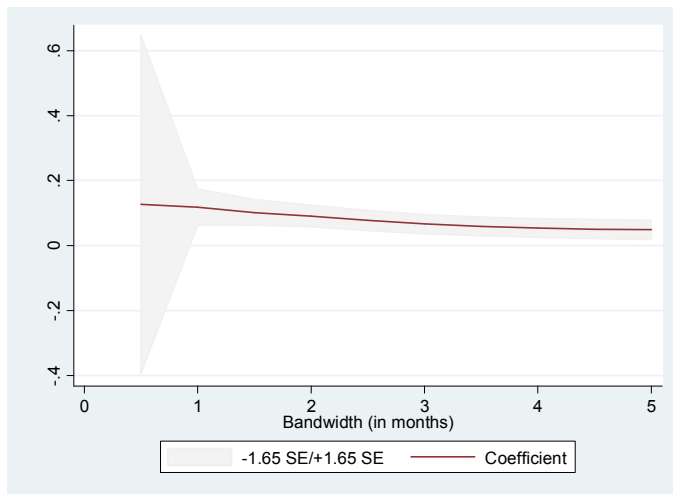
7C – Own-account workers - AFTER	7D – Own-account workers - AFTER x ELIG
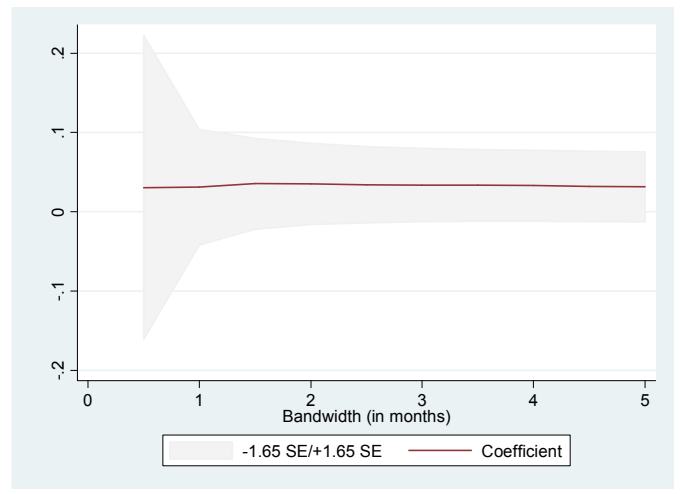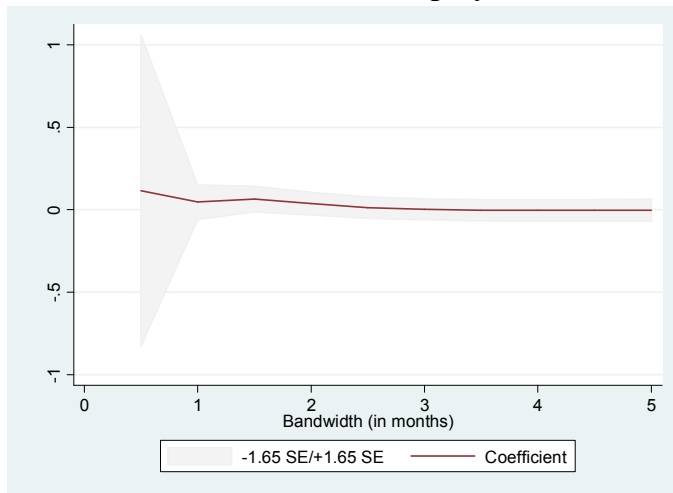
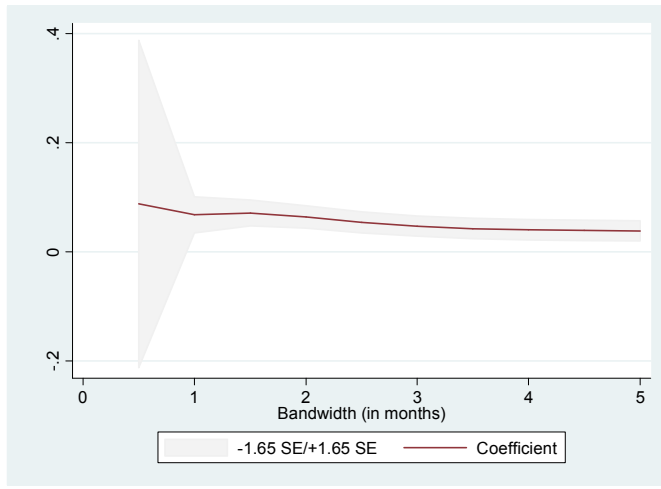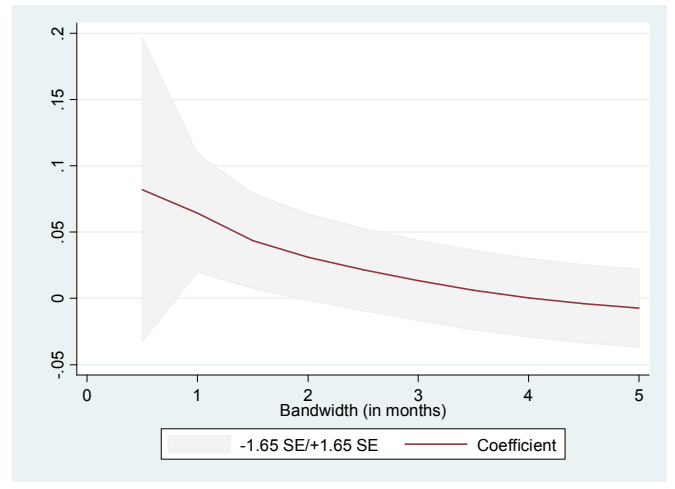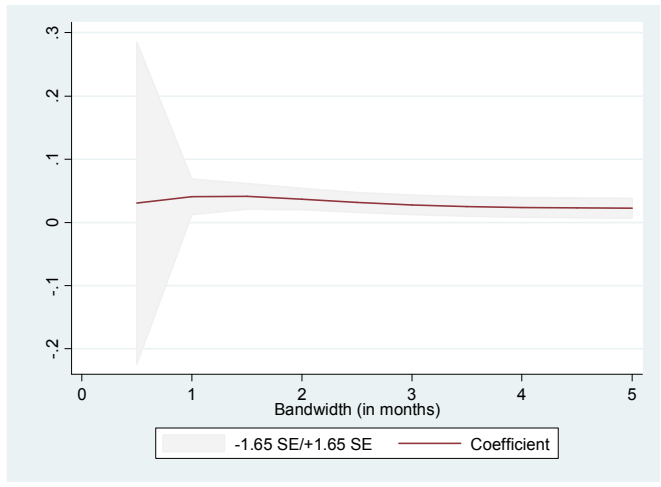| 7E – Firms with at least one employee - AFTER	7E – Firms with at least one employee - AFTER x ELIG
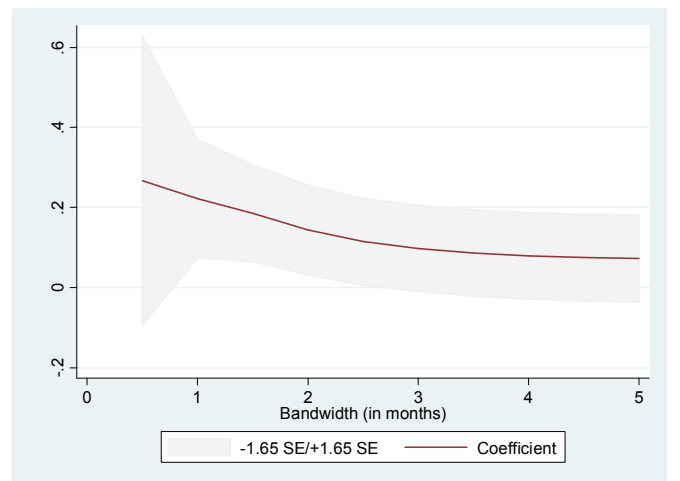
Figure 8: First stage results with different bandwidths (Legal status)
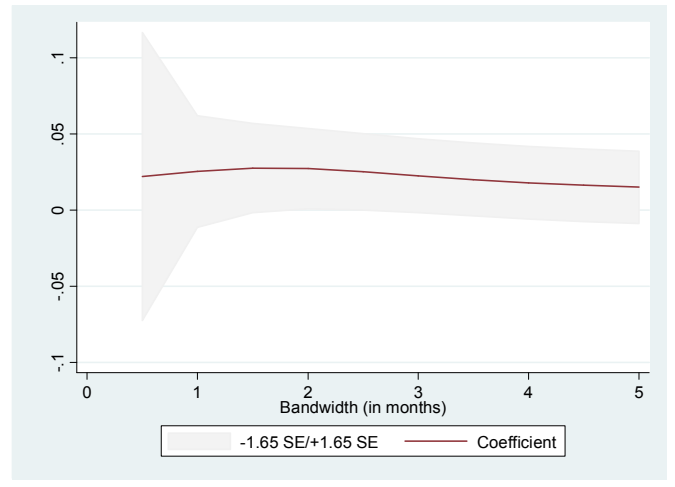
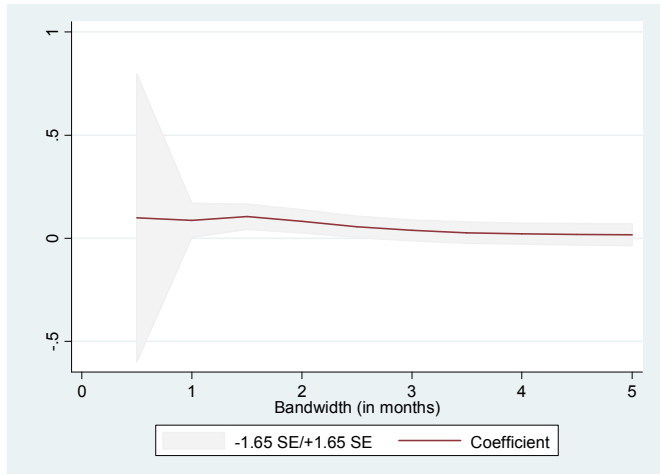| 8A – All micro-firms - AFTER	8B – All micro-firms - AFTER x ELIG

8C – Own-account workers - AFTER	8D – Own-account workers - AFTER x ELIG

8E – Firms with at least one employee - AFTER	8E – Firms with at least one employee - AFTER x ELIG