



Coming out of the shadows? Estimating the impact of bureaucracy simplification and tax cut on formality in Brazilian microenterprises[☆]

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ABSTRACT

This paper evaluates the impact of a program of bureaucracy simplification and tax reduction on formality among Brazilian microenterprises – the SIMPLES program. We document an increase of 13 percentage points in formal licensing among retail firms created after the program when compared to firms in ineligible sectors. The impact on retailers is robust to a series of tests. We find no impact on construction, transportation, services and manufacturing sectors.

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1. Introduction

In most countries, a substantial portion of the GDP is produced by the so-called shadow or underground economy. In Latin America, for example, the size of the informal sector relative to official GDP ranges from 25% to 50%. For OECD countries, underground activities account, on average, for 16% of GDP (Enste and Schneider (2000)).

A large body of literature addresses the measurement of the shadow economy. Many 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 Enste and Schneider (2000). However, less attention has been devoted to the causes and consequences of informality. Empirical evidence about key determinants is still very scattered due, predominantly, to the absence of data. As mentioned by Enste and Schneider (2000), “*gathering information about underground economic activity is difficult, because no one engaged in such activity wants to be identified*”.

This paper evaluates the effects of new bureaucracy simplification and tax reduction legislation for micro and small firms in Brazil – the

so-called SIMPLES system. The analysis of SIMPLES program offers a great opportunity to contribute to the literature on determinants of informality because the program promotes a sizeable reduction in tax burden and reduces the red tape involved in tax payments, and therefore bypassing cumbersome procedures that increase the costs of being formal.

Our evidence is based on a special cross-sectional survey of micro and small firms conducted in 1997, less than one year after the implementation of the program. This database along with the implementation of this new taxation in Brazil provides an opportunity for investigating the informal economy at the firm level.

The identification strategy is based on a few key aspects of the empirical environment. 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. By restricting the analysis to a single country, our empirical strategy is less subject to other changes in 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 – and we investigate the variation in the official registration of firms.

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 27% of the retailers which started-up before the program are licensed, this result represents a measurable reduction in unlicensed firms in

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the retail trade sector. The estimated impact on retailers holds after a series of robustness checks, accounting for differentiated time effects across groups, the possibility of split-ups, firm age measurement errors, time to formalize and sector or occupational changes.

The result that SIMPLES effect varies by economic sector is in line with previous indications that the requirements to enter and operate in the formal sector depend on the economic activity (see Capp et al. (2005), Farrell (2004), Paula and Scheinkman (2010)). Since SIMPLES promoted a partial reduction in the cost of being formal, it is possible that the incentives generated vary by sector. We discuss further in the paper why we find positive results just for the retail sector. In particular, we argue that the benefits of SIMPLES reform are clearer for retail firms. Transportation and construction firms face other important barriers to register and there is uncertainty over eligibility in the service and manufacturing sectors.

We are also aware that our empirical setting leaves open the possibility that the effect on the retail sector could be generated by a specific sectoral shock coincident with the SIMPLES reform. Therefore, in addition to the interpretation described above, one can argue that the SIMPLES reform had little significant impact, and that the effect on the retail sector is a statistical artifact generated by another simultaneous sectoral shock. Even after the robustness tests we provide, we are not able to rule out this possibility, especially because we cannot explore possible variations of the reform within our sample. Only future research, with better data, can shed light on these issues.

This paper contributes to the literature on determinants of formality. A first branch of this literature is primarily based on cross-country comparisons. Johnson et al. (1997) and Johnson et al. (1998) present evidence of close relationships between the size of the unofficial economy, taxes, quality of public goods, regulatory discretion, and corruption. Based on a sample of 69 countries and using an instrumental variable approach, Friedman et al. (2000) suggest that bureaucracy, corruption and a weaker legal environment are all determinants of the informal sector. However, they find that the tax rate has no effect on informality. Djankov et al. (2002), studying 85 countries, show that firms have significant entry costs, both in terms of time and monetary fees for registration and licensing, and that stricter entry regulation 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 diminishes when the fixed cost of market entry is reduced.

Recently, there is an emerging literature exploring firm-level data and within country variation to understand the causes and consequences of informality. McKenzie and Sakho (2010) argue that proximity to tax registration office increases the information a firm has about registration and, by using the distance of a firm to the tax office as an instrument, shows that registering to pay taxes leads to significantly higher profits among middle firms but a decrease in profits of small and large firms. Paula and Scheinkman (2010) show that formalization is affected by the tax structure in different value chains. Bruhn (2011) finds that an improvement in business entry regulation stimulates formality. By analyzing the economic effects of a reform that simplified business entry regulation in Mexico, she finds that the reform increased the number of registered businesses by 5%, which was driven mostly by former wage earners opening businesses. However, her results indicate that the program did not stimulate registration among existing informal firms. De Mel et al. (2011) find that simply providing information and reimbursing the cost of registration is not enough to lead firms in Sri Lanka to register. By conducting a field experiment which provided incentives to register to randomly selected informal sector firms, they show that only payments equivalent to one-half to one month profit leads to an increase in registration. Among the firms not registering after receiving the larger incentive, authors show they face issues related to ownership of land.

Taking all together, these studies suggest that the effect of a reform aiming to reduce to costs of formalization may be heterogeneous

among firms, depending on the economic and institutional environment. The specific constraints that prevent firms to become formal can vary across sectors and circumstances. Therefore, reforms that do not have a sufficient large scope may fail to increase formalization in some sectors. In this context, our results contribute to a better understanding of the determinants of formality – a joint effort of tax reduction and bureaucracy simplification is found to be effective in reducing informality in retail sector, although having no effect on construction, transportation, services and manufacturing.

The rest of the paper is organized as follows. Section 2 provides the institutional background of the SIMPLES reform. Data are presented in Section 3. The empirical strategy is presented in Section 4. Main results are depicted in Section 5, while a series of robustness checks are provided in Section 6. In Section 7, we discuss why the results are expected to vary by sector. Finally, we summarize our main findings in the conclusion.

2. Institutional background: the SIMPLES reform

The SIMPLES system (Sistema Integrado de Pagamento de Impostos e Contribuições das Microempresas e Empresas de Pequeno Porte) was enacted in December 1996 with the objective to reduce and simplify the tax system to micro and small firms. According to the Law, microenterprises are firms with an annual revenue equal to or lower than R\$ 120,000, while small firms are the ones with annual revenue up to R\$ 1,200,000.¹

The system combines six different federal taxes and social contributions into one single and monthly-based rate. The taxes included in the system are IRPJ (corporate income tax), PIS/PASEP (contribution to employees' savings programs), CSLL (contribution on net profit), COFINS (contribution for financing the social security system), IPI (industrialized products tax) and the employer's social security contribution. The system represents a partial simplification and reduction of the tax burden since firms still need to pay for other federal, state and municipal taxes.²

The Law also opens the possibility that states and municipalities collect their most important taxes, respectively, ICMS (value-added tax) and ISS (service tax), through the SIMPLES system. However, in October 1997 when our survey was carried out, only 45 municipalities in the country (out of 5565) have signed an agreement to collect ISS through the SIMPLES system.³ No Brazilian state adhered to the system in 1997. Apart from that, the system was set nationally and there is no variation across states or municipalities. In 2006, the government added the municipal and state taxes SIMPLES system (instead of simply allowed this possibility). With this modification, the incentives to adhere to the law can vary among states. Unfortunately, there is no survey that enables us to assess the impact of this second reform.

Table 1 presents a diagram that shows the tax and bureaucratic requirements that an entrepreneur needs to perform under the Brazilian regular tax system and the requirements of SIMPLES. Under the regular system, the burden of five taxes covered by SIMPLES (IRPJ, CSLL, COFINS, PIS and IPI) varies from 5% to 11% of gross revenue, depending on the economic activity. In addition, firms must contribute with 20% of the payroll to the social security.

On the other hand, firms under the SIMPLES system pay a single rate that varies from 3% to 5% of the total revenue for microenterprises and from 5.4% to 8.6% for small firms. The SIMPLES rates for microenterprises are the following: 3% of total revenue for firms with annual gross revenue up to R\$ 60,000; 4% for firms with annual

¹ The exchange rate in December 1996 was US\$ 1 = R\$ 1.0365. These limits were increased, respectively, to R\$ 240,000 and R\$ 2,400,000 in 2004.

² Federal taxes not included in the system include FGTS, employees' social security contribution (INSS dos empregados), IOF (financial operations tax), CPMF, ITR (land property tax) and II (Import tax).

³ Source: <http://www.receita.fazenda.gov.br/Pessoajuridica/SIMPLES/MunicipiosConveniados.htm>

Table 1
Cost and time to pay taxes.

		Monetary cost by sector					Months												Once a year
	Tax base	Retail trade	Construction	Transportation	Service	Manufacturing	1	2	3	4	5	6	7	8	9	10	11	12	
Regular system																			
Taxes																			
CSLL	Gross revenue	1.08%	1.08%	1.08%	1.08%	1.08%													
COFINS	Gross revenue	2%	2%	2%	2%	2%													
PIS	Gross revenue	0.65%	0.65%	0.65%	0.65%	0.65%													
IRPJ	Gross revenue	1.2%	4.8%	2.4%	2.4%	1.2%													
IPI	Value-added	0%	0%	0%	0%	0%–20%													
Total	Gross revenue	4.9%	8.5%	6.1%	6.1%	4.9%–10.9%													
Employer's INSS	Payroll	20%	20%	20%	20%	20%													
Red tape																			
DCTF			R\$ 500 fine for not filling in the form																
DACON			R\$ 500 fine for not filling in the form																
DIPIJ			R\$ 500 fine for not filling in the form																
DIPI						R\$ 500 fine													
DIRF			R\$ 500 fine for not filling in the form																
SIMPLES system																			
Taxes																			
SIMPLES	Gross revenue	3%–8.6%	3%–8.6%	3%–8.6%	3%–8.6%	3.5%–9.1%													
Red tape																			
DAS			R\$ 500 fine for not filling																

Note: This Table is based on several laws and instructions that regulate Brazilian tax system. The rates indicated are the ones in effect in October 1997. IPI is the tax that levies in industrialized products and its rate varies according to the product manufactured by the firm. To calculate total taxation in manufacturing sector, we considered that the type of product in our sample has an IPI rate that varies from 0% to 20% and assumed that 30% of the revenue of manufacturing firms is value added by the firm. Firms considered IPI taxpayers have a SIMPLES rate of 0.5% higher, even when the IPI rate is 0%. SIMPLES rate varies according to the following rule: 3% of the total revenue for firms with annual gross revenue up to R\$ 60,000; 4% for firms with annual revenue between 60,000 and 90,000; 5% for the ones with annual revenue between 90,000 and 120,000. For small firms, rates begin in 5.4% for the ones with annual revenue between 120,000 and 240,000 and increase by 0.4% for every additional R\$ 120,000 of annual revenue. Red tape refers to the forms that firms need to fill in to inform the Internal Revenue Service that they paid the taxes.

revenue between 60,000 and 90,000; 5% for the ones with annual revenue between 90,000 and 120,000. For small firms, rates begin in 5.4% for the ones with annual revenue between 120,000 and 240,000 and increase by 0.4% for every R\$ 120,000 of additional annual revenue. In our main sample, only two firms (out of 6127) have annual revenue above 60,000. The SIMPLES rate for most of our sample is 3%.

Table 1 also emphasizes that SIMPLES promoted a reduction in the red tape. Brazilian firms must report to the Internal Revenue Service that they paid specific taxes by filling specific forms on a frequent basis. Under SIMPLES system, five tax forms were substituted by one, which needs to be filled just once a year. The system did not change the procedure to register firms, which is specially cumbersome in Brazil as pointed out by Doing Business report (see WorldBank (2004)).⁴

The SIMPLES system does not affect all Brazilian micro and small enterprises. The economic activity performed by the firm determines whether it can apply to participate in the system or not. Real estate companies, developers, the financial sector, trading companies, advertising agencies, cleaning service firms and outsourcing companies are not eligible. In addition, SIMPLES system is not an option for firms that provide services which require professionals with regulated occupations such as dentists, physicians, auditors, architects, engineers, journalists, actors, sales representative, musicians and others.

By the time the law was enacted and the data were collected the following activities were clearly included in the system: retail trade, manufacturing which does not require a professional with a regulated occupation, transportation, civil construction and other services which do not require a professional with a regulated occupation. According to official data,⁵ 2/3 of formal Brazilian firms used the SIMPLES system

in 1997. This percentage remained barely unchanged in the following years. The appendix presents the economic activities in our database that 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.⁶

We should emphasize that this exercise to classify firms as eligible and ineligible is not straightforward for the service and manufacturing sectors. The main problem is that the law does not state explicitly which activities 'require professionals with regulated occupations'. Indeed, the Internal Revenue Service has disclosed several pieces of legislation and normative acts since the Law was enacted to determine whether specific activities are eligible or not. In practice, many firms have the confirmation of the adhesion to the system only after their processes have been analyzed and approved by the Internal Revenue Service. For an idea of how uncertain was the eligibility status for some activities, firms that provide services of maintenance and repair of vehicles, machines, computers and home appliances were initially considered not eligible because they were associated with the engineering profession, although it is hard to believe that an engineer works in a auto repair firm. In 2004, the government reviewed that restriction and allowed these firms to adhere SIMPLES.

In this paper, we use the classification criteria in effect by the time the database was collected (October 1997). However, for many firms in the service and manufacturing sectors the eligibility status depended on the interpretation of the Law by the firm's owner, his accountant (who suggests the tax system and does the application) and the Internal Revenue Service. This can challenge the analysis for service and manufacturing sectors as discussed in Section 7.

⁴ Recently, several municipalities and states tried to simplify the procedures or/and create one-stop-shops to facilitate formalization. We are not aware of any initiative of this type which were in place in 1997 that could be used in our analysis.

⁵ Secretaria da Receita Federal (Internal Revenue Service), Coordenação-Geral de Estudos Econômico-Tributários.

⁶ Other firm's characteristics also affect their eligibility. Firms listed in the stock markets, which have a foreign partner that lives abroad or partly owned by another company are not eligible to the system. We don't have information on whether the firms in our sample have these characteristics or not. But we don't think it is a concern due to the type of entrepreneur under analysis.

Table 2
Summary statistics of eligible and ineligible firms.

	Total	Ineligible		Eligible	
	Mean	Mean	SE	Mean	SE
	(1)	(2)	(3)	(4)	(5)
<i>Dependent variable</i>					
Licensed firm	0.24	0.26	(0.02)	0.23	(0.01)
<i>Characteristics of the owner</i>					
Primary education	0.58	0.37	(0.03)	0.65	(0.01)
Secondary education	0.25	0.32	(0.02)	0.23	(0.01)
College degree	0.11	0.28	(0.02)	0.05	(0.01)
Age	35.17	33.56	(0.53)	35.77	(0.34)
Male	0.64	0.58	(0.03)	0.66	(0.01)
Owens his house	0.72	0.68	(0.02)	0.74	(0.01)
Has another job	0.11	0.15	(0.02)	0.09	(0.01)
<i>Characteristics of the firm</i>					
Total assets	3544.51	4638.38	(1968.74)	3135.00	(277.99)
Did not declare assets	0.35	0.38	(0.02)	0.34	(0.01)
Revenue	883.31	876.63	(79.50)	885.82	(66.97)
Located out of owners' house	0.61	0.58	(0.03)	0.62	(0.01)
Sell to other firms and government	0.14	0.21	(0.02)	0.12	(0.01)
Startup was financed by the owner	0.49	0.40	(0.03)	0.53	(0.01)
Has non-paid employees	0.05	0.01	(0.00)	0.06	(0.00)
Employs owner's relatives	0.10	0.04	(0.01)	0.13	(0.01)

Note: This table presents the means and standard-errors of the main variables used in our analysis. Column 1 shows the mean for the whole sample and columns 3–4 and 5–6 present the means and standard errors for ineligible and eligible firms.

3. Data

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

The survey was conducted by using 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 that its head was employed in the 1991 Demographic Census. In the second round, heads of households who were self-employed or small employers (with less than 5 employees) were stratified according to their economic activity and selected with respect to uniform probability in each strata.

The key definition in our analysis is informality. According to Gerxhani (2004), 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 an official license, issued by a state or a municipality authority. 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% of the firms in our sample held official licenses. Our study does not address labor informality. The registration of wage workers, for example, is not our focus here and thus we restrict our sample to firms without a payroll.

Another characteristic of our sample is that all firms that were created more than 20 months before the survey are excluded.⁷ 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 the government), origin of the financial resources invested, compliance with different governmental registrations and others. About owners, the dataset has information on gender, educational level, age, and time when s/he started the business.

About 40% of the firms in the sample have not indicated their asset value. Thus, to avoid losing information, we created 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.

4. Identification strategy

Our empirical analysis aims to evaluate the effect of SIMPLES system on firms' formality. As mentioned before, the outcome variable is a binary one indicating the possession of an official license. Ideally, we would like to compare the probability of ineligible 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 as either facing the program or not, but not both. As a consequence, constructing the counterfactual is the central issue in the analysis.

Our main strategy relies on the use of ineligible 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 ineligible 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 ineligible firms in the *comparison group*.

Another important issue in the analysis is the time dimension. Firms in the treatment group may exhibit structural and significant differences when contrasted with 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 for building 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 a firm's age is controlled in our strategy. Firms in the treatment and control groups are assumed to share the same aggregate shocks affecting their decision to register.

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 lack of information. However, based on the 2003 edition of the same survey, Table 3 shows strong evidence in this direction.⁸ Almost 90% of the owners of unlicensed firms did not try to formalize their business at the startup. This percentage is reduced to 24% in the case of licensed firms. For approximately 3/4 of licensed firms, formalization occurred when they were starting-up. This evidence suggests a strong correlation between current legal status and formalization attempts at startup.

The possibility that formalization is not decided at the startup introduces a potential negative bias in our analysis. Eligible firms created before the law still face a decision whether to formalize or not

⁸ ECINF/2003 is a more recent edition of the survey conducted in 1997, with a more comprehensive questionnaire. The newer edition was based on the same procedures of the 1997 edition, with the same sample design.

⁷ Firms with more than 20 months are considered in the robustness checks of Section 5.

Table 3
Obstacles and attempt to 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

Note: This table is based on ECINF/2003 which is a more recent edition of the survey conducted in 1997, with a more comprehensive questionnaire. The newer edition was based on the same procedures and sample design of the 1997 edition, which is the one used in the rest of the paper. 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). All statistics are expanded through the sample weights. The total sample used in the table comprises 47,196 firms. 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.

their activities afterwards. In other words, the SIMPLES law might increase the formalization of eligible firms created before December 1996. Consequently, when we compare eligible firms created afterwards 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 figure 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 comparisons between firms in eligible and ineligible sectors, created before and after the new legislation. In this sense, we face two usual and important assumptions of any difference-in-differences analysis. First, we assume that there are common time trends across groups – firm's age has the same effect on eligible and ineligible firms. Second, we assume there are no systematic changes within groups. We address these issues and other concerns in Section 6, which provides several robustness checks.

Descriptive statistics of observable characteristics of eligible and ineligible firms and their owners are also presented in Table 2.

5. Empirical results

Our starting point is an unconditional analysis with raw data. Table 4 shows the percentage of firms holding official licenses in different groups. 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 different sectors.

Columns 1 and 4 indicate the number of firms in the sample that were created before and after SIMPLES reform. The first group is composed by firms which are in operation for 11 up to 20 months and the second group is formed by young firms which had less than 10 months of operation in October 1997. We observe that there is a higher number of young firms, which may reflect the high mortality rate among microenterprises in Brazil. The number of young firms is approximately 35% higher than the number of older firms in the retail and manufacturing sectors and also in the comparison group. Transportation and service sectors are exceptions in this pattern. While the number of young firms is relative the same of the older firms in the transportation sector, it is almost 50% higher in the service sector.

Table 4 presents a decrease in the proportion of licensed firms both in the comparison and treatment groups (columns 2 and 5).

Table 4
Number and percentage of licensed firms created before and after the program by sector.

	Created before SIMPLES			Created after SIMPLES			All firms	
	N	% licensed	SE	N	% licensed	SE	N	% licensed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Comparison	623	0.28	(0.04)	864	0.24	(0.03)	1487	0.26
Treatment	2020	0.25	(0.02)	2648	0.22	(0.02)	4668	0.23
Retail	513	0.27	(0.04)	689	0.36	(0.03)	1202	0.32
Construction	275	0.11	(0.07)	329	0.05	(0.02)	604	0.08
Manufacturing	237	0.28	(0.08)	329	0.11	(0.03)	556	0.18
Transportation	398	0.37	(0.04)	418	0.39	(0.05)	816	0.38
Services	597	0.25	(0.03)	883	0.20	(0.02)	1480	0.22
Total	2643	0.26	(0.02)	3512	0.23	(0.01)	6155	0.24

Note: This table reports the number of firms in our sample and the percentage of licensed firms before and after the program by sector. The first two lines correspond to the comparison group (ineligible firms) and the treatment group (eligible firms), while the following five lines disaggregate the treatment group into economic sectors. A licensed firm is the one which holds a municipal or state license. The percentage of licensed firms and the standard errors were computed using the sample weights.

This is expected because 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. Younger firms in the comparison group (ineligible firms) have a lower formalization rate (24%) than older firms in this group (28%). Firms in the treatment group (eligible firms), on the other hand, have a license rate 3 percentage points lower (25% versus 22%). This first approximation indicates that the new legislation increases formalization of eligible firms, on average, by 1 percentage point.

Formalization is also an issue of multiple aspects. Effective tax rates and regulatory costs usually differ from sector to sector. Some sectors are more prone to informality because of tax rates, while other sectors are more informal because of strict operational obligations, such as sanitary and environmental requirements, quality control, safety measures, copyright rules and so on. Thus, the causes of informality can vary considerably among different sectors. Indeed, when the treatment group is disaggregated into sectors, significant differences are uncovered. Retailers, for example, expanded licensing by 9 percentage points, from 27% to 36%, suggesting that the SIMPLES program increases by 13 percentage points the formalization of such firms.

However, the results of Table 4 might be driven by the characteristics of the firms and their owners. In order to account for such variation, we carry out a linear regression analysis. The basic difference-in-differences (DID) estimates of the introduction of SIMPLES on formality of firms are based on the following equation for a firm i :

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

where Z_i is a binary variable indicating whether firm i is licensed; $I_i^{\{after\}}$ denotes whether firm i was created after December 1996; $I_i^{\{eligible\}}$ represents whether firm i is eligible for the SIMPLES; and X_i is a vector of observed characteristics. Notice that Eq. (1) is a linear probability model, which provides easier interpretations for the marginal effects on the probability of licensing.⁹ 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.

⁹ 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).

Table 5
Difference-in-difference estimates.

	All sectors	Retail trade	Construction	Manufacturing	Transportation	Services
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A – Self-employed entrepreneurs</i>						
Eligible created after SIMPLES (Y_{TC})	0.032 (0.041)	0.130 (0.046)***	0.004 (0.034)	–0.116 (0.113)	0.048 (0.070)	0.020 (0.037)
Eligible (Y_C)	0.005 (0.050)	0.045 (0.049)	–0.201 (0.047)***	0.094 (0.094)	0.046 (0.085)	0.050 (0.057)
Created after SIMPLES (Y_T)	–0.051 (0.035)	–0.054 (0.036)	–0.055 (0.035)	–0.054 (0.036)	–0.044 (0.035)	–0.050 (0.036)
Observations	5911	2517	2033	1988	2242	2871
R^2	0.156	0.176	0.226	0.215	0.205	0.203
<i>Panel B – Self-employed entrepreneurs and firms with up to 5 employees</i>						
Eligible created after SIMPLES (Y_{TC})	0.007 (0.032)	0.093 (0.043)**	–0.027 (0.030)	–0.095 (0.088)	–0.006 (0.060)	0.005 (0.031)
Eligible (Y_C)	–0.014 (0.049)	0.071 (0.054)	–0.200 (0.042)***	0.045 (0.073)	0.044 (0.091)	0.048 (0.054)
Created after SIMPLES (Y_T)	–0.016	–0.019	–0.022	–0.019	–0.014	–0.019
Observations	8408	2892	2280	2352	2515	3285
R^2	0.203	0.231	0.256	0.242	0.217	0.239
Owner's characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm's characteristics	Yes	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports OLS coefficients of Eq. (1) where the dependent variable is a binary variable indicating whether the firm holds a state or municipal license. All regressions control for firm's owner characteristics (dummies indicating primary education level, secondary education level, college degree, age, gender, lives on his/her own house, has other job), characteristics of the firm (total assets, annual revenue, and dummies indicating non-declaration of assets, location out of owner's house, sales to other firms and government, startup was financed by the owner, non-paid employees in the firm, relatives employed in the firm), and 27 state dummies. The sample used varies across the columns and panels. Panel A includes only firms without employees, while panel B includes both firms managed by self-employed entrepreneurs and firms with up to five employees. Column 1 shows the results when we include all economic sectors. Columns 2 to 6 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 ineligible firms and the set of eligible firms in the correspondent sector. Robust standard errors clustered at economic activity are reported in parentheses.

*** Significantly different than zero at 99%.

** Significantly different than zero at 95%.

Table 5 presents different estimates for Eq. (1). All regressions controls for the whole set of observed characteristics described in Table 2. In Panel A, we show the results when we consider just firms managed by self-employed entrepreneurs, which is our baseline sample. Column 1 corresponds to the full sample estimate with all economic sectors, while columns 2 to 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 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_C and γ_T represent the differences in licensing among eligible and ineligible firms and between firms created before and after the new legislation, respectively. Table 5 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_C and γ_T are not significantly different from 0, with the only exception being γ_C for construction.

Considering the sectors altogether, 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. Panel B shows that the results are essentially the same when we include in the sample firms which have up to five employees. Again, the results indicate that formalization increased only among firms in the retail sector, though the effect is reduced to an increase in 9 percentage points in licensing.

In addition to vary by sector, the incentives that SIMPLES provide may change according to firms' profile. On the one hand, larger firms and the ones located outside owner's house may be more keen to formalize since they are more visible and easier to be monitored by the government. On the other hand, smaller firms and the ones located in the owner's house compose a group that have few incentives to become formal in the regular system and can be specially stimulated by the new system to enter formality.

Table 6 analyzes the profile of the retailers at the margin of becoming formal by showing the results of the following regression:

$$Pr(Z_i = 1|X_i) = \gamma_T I_i^{\{after\}} + \gamma_C I_i^{\{eligible\}} + \gamma_{TC} I_i^{\{after\}} I_i^{\{eligible\}} + \gamma_{TCW} I_i^{\{after\}} I_i^{\{eligible\}} W_i + \alpha W_i + \beta' X_i, \quad (2)$$

where W_i is a interaction variable that indicates a firm's characteristic.

In the first three columns, we consider alternative measures of firm's size. In column 1, we analyze whether the effect of SIMPLES on formalization is larger for firms which have 1 to 5 paid employees,¹⁰ while in columns 2 and 3 we investigate whether there is a differential effect for firms with larger annual revenue and assets, respectively.

The results in column 1 show that, although firms with paid employees have a higher probability of holding a license, they are not specially stimulated by SIMPLES to obtain a municipal or state license.¹¹ Results from columns 2 and 3 reinforce the idea that SIMPLES

¹⁰ ECINF survey only interviews firms with up to 5 employees.

¹¹ Additional exercises also show that SIMPLES does not increase formalization of workers among firms with paid employees (results not shown and available upon request).

Table 6
Decomposition of the effect on retailers.

Dependent variable	Firm holds official license				
	Employer	Annual revenue	Assets	Located outside owner's house	Sell to firms or government
Interaction variable	(1)	(2)	(3)	(4)	(5)
Eligible created after SIMPLES (Y_{TC})	0.100 (0.043)**	0.144 (0.044)***	0.126 (0.047)***	0.189 (0.062)***	0.165 (0.054)***
Eligible created after SIMPLES *interaction variable	−0.059 (0.054)	−0.001 (0.001)	0.004 (0.003)	−0.103 (0.076)	−0.330 (0.145)**
Eligible (Y_C)	0.065 (0.050)	0.044 (0.047)	0.044 (0.049)	0.047 (0.046)	0.053 (0.046)
Created after SIMPLES (Y_T)	−0.028 (0.030)	−0.048 (0.038)	−0.050 (0.037)	−0.050 (0.037)	−0.051 (0.037)
Interaction variable	0.299 (0.035)***	0.001 (0.001)	0.193 (0.000)***	0.041 (0.041)***	−0.009 (0.040)
Owner's characteristics	Yes	Yes	Yes	Yes	Yes
Firm's characteristics	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Observations	2892	2517	2517	2517	2517
R^2	0.254	0.175	0.175	0.177	0.183

Note: This table reports OLS coefficients of Eq. (2) where the dependent variable is a binary variable indicating whether the firm holds a state or municipal license. The second line shows the coefficient of the interaction term of the dummy indicating the effect of SIMPLES and a variable indicated in the columns. Employer indicates whether the firm has from 1 to 5 employees. Annual revenue is the total value of revenues accumulated in the last 12 months. Assets indicate the value of equipments, tools and buildings owned by the firm. Located outside owner's house indicates whether the firm does not operate in owner's house. Sell to firms or government indicates whether the firm has other firms and/or the government in its client base. All regressions control for firm's owner characteristics (dummies indicating primary education level, secondary education level, college degree, age, gender, lives on his/her own house, has other job), characteristics of the firm (total assets, annual revenue, and dummies indicating non-declaration of assets, location out of owner's house, sales to other firms and government, startup was financed by the owner, non-paid employees in the firm, relatives employed in the firm), and 27 state dummies. In column 1, the sample comprises all retail firms and ineligible firms managed by self-employed entrepreneurs or employers. The sample in columns 2 to 5 includes only retail firms and ineligible firms managed by self-employed entrepreneurs. Robust standard errors clustered at economic activity are reported in parentheses.

*** Significantly different than zero at 99%.

** Significantly different than zero at 95%.

* Significantly different than zero at 90%.

does not have a differential effect on larger firms. These results might be determined by the fact that almost all firms in our sample have annual revenue less than R\$ 60,000 and, consequently, face the same (and lowest) tax rate. In column 4 we analyze whether firms located outside the owner's house are more affected by the SIMPLES system, since they have higher exposure to inspections and monitoring. The coefficient of the interaction is not statistically significant. Finally, column 5 looks at whether SIMPLES has a differential effect on firms that sell to other firms and government, which are clients that usually demand a tax receipt. The results indicate that SIMPLES actually reduce the probability of this group of firms to obtain a license. This result, however, should be interpreted with caution because it is identified by a small number of firms. Only 68 out of 1,086 firms, or 7% of the sample, sell to this type of clients and among these firms only 19 have a license.

Taken together, the results from Table 6 do not indicate that SIMPLES has a differential effect on firms that are more likely to demand formalization because of their customer base or their exposure to inspection.

We now decompose the impact according to the previous occupations and sectors. This exercise not only sheds light on the nature of the changes induced by the reform, but also contributes to a better characterization of potential selection bias in our analysis. The SIMPLES system improves the business environment of eligible sectors relative to ineligible ones. Thus, the new tax regime may stimulate entrepreneurs to switch from an ineligible sector to an eligible one. This switch would not be very difficult since the sectors which are affected by the reform do not require special skills.¹² Food retailers, garment manufacturing, transportation and food services are highly represented among eligible firms in our sample. If this switching is happening, the difference-in-differences estimator might not reflect any improvement in formalization but rather a reallocation among sectors. The same argument can also be applied to occupations.

In Table 7, we interact the binary variable which indicates that the firm was created after SIMPLES law and is from the retail sector with owner's position in his previous occupation (column 1) and the economic sector the owner used to work (column 2). We follow the same econometric specification of Eq. (2).

Column 1 in Table 7 analyzes how the estimated impact of the SIMPLES reform on retailers varies according to the previous occupation. Column 1 shows that firms whose owners were self-employers and employers in previous occupation are more affected by the SIMPLES when compared to the other occupations. A test of equality of coefficients shows that the effects on self-employers and employers in previous occupation are statistically the same, but different from the effect on non-workers.

Sector transitions are considered in column 2 of Table 7. There is no statistically significant difference between the impact on firms whose owners were retailers and impact on firms whose owners were non-retailers in their previous business. The point estimate of the two is quite similar, although only the coefficient of non-retail is significantly different from zero.

Table 7 suggests that the increased formalization induced by the SIMPLES reform is not likely to be determined by transitions between occupations or sectors. This evidence reinforces the numbers presented in Table 4, which show that the change in the number of retailers created before and after the reform is similar to the change in the number of firms in the comparison group.

6. 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 of the following exercises 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.

¹² We thanks an anonymous referee to point out this issue.

Table 7
Occupational choice and sector transitions.

Dependent variable	Firm holds official license	
	Previous occupation	Previous sector
	(1)	(2)
Eligible created after SIMPLES (Y_{TC})*		
Past job: nonworkers	0.04 (0.06)	
Past job: employee	0.11 (0.06)*	
Past job: self-employed	0.19 (0.05)***	
Past job: employer	0.27 (0.13)**	
Past sector: retail trade		0.11 (0.08)
Past sector: non-retail		0.13 (0.05)**
Owner's characteristics	Yes	Yes
Firm's characteristics	Yes	Yes
State dummies	Yes	Yes
Observations	2517	2459
R ²	0.18	0.18
P-value for test of equality between coefficients		
Nonworkers vs employee	0.35	
Nonworkers vs self-employed	0.04	
Nonworkers vs employer	0.07	
Employer vs employee	0.27	
Employer vs self-employed	0.59	
Employee vs self-employed	0.22	
Retail vs non-retail		0.83

Note: This table reports OLS coefficients of Eq. (2) where the dependent variable is a binary variable indicating whether the firm holds a state or municipal license. Past job indicates firm's owner position in his previous occupation. Nonworkers are people who were previously unemployed or out of the labor force. Past sector indicates the sector that the firm's owner worked in his previous occupation. All regressions control for firm's owner characteristics (dummies indicating primary education level, secondary education level, college degree, age, gender, lives on his/her own house, has other job), characteristics of the firm (total assets, annual revenue, and dummies indicating non-declaration of assets, location out of owner's house, sales to other firms and government, startup was financed by the owner, non-paid employees in the firm, relatives employed in the firm), and 27 state dummies. The sample comprises retail firms and all ineligible firms. Robust standard errors clustered at economic activity are reported in parentheses.

*** Significantly different than zero at 99% confidence.

** Significantly different than zero at 95% confidence.

* Significantly different than zero at 90% confidence.

6.1. 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 5 could be associated with differences in firm age rather than with the SIMPLES program.

In order to take this possibility into consideration, we re-estimate the equation using 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 also expect 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.

Although this exercise corroborates the key identification hypothesis, it does not rule out the possibility that the retail sector experienced an idiosyncratic shock between December 1996 and October 1997 that induced more formalization. This would explain why we only measure an effect in the retail sector and would imply that

Table 8
Robustness checking.

	Retail trade	Year before	Splitting-up	Memory/focus on 12 months	Time to formalize
	(1)	(2)	(3)	(4)	(5)
Eligible created after SIMPLES (Y_{TC})	0.13 (0.05)***	−0.01 (0.08)	0.14 (0.05)***	0.15 (0.08)*	0.14 (0.06)**
Eligible (Y_C)	0.04 (0.05)	0.04 (0.05)	0.01 (0.05)	0.09 (0.08)	0.02 (0.06)
Created after SIMPLES (Y_T)	−0.05 (0.04)	0.07 (0.05)	−0.06 (0.04)	−0.06 (0.06)	−0.04 (0.05)
Owner's characteristics	Yes	Yes	Yes	Yes	Yes
Firm's characteristics	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Observations	2517	1493	2404	1397	1540
R ²	0.17	0.19	0.15	0.15	0.22

Note: Each column in the table represents the least square estimate of Eq. (1) in the text considering different contexts for the sake of robustness. The regression for the retail trade sector is reproduced from Table 5 in column 1. Columns 2 to 5 refer to different falsification tests that are explained in Section 6. All regressions control for firm's owner characteristics (dummies indicating primary education level, secondary education level, college degree, age, gender, lives on his/her own house, has other job), characteristics of the firm (total assets, annual revenue, and dummies indicating non-declaration of assets, location out of owner's house, sales to other firms and government, startup was financed by the owner, non-paid employees in the firm, relatives employed in the firm), and 27 state dummies. The sample comprises retail firms and all ineligible firms. Robust standard errors clustered at economic activity are reported in parentheses.

*** Significantly different than zero at 99% confidence.

** Significantly different than zero at 95% confidence.

* Significantly different than zero at 90% confidence.

SIMPLES does not induce formalization. Even though we are not aware of any specific shock like this, we cannot rule out this hypothesis and a skeptical reader may read our results as an evidence that SIMPLES does not have much impact on microenterprises' decision to register.

6.2. Splitting-up

The SIMPLES system is restricted to small and microenterprises – firms with an annual revenue below thresholds of R\$120,000 and R\$1,200,000, respectively. Since the tax reduction decreases with firms revenue, 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.

We believe this sort of bias seems to be of a second order and negligible in our sample because less than 1% of firms created before SIMPLES had an annual revenue above R\$ 120,000. This proportion remained unchanged after SIMPLES. In any case, we econometrically assess this issue by restricting the analysis to households which own only one firm. As shown in column 3 of Table 8, the result remains unaltered. The underlying assumption behind this exercise is that, in case of new firms are created, they are owned by someone who lives in 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.

6.3. 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 if multiples of 12 months are focal answers.

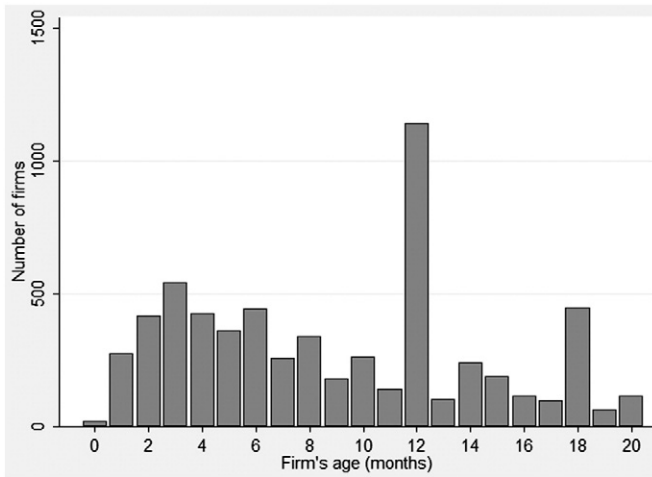


Fig. 1. Distribution of firms' age.

Fig. 1 shows spikes in the percentage of firms with reported ages of 12 and 18 months. In particular, 19% of firms in our sample reported exactly 12 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 Eq. (1) excluding 1,120 firms (44% of the sample) aged between 7 months and 14 months. Again, the result is virtually the same: SIMPLES increases by 15 percentage points the probability of holding a formal license.

6.4. Time to formalize

Column 5 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 tiny increase in the estimated effect, which becomes 14 percentage points. This suggests that the bias due to the time to formalize is negative, as expected, but not economically important.

6.5. Selection of owners

Another potential source of selection bias is a potential effect of the SIMPLES reform on the profile of firms' owners. Since the SIMPLES reform has affected the business environment, it could change the willingness of different types of entrepreneurs to start new businesses. Therefore, our results could reflect a new composition of entrepreneurs (potentially more prone to open formal business) rather than the impact of the new tax regime on formalization.

Table 9 analyzes whether the average profile of the entrepreneur who opens a firm in each sector changed before and after SIMPLES law. The structure of the table is as following. The lines depict a set of owner's characteristic under analysis and the columns show the percents of owners in each sector with that particular characteristic.

Except by the age, there is no systematic statistical difference in the average owners' characteristic between firms opened before and

Table 9
Firms' owners profile before and after SIMPLES reform.

Owners' characteristics	Sectors in the treatment group						
	Created before or after SIMPLES	Retail	Construction	Manufacturing	Transportation	Services	Comparison group
Primary education	Before	0.51	0.87	0.67	0.63	0.61	0.37
	After	0.57	0.80	0.65	0.59	0.66	0.38
	Diff (A-B)	0.06	-0.06	-0.02	-0.04	0.05	0.02
Secondary education	Before	0.32	0.06	0.25	0.27	0.26	0.31
	After	0.30	0.09	0.22	0.26	0.22	0.33
	Diff (A-B)	-0.03	0.03	-0.03	-0.01	-0.04	0.02
College degree	Before	0.09	0.01	0.03	0.02	0.03	0.29
	After	0.05	0.00	0.09	0.08	0.05	0.26
	Diff (A-B)	-0.04	0.00	0.07*	0.05	0.01	-0.02
Age	Before	37.95	34.07	38.41	35.46	39.10	34.69
	After	35.71	31.73	32.89	34.63	36.51	32.62
	Diff (A-B)	-2.24*	-2.34	-5.52***	-0.83	-2.59**	-2.07**
Male	Before	0.58	0.97	0.52	0.99	0.49	0.60
	After	0.52	1.00	0.44	0.97	0.47	0.56
	Diff (A-B)	-0.07	0.03*	-0.08	-0.02**	-0.02	-0.04
Owns his house	Before	0.80	0.81	0.72	0.77	0.66	0.69
	After	0.78	0.79	0.69	0.66	0.72	0.67
	Diff (A-B)	-0.02	-0.02	-0.03	-0.10	0.06	-0.02
Has another job	Before	0.11	0.05	0.04	0.08	0.12	0.15
	After	0.10	0.07	0.12	0.10	0.10	0.15
	Diff (A-B)	-0.01	0.02	0.08*	0.01	-0.03	-0.01
Startup was financed by the owner	Before	0.69	0.34	0.66	0.60	0.62	0.42
	After	0.62	0.18	0.45	0.60	0.52	0.39
	Diff (A-B)	-0.07	-0.16	-0.21***	0.00	-0.09	-0.03
Work with relative in the firm	Before	0.18	0.03	0.06	0.01	0.18	0.03
	After	0.16	0.02	0.26	0.02	0.18	0.05
	Diff (A-B)	-0.02	-0.01	0.20***	0.01	0.00	0.02

Note: This table compares the average firms' owners characteristics before and after SIMPLES law in the different economic sectors under analysis. Each cell indicates the percentage of firms whose owner has the characteristics indicated in the lines. Diff (A-B) indicates the difference in means among firms created after and before SIMPLES law.

*** Significantly different than zero at 99% confidence.

** Significantly different than zero at 95% confidence.

* Significantly different than zero at 90% confidence.

after SIMPLES law. This is exactly true for the retail sector. There is no evidence that our results are determined by selection of owner profiles. Notice that this pattern is true for the other sectors as well, although some characteristics are different across periods for the manufacturing sector.

7. Discussion: why the results vary by sector?

Our results indicate that SIMPLES effect on formality varies with the economic sector. In this section we discuss the rationale of this difference. We argue that both informality levels and the incentives provided by SIMPLES vary by economic sector since the requirements to enter and operate in the formal economy depend on the activity of the firm and SIMPLES promoted a partial and uniform reduction in the cost of being formal.

The idea that informality varies by economic sector is supported by the analysis of formality rates across sectors and by some studies done about the subject. In our dataset, 24% of the firms have a municipal or state license but this rate ranges from 8% in the construction sector to 38% among transportation firms. Capp et al. (2005) argue that levels and forms of informality vary according to the value chain of a given sector, the way it is taxed and regulated, and sector-specific schemes for getting past regulatory or tax-enforcement agents.

In the decision to become formal or not, entrepreneurs balance the benefits and costs of formality and both can vary by sector. The costs of formalization can be divided between the costs of becoming formal and the costs of operating in the formal sector. The first group includes the several requirements to register a firm. The registration process in Brazil demands 15 steps and the visit to several institutions, reaching 152 days on average according to Doing Business estimates (WorldBank (2004)). This process is more cumbersome for some activities than others. For instance, firms that process or handle food face an additional step, the health inspection, which adds considerable time and cost to the process. In other sectors, formalization does not depend only on firms' demand. Cities usually regulate the number of taxis and busses that circulate in their area. Therefore, even if an entrepreneur who works in the transportation sector decides to formalize his vehicle, this option may not be available due to limits on licenses imposed by city authorities.

The costs to operate in the formal sector also depend on the economic activity. As shown in Table 1, the Federal tax burden varies by sector and therefore the net benefit that SIMPLES promotes. In addition, the system implies just a partial reduction in the tax burden since other important taxes are not included in the reform. The service sector, for instance, must pay ISS, a municipal tax that reaches 5% of gross revenue, which is more than the SIMPLES rate for microenterprises with annual revenue up to R\$ 60,000. Another important cost is related to labor regulations. Labor taxes and fees represent more than 50% of the wages in Brazil so companies are tempted to underreport employment. Farrell (2004) reports that informality in manufacturing industries is more prevalent in labor-intensive sectors such as apparel and food processing than in capital-intensive ones such as automotive assembly, cement, oil, steel, and telecommunications. Finally, underreporting of revenue may be easier in some sectors, which can reduce firms' de facto tax burden. Paula and Scheinkman (2010) show that the formality of a firm is correlated to the formality of suppliers and purchasers when firms are subject to the credit system of value added tax, which does not levy in all economic activities. In addition, a firm's ability and necessity to underreport revenues depend on how much its competitors rely on informal practices. Underreporting of revenues and the consequent reduction in tax burden can dramatically reduce costs in Brazil. For instance, an estimate from McKinsey Global Institute reported in Capp et al. (2005) indicates that evasion of taxes and social charges can more than triple a Brazilian supermarket's income. Therefore, it is hard to

compete in prices with informal firms and underreporting may be a requirement to survival in some markets.

In addition, the decision to enter the informal sector depends crucially on law enforcement. Limited enforcement of legal obligations stimulates informality and firms' ability to avoid detection is lower in some sectors. Entrepreneurs that serves the open public (e.g. restaurants) or circulate around the city (e.g. drivers) are more exposed to inspection, while sectors composed by small and geographically dispersed companies that serve mainly individuals such as construction make the task of auditors and tax collectors more difficult.

These examples illustrate that both informality levels and the incentives provided by SIMPLES vary by sector. In our context, we believe that construction and transportation firms have specially few incentives to enter the formal sector induced by SIMPLES reform. The typical construction firm in our database is a plumber or electrician that serves individuals. These firms are particularly hard-hit by inspection and can expect few benefits from formalization since their customers are often keen to exchange an invoice for a reduction in prices. Indeed, only 11% of the construction firms created before the program were licensed at the moment of the survey.

The transportation sector follows a particular dynamic. This sector has the highest formalization rate in our dataset (38%) mostly due to firms that operate taxis, school busses and urban busses, which represent 53% of the firms in this sector and have a formalization rate of 52%. This activity is heavily regulated. In most Brazilian cities, for instance, an entrepreneur cannot simply decide to register a car or a bus to carry passengers. It is necessary availability of licenses and there is usually a cap on the number of licenses issued by a city, meaning that formalization in this sector depends both on demand and supply of licenses. Operate informally is also more risky in this sector since the fact that these vehicles circulate around the city let them more exposed to inspection.

Therefore, the three other eligible sectors – retail trade, manufacturing and service – are potentially more affected by the reform. However, we believe that the design of SIMPLES law makes the eligibility in the manufacturing and service sectors highly uncertain. As discussed, activities which require professionals with regulated occupations are not eligible to the system. The problem is that this is not a precise definition and, specially in the first years of the new system, there was much doubt on which activities require professionals with regulated occupations. For instance, firms that provide services of maintenance and repair of vehicles, machines, computers and home appliances were initially considered not eligible because they were associated with the engineering profession. In 2004, the government reviewed that restriction and allowed these firms to adhere to SIMPLES. Firms which provide internet services were also ineligible in the beginning of the system due to the interpretation that they require a computer programming analyst and daycare facilities were only accepted in the system in 2000. Much of these uncertainties were resolved along the years after clarifications and law addenda. Zanluca (2006) cites 14 pieces of legislation and normative acts that were enacted from 1998 to 2006, aiming, among other things, to clarify whether specific activities were eligible or not to SIMPLES.

This eligibility uncertainty brings two difficulties to our analysis. From the econometrician point of view, it is hard to determine which firms among the ones in the manufacturing and service sectors are part of the treatment or control group. From the point of view of the firms, this uncertainty may reduce their willingness to formalize their ventures. This decision depends highly on the advice provided by accountants and therefore their assessment on whether an activity is eligible or not.

8. Conclusion

This paper evaluates the impact of bureaucracy simplification and tax reduction on the formality of microenterprises. Our source of identification is the enactment of a new tax system designed for

micro and small firms, the SIMPLES system. We explore the fact that the new tax system is restricted to a subset of sectors and use 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.

We find that the impact vary according to economic sector. Formalization increased by 13 percentage points in retailers with the new tax regime but we do not find an effect on license rates among firms in transportation, construction, services and manufacturing sectors. The key hypothesis behind this result is the assumption that aggregate shocks have no differential effect across the retail sector and the comparison group. We perform a series of falsification checks and sensitivity analysis and show that our results are robust to all of them. In particular, we do a placebo test by replicating the same econometric exercise one year before the enactment of SIMPLES and show that there is no measured effect on the retail sector for that period. We also discuss reasons to expect that SIMPLES incentive varies with economic sector.

Our results are an indication that tax burden and bureaucracy, which are key elements in the SIMPLES reform, constitute important obstacles to the regularization of firms. However, since we cannot rule out the possibility that an idiosyncratic shock to the retail sector caused the measured increase in formalization, a skeptical reader may interpret our results as an evidence that SIMPLES does not have much impact on microenterprises' decision to register. In any case, this paper shows that this type of reform can produce limited effects on the reduction of the informal sector because it does not induce all types of firms to formalize. Economic activities such as transportation, manufacturing and construction require other initiatives to experience lower levels of informality. We still need more research to identify which initiatives are these.

Appendix A. Composition of treatment and comparison groups

Eligible economic activities (number of firms in the sample)

Retail Trade (1202): retail trade of the following products: grocery (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), pharmaceutical and chemical products (52), oil and fuel (23), supermarkets (6), leisure articles (183).

Civil construction (604)

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

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

Other services (1480): lodging (10), bar and restaurant (944), furniture repair (29), plumber and electricity services (41), sewing (202), apparel rental (24), laundering, pressing and dyeing (65), gardening and housing maintenance and repair (24), entertainment (131), tourism (10).

Ineligible economic activities (number of firms in the sample)

Comparison group (1487): machine manufacturing (18), home appliance and electric supply manufacturing (23), transport equipment

manufacturing (5), chemical product 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 appliance repair (72), auto repair (193), watches and precision article repair (25), gymnasium 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), services of architecture, engineering and geology (26), advertisement and event promotion (27), writers, services of journalism, investigation and statistics (6), machines and rural labor rental services (6), commercial representation and foreign trade offices (90), tools and equipments rental; leasing and marketing offices (35), lottery shops (7), port services (6), employment and training agency; telecommunication services (24), services to hospitals, foundations, welfare and social securities (6), clubs and sport associations (6), clinics, hospitals and laboratories (45), odontological services (12), colleges, universities and educational courses (270).

Excluded sectors: mining, beverage manufacturing, tobacco and cigarettes manufacturing, water distribution and supply, peddler, produce fair, telecommunication companies, TV and radio stations, photography, filming and translation, ateliers of panting, decoration and design, car rental, parking, traffic engineering services and towing, social assistance centers, cultural centers, museums and parks, religion centers, communities associations, vets, notary, lottery shop, brothel and hunting, street vendors, non-defined activities, non-declared activities.

Notes: The classification of economic activities as eligible and ineligible was made by the authors following SIMPLES law, conversations with accountants and lists provided by the Internal Revenue Service and accountancy consulting firms. This classification follows the rule in effect in October 1997. After that date, some activities were excluded from the system and others were accepted. Excluded activities are the ones whose eligibility status in October 1997 was not clear to the authors.

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