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TAX COMPLIANCE COSTS AND FIRM GROWTH: EVIDENCE FROM BRAZIL

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Orientador: Professor Dr. Paulo Henrique Pereira de Meneses Vaz

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ABSTRACT

This paper aims to examine the causal effect of the tax burden reduction and simplification promoted by the Simples Nacional Program (Law 127/2006) on the growth of Micro and Small Enterprises (SMEs) in Brazil. Based on RAIS microdata over the period 2003-2012, we select a sample of establishments from the three main sectors of activity in Brazil: commerce, industry and services. Such establishments, homogeneous in their economic structure are divided into groups of Control (the ones that never became eligible to Simples Nacional) and Treatment (the ones that became eligible to Simples Nacional in 2007 or after). We used the differences-in-differences model, allowing the effect to be heterogeneous at the time of operation of the program by the firms. The results obtained suggest evidences of consistency in the causal effect of the Simples Nacional over the growth rates of firms in the commerce and industry sectors. For the service sector, the results are not robust.

Key-words: Tax burden reduction and simplification. Simples Nacional Program. Small and micro enterprises. Differences-in-Differences.

RESUMO

Este trabalho objetiva examinar o efeito causal da redução e simplificação de carga tributária promovida pelo Programa Simples Nacional (Lei 127/2006) sobre o crescimento das Micro e Pequenas Empresas (MPEs) do Brasil. Com base nos microdados da RAIS do período 2003-2012, selecionou-se uma amostra de estabelecimentos dos três principais setores de atividades do Brasil: comércio, indústria e serviços. Tais estabelecimentos, homogêneos em sua estrutura econômica foram divididos em grupos de Controle (aqueles que nunca se tornaram elegíveis ao Simples Nacional) e Tratamento (aqueles que se tornaram elegíveis ao Simples Nacional em 2007 ou depois). Utilizamos o modelo de diferenças-em-diferenças, permitindo que o efeito fosse heterogêneo ao tempo de atuação do programa nas firmas. Os resultados obtidos sugerem evidências consistentes de causalidade da atuação do Simples Nacional sobre a taxa de crescimento das firmas do setor de comércio e indústria. Para o setor de serviços, os resultados não se mostraram robustos.

Palavras-chaves: Redução e simplificação de carga tributária. Programa Simples Nacional. Micro e pequenas empresas. Diferenças-em-Diferenças.

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1 INTRODUCTION

Small and Micro sized enterprises (SMEs) are particularly important in the developing countries as they play a key contribution to employment, innovation and economic growth. The majority of the countries in the Western world have some differentiated tax treatment for those types of enterprises as they might be a great moving force on job generation and a potentially fount of productivity growth. The differentiated tax treatment also aims to affect firms' life-cycle and longevity, especially for young enterprises (OECD, 2015). In this work, we wish to estimate the causal impact over firms' growth, of a major reduction of tax compliance costs for small manufacturing firms in Brazil, one of the worst countries regarding the payment of business taxes.

In order to do so, we will exploit a difference-in-difference framework, aiming to estimate the effect of a tax complaince cost reduction and bureaucracy reductions over firm growth, as a result of the implementation of the Simples Nacional[1] program. Our identification strategy relies on the exogenous eligibility criteria based on the seven digit economic activity classification defined by the Simples Nacional. In one hand, all the SMEs who adopted the Simples Nacional as their tax regime in 2007 and on, are the ones that were eligible to the program based on the economic activity criteria (*Threated* group). On the other hand, the SMEs who did not adopted were the ones never eligible (*Control* group).

The effectivity of such policies that support differentiated tax system to SMEs as a mechanism that promote economic growth, formalization of new firms and strengthening of the labor market is in current debate worldwide. Despite the efforts made to evaluate such policies, there is no clear consensus about their effects, especially in the developing countries (DEIJL et al., 2013). Since the works of Birch (1979, 1981), the importance of small firms for job creation have been widely debated among economists. Evidences have shown that a considerable labor force works on SMEs. Haltiwanger et al. (2013) shows that, even considering firm age effects and the duty played by mature and big enterprises in the economy, the SMEs still holds a great share of total employment and job creation, even in the United States. The researches

[1]The Micro and Small Companies Tax and Contribution Payment Integrated System (SIMPLES) or Simples Nacional (SN, hereafter) is a system that enables tax simplification, benefiting firms that join it.

conclude that the younger companies are the ones who create more jobs, regardless of their size. Although all discovers made, there is still a concern in the literature with respect to job destruction, turnover, and the quality of the vacancies made by the SMEs.

Given the discussion above regarding the apparent importance of SMEs to the economy as a whole, the presence of different tax treatment that favor such businesses and our interest in inferring the causal impact of a major size dependent policy in Brazil (Simples Nacional) over firm growth, this work can be related to a vast strand of literature related to firms' life cycle. It is know that all startups businesses operate in a volatile environment. After five years, many of these young and new companies fail, and as a result, destroy almost half of the jobs created by them. The ones who survive, grow relatively faster than mature firms, and create a disproportionally more jobs relative to their size (HALTIWANGER et al., 2013).

Since the work of Sutton (1997), many have been discovered. The literature points out that firm's tend to get bigger (grow) as they age, and this life-cycle pattern if frequently explained as an evidence of firm-specific accumulation of intangible organizational capital over the years (HSIEH; KLENOW, 2014; KUENG et al., 2014). In this sense, if firms' faces limited capacity to grow over time aggregate productivity might be negatively affected as firms will not be able to accumulate establishment-specific intangible organizational capital over the life cycle. Given the common perception among economists that bigger and mature businesses becomes crucial for employment over time, the reduction of barriers to growth for young and new firms may lead to better aggregate productivity. Aggregate productivity may augment prompted by and increasing participation of SMEs if the high-productivity firms increase their market share followed by resource reallocation.

Ferraz et al. (2015) suggests that growth in the intangible organizational capital can be a result of investments in new technologies, managerial practices or costumer capital. They argue that young firms might have not yet developed the organizational capital and do not have acquired the customer base of older firms. In this sense, there is a nascent literature that analysis the role that demand and productivity shocks play in firm growth. None, however, have tried to explain the role that a tax compliance cost reduction have in firm growth, which is the objective of this project and the way we can contribute to the literature.

Since there is an apparent consensus about the value of small and micro enterprises, policy makers created different interventions that favor and protect this group. Despite they can be found all over the world, they seem more attractive to developing countries, where market frictions and constraints are more acute. In Brazil, for example, exists since 1997 a special tax system called SIMPLES that promoted a tax burden reduction and simplification for SMEs. According to Brazil's Federal Revenue (RFB) the program represents the largest tax waiver in the Union - with a predicted expense of almost R$ 77 billion in 2017. Furthermore, it is the tax regime of more than 70% of the SMEs in Brazil, comprehending businesses in the industry, commerce and service sectors.

In comparison to other countries, the simplified tax system held in Brazil is the most generous regarding the revenue limit that guarantee eligibility to the system. According to Appy (2015), in the United States, for example, the revenue limit for staying in the simplified tax system is US$ 48 thousand dollars per year; in Canada is US$ 121 thousand dollars and in the United Kingdom is US$ 114 thousand dollars. In Brazil, the author highlights, the revenue limit for maintaining at Simples Nacional is US$ 1 million dollars, a huge amount even when compared to developing countries like Argentina (US$ 48 thousand), Colombia (US$ 60 thousand) and Mexico (US$ 148 thousand). This fact allied with the consensus that tax burden and compliance is a critical barrier to growth impacting Brazilian firms' competitiveness, according to World Bank Doing Business reports, this project is motivated by the possibility of inferring the causal effects of this type of size-dependent policy in Brazil.

Despite the economic relevance of the simplified tax system, tax incentives and tax burden and compliance reductions, no clear consensus has been reached. It is accepted in the economic literature that a badly intended tax system can be a major disincentive for businesses, but the evidences on these reforms experienced by some countries suggest different results. The effect on employment, investment, productivity and job generation are found to be null (BECKER et al., 2012; LJUNGQVIST; SMOLYANSKY, 2014b; BIRD; KAROLYI, 2015; YAGAN, 2015), while some indicate a positive impact on employment and wages but only during crisis periods and for develop countries (FAULK, 2002; FINKE et al., 2013; BORDIGNON et al., 2014; CHEN et al., 2014; LJUNGQVIST; SMOLYANSKY, 2014a).

In Brazil, the efforts towards understanding and evaluating the reform in the tax system held in the country are scarce and are only related to manufactoring firms, but can be found at de Paula and Scheinkman (2010), Fajnzylber et al. (2011), Monteiro and Assunção (2012) and Franco et al (2017). These authors focus on the effects of the reform on employment, informality, formalisation of new firms, leaving open questions with respect to firm growth. The question raised is: would a tax burden and bureaucracy reduction policy program be able to boost firms growth rate in developing countries, such as Brazil, where the small businesses face limited means for expansion their activities? Thus, this work aims to fill the gap in the literature regarding causal effects of the simplification and reduction of taxes on firm dynamics in SMEs firms in Brazil.

The remainder of the project is organised as follows: besides this introduction, the next exposes the brazilian tax compliance cost reduction program, Simples Nacional, his evolution and structure. The third section describes the data that will be used to develop the present work. The fourth presents the empirical strategy. The results are presented in the fifth section. The sixth section concludes the work.

2 THE SIMPLES NACIONAL PROGRAM: ESTRUCTURE AND EVOLUTION

The Micro and Small Companies Tax and Contribution Payment Integrated System (SIMPLES) were created by the law 9,317/1996 and represented a remarkable change in the Brazilian legal system regarding the small and micro enterprises (SMEs). The Simples Federal program (SF) was conceived as an economic incentive to formalization of small informal businesses and as a way to consolidate the different tax benefits received by SMEs at the time, the program aimed the reduction of informality and promotion of employment for the small and micro enterprises. The main mechanism of action of the program was the simplification and reduction of the tax burden for the opting firms. Under the new regime, companies could collect up to six taxes through a single document, with the calculation and simplified payment being operationalized by applying a rate on the gross revenue of the company. The Simples program comprises the

following taxes and contributions: Legal Entity Income Tax (IRPJ), Social Contribution on Net Profits (CSLL), Social Integration Program and Civil Servant Patrimony Formation Program (PIS/PASEP), Contribution for the Financing of Social Security (COFINS), Industrial Products Tax (IPI), and the Employer Contribution for Social Security (INSS).

Thus, based on the SIMPLES system, the calculation base, the date of payment and the method of calculation of the six taxes covered by the scheme were unified, which considerably reduced the cost and time spent by companies in complying with their tax obligations with the federal government. The amount owed by each company depended on the gross annual revenue and economic activity performed. SIMPLES Federal operated with five taxation tables, with the rates scaled by revenue range, and varying for each type of activity (one for the commerce, another for the industry and two for the different types of service activity). In each table, there were nine revenue bands, with progressive rates: the higher the gross revenue accumulated in the previous twelve-month period in relation to the calculation period, the higher the total tax rate on the taxpayer.

Tax rates varied between 3% and 5% of annual gross income for microenterprises (ME) and between 5.4% and 7% for small enterprises (SE). The simplified tax system regime could only be used by companies of certain economic segments and below a certain limit of annual revenue, which for microenterprises was R$ 120 thousand and R$ 720 thousand for small enterprises until 2002 (Monteiro and Assunção, 2012).

A major modification on Simples Federal occurred in 2006 by the Law 123/2006, which established the Simples Nacional Program (SN, hereafter), allowing from July 1st 2007 on, all state tax systems to be revoked and replaced by SN. Simples Nacional thus included the State Tax on Circulation of Goods and Services (ICMS), and the municipal Tax on Services of Any Nature (ISS). In this way, under the SN program, eligible firms pay, in a single document, all municipal, state and federal taxes and contributions, being the rates variable depending on the sector. In contrast, under Simples Federal only federal taxes and contributions were included.

The Simples Nacional became effective on July 1st 2007 and all companies opting for Simples Federal were automatically included in the new regime. Among the main changes brought by Law 123/2006, should be highlighted the shared management of SN, the inclusion of new

eligible activities, the updating of annual revenue limit and the increase in the Union's tax relief associated with the program. According to the Micro and Small Companies Tax and Contribution Payment Integrated System (SIMPLES), under SN, a micro-enterprise is an entrepreneur or legal entity whose gross revenue does not exceed R$ 240,000.00 per calendar year, whereas the range for a small business is between R$ 240,000 and R$ 2,400,000 inclusive. Thus, from 2007 on, the simplified tax system regime began to be jointly managed by the Municipalities, States and Union, through the Simples Nacional Steering Committee (CGSN), with competence to determine the eligible sectors, prohibitions, annual revenue limits and other issues related to the operationalization of the regime.

In 2011 and 2014, by Laws 139 and 147, respectively, Simples Nacional underwent another transformation which altered the classification of micro-enterprise and small business based on gross revenue to declare eligibility to the regime (Law 139/2011) and created a new table of taxation in the regime and included a significant number of new activities, notably in the service sector, which began to be taxed by this new table (Law 147/2014). As pointed out previously, there were prohibitions for some segments of the Brazilian economy, which was significantly altered by this measure. Currently, Simples Nacional operates with six taxation tables and twenty revenue ranges, covering countless economic activities in the commerce, industry and services sectors.

The underlying motivation when adopting the Simples Federal (until 2006) and Simples Nacional programs (from 2007 on) is the tax complaince cost reduction and bureaucracy simplification incentive for micro-enterprises and small businesses, which makes them more competitive when compared to medium-sized and large enterprises, fostering job creation, salary increase, and reducing informality. The program, however, rules some activities out, which might have been eligible following the revenue range criterion, but are not enabled to join because of the exclusion criteria prescribed by law. Among such activities excluded from the program are: industrialized chemical products, machinery and equipment, education, health, services from self-employed professionals (accountants, lawyers, dentists, etc.), investments, final services, and banks services of all kinds.

3 DATA

Aiming to analyze the possible effect of the major tax compliance cost reduction promoted by Simples Nacional Program to Brazilian SMEs growth we use data from the Registro Anual de Informações Sociais (RAIS), an administrative data set from the Ministry of Labor established in 1975 by Decree 76,900. RAIS is a matched employer-employee data set that contains the universe of formal workers and firms in Brazil and gathers socioeconomic information about the employer and employees at an annual periodicity.

The RAIS data set is compiled from the data sent by enterprises and employers to the Ministry of Labor, with several information about the workers (remuneration, occupation, age, nationality, gender, date of admission, and more) and also about the establishments (activity sector, size, legal nature, option by Simples, etc.). In this work, only establishments with active employment relationship on December 31st of each year and that have declared at least one employee was maintained in the data set. In the analysis, only the active employment relationships were considered, discarding the workers who, during the calendar year, were fired or left the company for any reason.

Table 1: Descritive Statistics, Firms from Brazilian Commerce Sector, 2006

		Control		Treated		Diff: Treated-Control	
	VARIABLES	Mean	Sd	Mean	Sd	Coef.	P-Value
Outcome	Growth Rate	0.0656	0.494	0.0662	0.481	0.0006145	0.931
Controls	Employment	11.72	8.731	7.937	6.727	-3.786	0.000
	Total Wage (Minimum Wage)	31.27	38.83	15.56	18.12	-15.712	0.000
	Total Time Of Employment (Hrs)	515.5	521.3	377.1	394.3	-138.417	0.000
	Total Education	72.18	56.29	48.25	42.16	-23.925	0.000
	Total Hours Hired	510.2	380.6	345.8	294.1	-164.365	0.000
	Mean Wage	2.592	2.339	1.910	1.192	-0.682	0.000
	Mean Education	6.090	1.038	6.051	1.060	-0.039	0.009
	Number of Firms	43,109		5,463			

Table 2: Descritive Statistics, Firms from Brazilian Industry Sector, 2006

		Control		Treated		Diff: Treated-Control	
	VARIABLES	Mean	Sd	Mean	Sd	Coef.	P-Value
Outcome	Growth Rate	0.0790	1.287	0.0916	1.075	0.0126	0.776
Controls	Employment	27.27	21.78	16.53	16.10	-10.743	0.000
	Total Wage (Minimum Wage)	97.17	122.3	39.02	47.51	-58.153	0.000
	Total Time of Employment (Hrs)	1,559	1,629	880.6	994.0	-678.709	0.000
	Total Education	152.7	126.6	87.35	87.10	-65.399	0.000
	Total Hours Hired	1,191	951.4	721.8	703.6	-468.728	0.000
	Mean Wage	3.575	3.295	2.293	1.204	-1.283	0.000
	Mean Education	5.642	1.206	5.302	1.134	-0.339	0.000
	Number of Firms	11,709		889			

Table 3: Descritive Statistics, Firms from Brazilian Service Sector, 2006

		Control		Treated		Diff: Treated-Control	
	VARIABLES	Mean	Sd	Mean	Sd	Coef.	P-Value
Outcome	Growth Rate	0.0530	0.499	0.0682	0.516	0.015	0.004
Controls	Employment	6.750	7.454	6.801	6.901	-0.051	0.523
	Total Wage (Minimum Wage)	24.46	49.84	12.74	17.67	-11.721	0.000
	Total Time of Employment (Hrs)	482.60	702.70	354.40	452.10	-128.166	0.000
	Total Education	41.60	53.25	45.65	48.15	4.055	0.000
	Total Hours Hired	272.30	294.90	271.40	275.70	-0.834	0.790
	Mean Wage	2.879	2.782	1.769	1.072	-1.109	0.000
	Mean Education	5.635	1.792	6.641	1.253	1.006	0.000
	Number of Firms	168.098		9,270			

In Table 1 for commerce, Table 2 for industry and in Table 3 for the service sector, we compare descriptive statistics for firms receiving the Simples Nacional program to those not receiving it using data for 2006, the year before program implementation. We first note that, for the commerce and industry sectors, firms receiving the program compared to those not receiving it interestingly had the same growth rate before treatment in 2006 (Tables 1 and 2). The absence of discrepancies between treated and control firms before treatment is the main

motivation behind the empirical strategy we adopt in the present work. We add to this fact that control and treated firms differed along other dynamic variables in 2006, such as total employment, wage expenditures and education level of employees. For the service sector, in Table 3, however, firms receiving the program had a bigger growth rate compared to the firms not receiving it. The growth rate, for instance, was 28% higher on treated firms. Besided this level difference, the growth rate trend until 2006 in both groups of firms were the same, motivating our analysis about the effect of Simples Nacional program over firm growth.

In Figure 1 for the commerce, in Figure 2 for industry and in Figure 3 for the service sector, we report the evolution of firm growth for treated and untreated firms (panel on the top) and the evolution of the difference between treated and untreated firms and the number of firms adopting the program (panel on the bottom). First, for the commerce sector (Figure 1), we note the decreasing growth rate trend observed on all firms. This is expected since SMEs in Brazil faces limited capacity to expansion due to hard financial constraints. Second, we observe that treated firms appear to taking off from the control firms, hence growing at a faster rate. This specifically coincides with the implementation of the Simples Nacional program, as shown on the bottom panel.

Furthermore, for the industry and service sectors (Tables 2 and 3), we do not observe any consolidated pre-treatment trend in firms' growth rate; it appears to be stable over time. Althought, for the industry sector, it looks more seasonal. Treated firms, in contrast, coincidentally with the program adoption in 2007 experienced a boost in their growth rate, quickly taking of from the control firms. However, this need not imply that the program was effective in increasing growth rate of treated firms. It could be that firms with low growth rate were naturally catching up those with average or high growth rate, via a convergence effect, confounding any comparison between the trend of treated and untreated firms. This is another motivation for our empirical approach detailed below.

Figure 1: Evolution of average firm growth rate by group of treatment (top panel) and firms attended by SNP (bottom panel), Brazilian Commerce Sector, 2003-2012

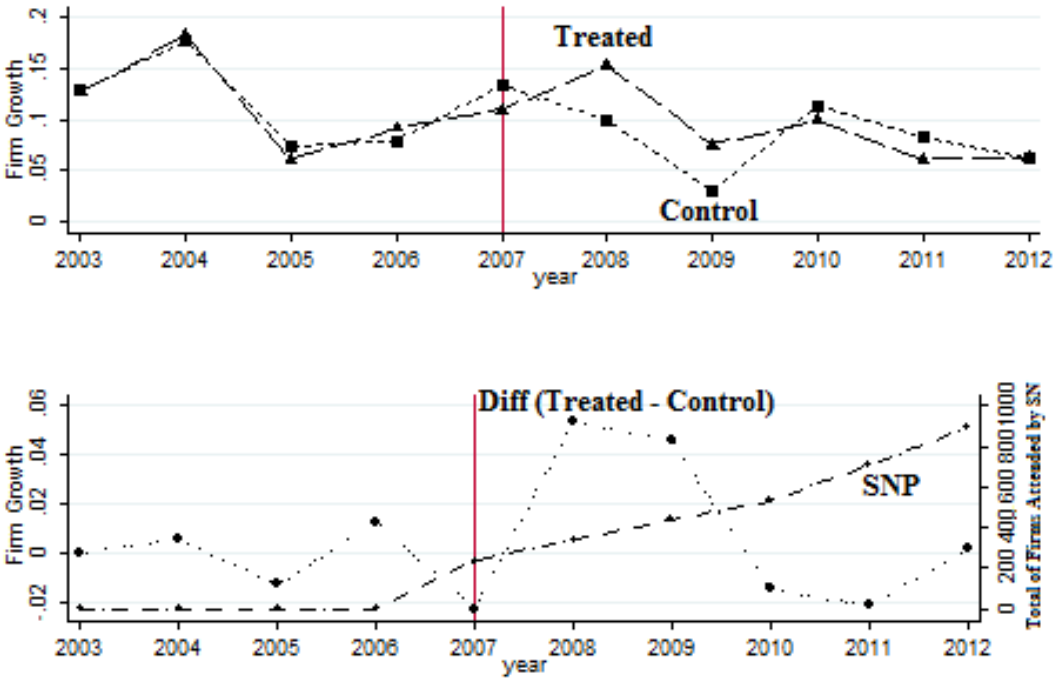

Figure 2: Evolution of average firm growth rate by group of treatment (top panel) and firms attended by SNP (bottom panel), Brazilian Industry Sector, 2003-2012

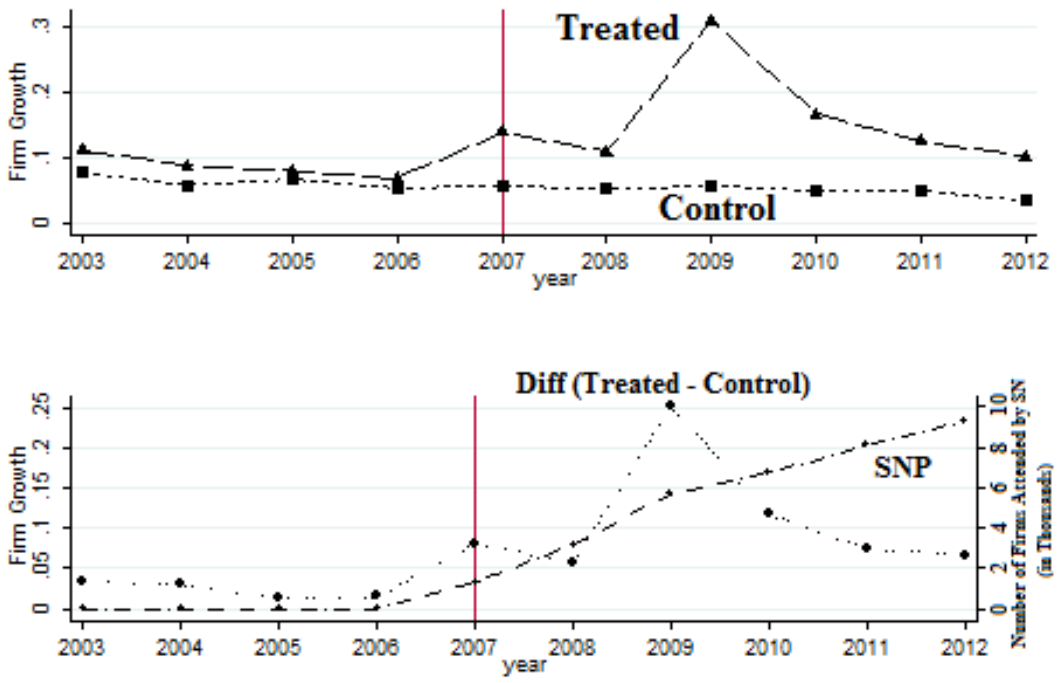

Figure 3: Evolution of average firm growth rate by group of treatment (top panel) and firms attended by SNP (bottom panel), Brazilian Service Sector, 2003-2012

Since the objective of the present work is to investigate que effect of Simples Nacional Program on small and micro enterprises growth rate from the Brazilian activity sectors, we opt to construct a panel with firms that appeared in the dataset in 2003 (start of the data availability) and live up to 2012 (end of data availability). For the commerce sector, we have data from 48,572 different firms between 10 years of time period. For the industry sector the data comprehends 12,598 different firms between the same 10 years of time period. And last, for the service sector, we have data on 177,368 different firms over the 10 years time period. In order to control for size and homogenize the firms around the SMEs, we explicitly restrict our data set to firm up to 49 employees for the commerce and service sectors, and up to 99 employees for the industry, following the methodology of size used in SEBRAE (2015).

4 EMPIRICAL STRATEGY

4.1 Causal Effect Estimation

Our objective is to evaluate the average impact of Simples Nacional Program – a tax compliance cost reduction and simplification that benefits firms that join it - on SME growth rate from the Brazilian activity sectors, that is, the average treatment effect on the treated. As our outcome variable, we define the growth rate of firm i in period t, g_{it}, in terms of employment over time:

$$g_{it} = \frac{Employment_t - Employment_{t-1}}{Employment_{t-1}} \tag{1}$$

In other words, we would like to compare each firm treated by the program with its counterfactual, that is, the same firm in the untreated condition. The clearest way to isolate the causal effects of Simples Nacional while maintaining covariates would be to examine the differences in firm growth rate among firms that were randomly benefited by the program from those who did not. Since this becomes impossible ex-post, we make use of non-experimental methods.

In order to estimate the effect of a tax complaince cost reduction and bureaucracy reductions over firm growth, as a result of the implementation of the Simples Nacional program, we will exploit a difference-in-difference framework. In our framework we have two distinct groups of firms. The first one is the *Control* group comprehending the small and microentreprises that never were eligible to the Simples Federal (prior to 2007) and to Simples Nacional (2007 on) tax regime; the second is the *Threated* group containing the firms that were eligible to the Simples Nacional in 2007 and on.

In order to capture the desired effect, controlling for unobservable variables that are common to all enterprises or specific to each enterprise, since they are constant over time, we exploit the heterogeneity in the year of eligibility and entry of firms from the brazilian activity sectors on the Simples Nacional program. A special advantage of the current program is that firm coverage increased from zero in 2006 to over 15,000 firms in 2012, generating enough variation in treatment status allowing us to precisely estimate the treatment effect. Our basic specification is given by, for the three activity sectors been analyzed:

$$Y_{ist} = \alpha_0 + \sum_{j=1}^{6} \beta_j SNP_{jist} + \alpha_1 X_{ist} + \delta_s + \lambda_t + \theta Trends_t * \delta_s + \epsilon_{ist} \quad (2)$$

where Y_{ist} is the growth rate outcome for firm i located in state s and in year t; SNP_{jist} are dummies indicating whether the firm i in state s and year t has ben benefited from the SNP for j years; X_{ist} represents the set of firm controls described in the previous section, also including sector dummies at a 3 digit level[2]; δ_s, λ_t and $Trends_t * \delta_s$ stands for, respectively, state fixed effect, year fixed effect and a interaction between time trends (linear and quadratic) and the state fixed effect. Furthermore, we clustered standard errors at the firm level to make their estimation robust to serial correlation and heteroskedasticity (BERTRAND; DUFLO; MULLAINATHAN, 2004).

Some sources of biases may arises and might take us to an incorrect interpretation of our estimates. A first source of bias to be considered comes from the fact that the program was implemented and adopted on firms that were, in the absence of the program, already experiencing positive shocks to their growth rate. Similarly, if there existed a tendency towards convergence, which would make firms with smaller growth rates spontaneously reaching those with average growth rate, initial growth rates could drive future growth rate dynamics, embarrassing our estimates. A last scheme is related to the possibility of firms adopting other policy in the same time period that the Simples Nacional program was implemented. This could cause our model to falsely indicate the estimated effect to the program, while it in fact represents the mixed effect of several policies intended to foster firm growth.

We deal with this problems in several ways. First of all, we include a set of controls in our specification in order to clarify the relationship between the Simples Nacional program and growth rate. Then, we check the robustness of our estimates to the existence of dynamic changes that might coincide with the implementation of the tax complaince cost reduction program. To do so, we take in consideration first estimating the model with an extra dummy variable indicating one year before program introduction. When we allow the model to have heterogenous anticipatory effects (leads), in addition to the heterogeneous post-treatment effects (lags) already

[2]The sector description at a 3 digit level is available at the Appendix A.1, A.2 and A.3 for the commerce, industry and service sectros, respectively

included in the model, we aim to check whether causes happen before consequences following the lines of a Granger causality test (GRANGER, 1969; ANGRIST; PISCHKE, 2009). If the model that is estimated acording to equation 2 mistakenly imputs pre-existing trends in firms growth rate to our treatment effect, the dummy that indicates one year before program introduction, should appear to be statistically significant, corroborating the existence of anticipatory effects.

A final check for the problems listed above involves the investigation of if any observed rise in firm growth rate is operating throught improved economic conditions or is a result of other changes at the national level that also impact firm growth. We follow Imbens (2004) and provide support for the identifying assumption by offering estimates of the causal effect of the treatment on outcomes that, under the hypothesis of identification, are supposed not to be affected by the shock - the Simples Nacional program implementation. Not rejecting the hypothesis that a similar effect is zero would not prove that the identification is achieved, but would make this assumption considerably more reasonable. To do so, we estimate the effect of the program on other types of variables not theoretically affected by the Simples Nacional program.

5 RESULTS

Table 4 presents the results for the commerce sector in our benchmark specification for the main outcome considered: firm growth rate. We start with a basic specification that controls only for state and year fixed effects; we then add a set of covariates to control for firm differences in total employment, since the growth dynamics tend to be different in relation to their size as smaller firms - among those classified as small - experience faster growth than the bigger ones; we also add total wage expenditure (mininum wage), total laboral time (in hours), total education level of employees, total laboral time hired, the mean wage and mean education level of employee. For last, we control for 2 times of time trend (linear and quadratic).

Our estimates presented in columns 1 to 7 of table 4 suggest a significant increase on firm growth rate caused by the Simples Nacional program. We observe that all variables accounting for at most six years are significant (columns 5 to 7). Our model allows us to conclude that firm

growth rate reached his maximum in the first year of implementation of the program and seem to slightly decrease with each additional year of exposure, but remains statistically significant at a 5% confidence level. For example, firms that adopted the Simples Nacional as their tax regime experienced a 0.0728 percentage points increase in their growth rate in the first year of program exposure. If we consider firms exposed for a total of six years, we observe a increase of about 0.0259 percentage points. These numbers correspond to approximately 112% increase in firm growth rate on the first year of exposure to the simplified tax regime and a 38% increase on the sixth year of exposure (column 7).

Table 4: Estimated impact of time of Simples Nacional program treatment on firm growth rate from the Brazilian Commerce Sector.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SN - 1 Year	0.0573***	0.0573***	0.0569***	0.0570***	0.0727***	0.0728***	0.0728***
	(0.0124)	(0.0124)	(0.0124)	(0.0124)	(0.0119)	(0.0119)	(0.0119)
SN - 2 Years	0.0519***	0.0522***	0.0517***	0.0518***	0.0640***	0.0641***	0.0641***
	(0.0147)	(0.0147)	(0.0147)	(0.0147)	(0.0143)	(0.0143)	(0.0143)
SN - 3 Years	0.0210*	0.0211*	0.0206*	0.0206*	0.0333***	0.0335***	0.0332***
	(0.0114)	(0.0114)	(0.0114)	(0.0114)	(0.0112)	(0.0112)	(0.0112)
SN - 4 Years	-0.00300	-0.00294	-0.00364	-0.00361	0.0193*	0.0194*	0.0196**
	(0.0100)	(0.0100)	(0.0100)	(0.0100)	(0.00998)	(0.00998)	(0.00997)
SN - 5 Years	0.00428	0.00435	0.00388	0.00390	0.0264**	0.0263**	0.0268**
	(0.0113)	(0.0113)	(0.0113)	(0.0113)	(0.0111)	(0.0111)	(0.0111)
SN - 6 Years	0.00751	0.00771	0.00728	0.00728	0.0253**	0.0254**	0.0259**
	(0.0120)	(0.0120)	(0.0119)	(0.0119)	(0.0119)	(0.0119)	(0.0119)
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES
Trend*State FE	NO	NO	YES	NO	YES	NO	YES
$Trend^2$*State FE	NO	NO	NO	YES	NO	YES	YES
Covariates	NO	NO	NO	NO	YES	YES	YES
Observations	465,360	465,360	465,360	465,360	465,360	465,360	465,360
Number of Firms	46,536	46,536	46,536	46,536	46,536	46,536	46,536

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Results for the Industry sector are presented at Table 5. Our results suggest that the Simples Nacional has a positive effect on firms growth rate only in the first year of the program adoption, and a negative effect for firms exposed for five years. The positive effect over firm growth rate - and so, on employment levels - for the first year of implementation is in line with the findings of Franco et al (2017). They find, using an Fuzzy Regression Discontinuity setup around the revenue limit for elegibility, that industrial firms that took part in Simples Nacional experienced an increment, in relation to the average, of 21.5% in job generation in the year of

implementation of the program (or in absolute terms, 10.63 employees).

In our setup, for example, firms that adopted the Simples Nacional experienced an increase of 0.157 percentage points over their growth rate (column 7). This corresponds to an 170% increase in comparison to pre-treatment growth rate level, and moreover, in terms of employment, this effect corresponds to an average increase of 11 employees. However, for firms that have been exposed to the Simples Nacional program for 5 years, they experience an reduction in growth of about -0.0879 percentage points (column 7), or a 92% decrease relative to the pre-treatment mean. Despite the positive and negative effect, we can conclude that the overal effect of this policy was a null effect over the growth rate for firms at the Brazilian Industry sector.

Table 5: Estimated impact of time of Simples Nacional program treatment on firm growth rate from the Brazilian Industry Sector.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SN - 1 Year	0.147**	0.148**	0.147**	0.148**	0.157***	0.158***	0.157***
	(0.0580)	(0.0580)	(0.0580)	(0.0580)	(0.0562)	(0.0562)	(0.0561)
SN - 2 Years	0.0483	0.0483	0.0472	0.0480	0.0314	0.0322	0.0319
	(0.0300)	(0.0300)	(0.0301)	(0.0301)	(0.0299)	(0.0299)	(0.0299)
SN - 3 Years	0.00241	0.00248	-0.000252	0.0000621	-0.0324	-0.0318	-0.0313
	(0.0316)	(0.0316)	(0.0319)	(0.0319)	(0.0318)	(0.0318)	(0.0318)
SN - 4 Years	-0.0222	-0.0221	-0.0249	-0.0249	-0.0433	-0.0429	-0.0424
	(0.0386)	(0.0386)	(0.0389)	(0.0389)	(0.0387)	(0.0387)	(0.0387)
SN - 5 Years	-0.0716**	-0.0716**	-0.0748**	-0.0749**	-0.0900**	-0.0895**	-0.0879**
	(0.0326)	(0.0326)	(0.0330)	(0.0331)	(0.0334)	(0.0334)	(0.0333)
SN - 6 Years	-0.0482	-0.0482	-0.0512	-0.0510	-0.0568	-0.0563	-0.0534
	(0.0421)	(0.0421)	(0.0424)	(0.0424)	(0.0407)	(0.0407)	(0.0407)
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES
Trend*State FE	NO	NO	YES	NO	YES	NO	YES
$Trend^2$*State FE	NO	NO	NO	YES	NO	YES	YES
Covariates	NO	NO	NO	NO	YES	YES	YES
Observations	125,980	125,980	125,980	125,980	125,980	125,980	125,980
Number of Firms	12,598	12,598	12,598	12,598	12,598	12,598	12,598

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Lastly, for the Service sector, the results are presented at Table 6. Our estimates presented in columns 1 to 7 of table 6 suggest a mixed effect on firm growth rate caused by the Simples Nacional program. We observe that all variables accounting for at most six years are significant at an 1% confidence level, but with divergent effects (columns 5 to 7). Our model allows us to conclude that firm growth rate reached a maximum peak in the first year of implementation of the program - just like the Commerce and Industry sectors - and seem to decrease with each

additional year of exposure, turning to a negative effect over firm growth rate for firms been exposure for three years or more to the program.

For example, firms from the Service sector that adopted the Simples Nacional as their tax regime experienced a 0.155 percentage points increase in their growth rate in the first year of program exposure. If we consider firms exposed for a total of three to six years the negative effect turns out to be from the magnitude of -0.0440 to -0.0790 percentage points. These numbers correspond to approximately 227% increase in firm growth rate on the first year of exposure to the simplified tax regime and a 65% to 120% decrease from the third to the sixth year of exposure (column 7).

Table 6: Estimated impact of time of Simples Nacional program treatment on firm growth rate from the Brazilian Service Sector.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SN - 1 Year	0.188***	0.187***	0.188***	0.188***	0.155***	0.155***	0.155***
	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0131)	(0.0131)	(0.0131)
SN - 2 Years	0.140***	0.140***	0.140***	0.140***	0.0744***	0.0743***	0.0746***
	(0.0125)	(0.0125)	(0.0126)	(0.0126)	(0.0121)	(0.0121)	(0.0121)
SN - 3 Years	0.0436***	0.0436***	0.0440***	0.0439***	-0.0439***	-0.0440***	-0.0440***
	(0.00790)	(0.00790)	(0.00791	(0.00791)	(0.00832)	(0.00832)	(0.00832)
SN - 4 Years	0.00709	0.00706	0.00750	0.00744	-0.0958***	-0.0958***	-0.0960***
	(0.00659)	(0.00659)	(0.00660)	(0.00660)	(0.00747)	(0.00748)	(0.00748)
SN - 5 Years	0.00984	0.00981	0.0100	0.00986	-0.0971***	-0.0972***	-0.0977***
	(0.0108)	(0.0108)	(0.0108)	(0.0108)	(0.0112)	(0.0112)	(0.0113)
SN - 6 Years	0.0277	0.0277	0.0281	0.0281	-0.0789***	-0.0788***	-0.0790***
	(0.0230)	(0.0230)	(0.0230)	(0.0230)	(0.0235)	(0.0235)	(0.0235)
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES
Trend*State FE	NO	NO	YES	NO	YES	NO	YES
$Trend^2$*State FE	NO	NO	NO	YES	NO	YES	YES
Covariates	NO	NO	NO	NO	YES	YES	YES
Observations	1,773,680	1,773,680	1,773,680	1,773,680	1,773,680	1,773,680	1,773,680
Number of Firms	177,368	177,368	177,368	177,368	177,368	177,368	177,368

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

5.1 Robustness

In order to help our causal interpretation of the previous results, we carry on with a series of robustness and placebo tests. First, we analysed the existence of antecipatory effects, checking whether a rise in firm growth rate was correlated with any previous trend not captured by our main equation. In order to capture this antecipatory effect, we added leads and lags into our

model.

On one hand, as can be seen on Figure 4 and Table 23[3] for the Commerce sector, and Figure 5 and Table 24[4] for the Industry sector, we infer no effect previous to the program implementation, that is, growth rate levels three, two and one year before Simples Nacional program adoption is not statistically different from zero (for the industry sector). The dummy indicating one year before program implementation appears to be statistically different from zero, at a 10% level, for the commerce sector, indicating some antecipatory effect.

This, however, does not invalidate our findings, since previous dummies for this sector are not statistically different from zero and the antecipatory effect is small relative to the boost in firm growth rate in 2007, the year of the implementation of Simples Nacional Program. Regarding the Commerce sector, after the start of the program, we observe a sudden rise in firms' growth rate, hitting it's peak in 2007 and decreasing as the policy matures, but remeaning statistically significant even controlling for many potential determinants of firms' growth. For the Industry sector, after the start of the program, we also observe sudden rise of firms' growth rate, decreasing thereafter and becoming statistically insignificant, with exception for the five years of exposure point estimate.

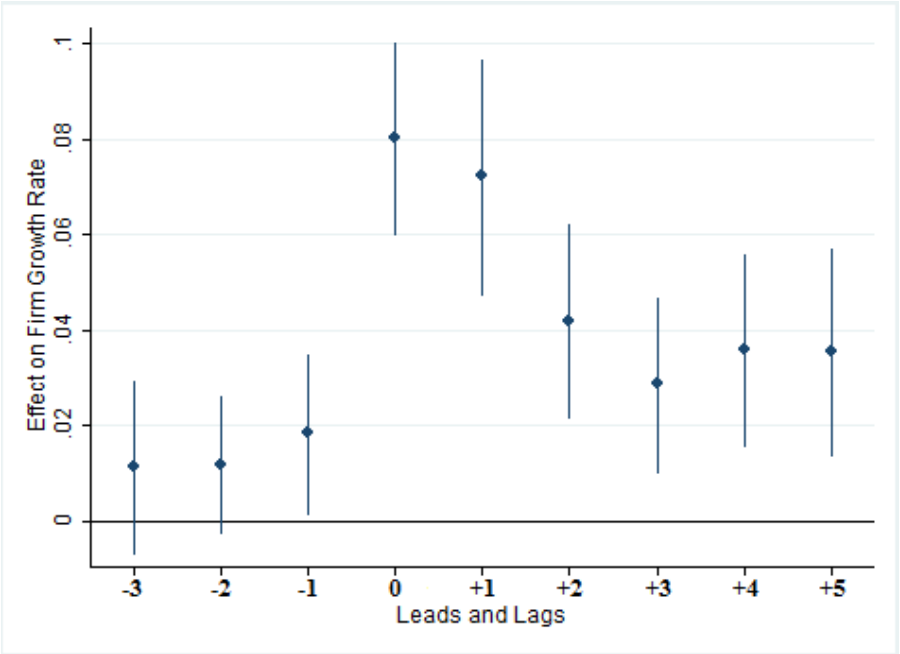

Figure 4: Robustness of estimated impact of Simples Nacional Program on firm growth, Leads and Lags, Brazilian Commerce sector, 2003-2012.

[3] Available at the Appendix B.1
[4] Available at the Appendix B.2

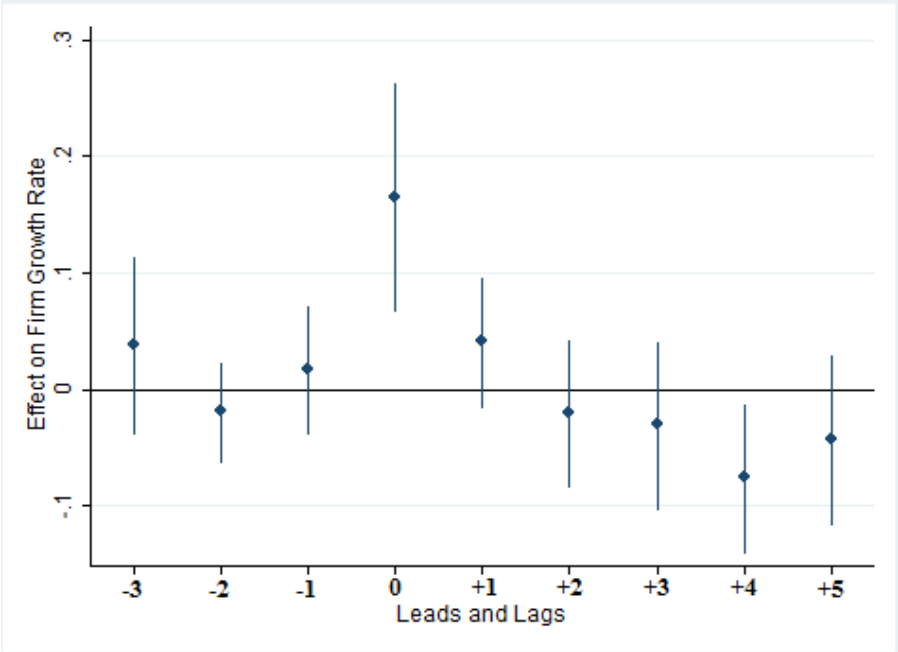

Figure 5: Robustness of estimated impact of Simples Nacional Program on firm growth, Leads and Lags, Brazilian Industry sector, 2003-2012.

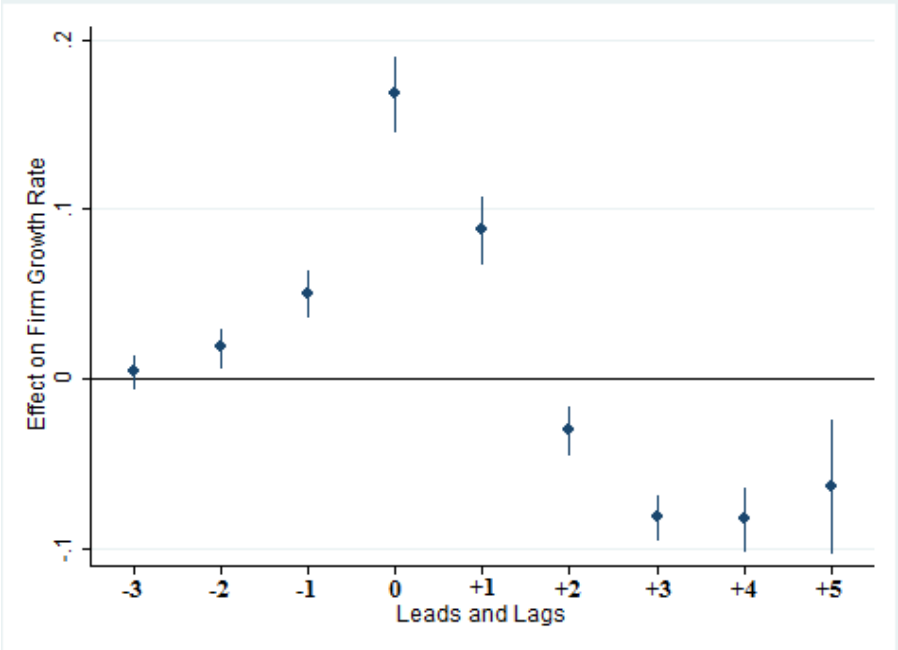

Figure 6: Robustness of estimated impact of Simples Nacional Program on firm growth, Leads and Lags, Brazilian Service sector, 2003-2012.

On the other hand, for the Service sector, as can be seen in Figure 6 and table 25[5] we do infer an effect previous to the program implementation, that is, growth rate levels one and two years before Simples Nacional program adoption is statistically different from zero. Indeed, it is statistically significant at a 5% confidence level. This means that the rise in firm growth

[5] Available at the Appendix B.3

rate for firms in the Service sector were correlated with the previous trend not captured by the model, obfuscating the robustness of our results for this particular sector and weakening our causal claim. This may be explained by the fact that the service sector were the activity sector with more segments that were forbidden to join the Simples Nacional program. Sebrae (2017) points out that the service sector is the segment with more potential on both new entreprises and job creations. Thus, the expansions that occured at the Simples Nacional tax system regime in 2007, 2008 and 2009 were targeted to include this segment especific firms.

Secondly, we also contructed a two-group, two-period differences-in-differences model[6] for the three different acitivy sectors been analyzed. The results for the standard differences-in-differences model are presented in Table 8 for the Commerce, in Table 9 for the Industry and in Table 10 for the Service sector. All regressions were performed with seven identification specifications.

For the Commerce, all the results suggest a positive correlation between taking part in Simples Nacional program and firm growth, and show up as statistically significant at a 1% confidence level. In our most complete specification - (7) -, taking part in Simples Nacional program is responsable for approximately 0.0327 increase in firms' growth rate, representing a approximately 55% increase relative to the pre-treatment mean. This results are well within our findings from the heterogenous effects model from equation (2) reinforcing our causal claim and the robustness of our results.

For the Industry sector, the standard differences-in-differences points out to a null effect of adopting Simples Nacional program over firms' growth rate in all seven model especifications considered. As shown in Table 9, all coefficients turn out to be statistically insignificant. This suggestive null effect is expected since most of the point estimates at the heterogeneous effect model estimated at Equation 2, and shown at Table 5, were also statistically insignificant, reinforcing the robustness of our findings.

Moreover, for the Service sector, all the results suggest to a positive correlation between taking part in Simples Nacional and firm growth, and show up as statistically significant at a 1% confidence level. In our most complete specification - (7) -, taking part in Simples Nacional

[6]Model specification for the standard differences-in-differences is available at Appendix C

program is responsable for 0.0417 increase in firms' growth rate, representing a approximately 62% increase relative to the pre-treatment mean. Although having failed the Leads and Lags robustness test, and so, the rise at firm growth rate appears to be correlated with previous trends, our suggestives findings at the standard differences-in-differences specification could be biased by the peak of firm growth that the firms from this particular sector experienced in 2009.

Table 7: Regression results over firm growth rate from Brazilian SMEs at Commerce sector - Standard Diff-In-Diff, 2003-2012

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post*SimplesNacional	0.0161***	0.0162***	0.0156***	0.0158***	0.0330***	0.0333***	0.0327***
	(0.00470)	(0.00470)	(0.00471)	(0.00471)	(0.00485)	(0.00485)	(0.00485)
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES
Trend*State FE	NO	NO	YES	NO	YES	NO	YES
$Trend^2$*State FE	NO	NO	NO	YES	NO	YES	YES
Covariates	NO	NO	NO	NO	YES	YES	YES
Observations	465,360	465,360	465,360	465,360	465,360	465,360	465,360
Number of Firms	46,536	46,536	46,536	46,536	46,536	46,536	46,536

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Table 8: Regression results over firm growth rate from Brazilian SMEs at Industry sector - Standard Diff-In-Diff, 2003-2012

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post*SimplesNacional	0.00555	0.00573	0.00423	0.00487	0.0163	0.0174	0.0156
	(0.0219)	(0.0219)	(0.0220)	(0.0220)	(0.0222)	(0.0221)	(0.0222)
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES
Trend*State FE	NO	NO	YES	NO	YES	NO	YES
$Trend^2$*State FE	NO	NO	NO	YES	NO	YES	YES
Covariates	NO	NO	NO	NO	YES	YES	YES
Observations	125,980	125,980	125,980	125,980	125,980	125,980	125,980
Number of Firms	12,598	12,598	12,598	12,598	12,598	12,598	12,598

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Table 9: Regression results over firm growth rate from Brazilian SMEs at Service sector - Standard Diff-In-Diff, 2003-2012

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post*SimplesNacional	0.0851***	0.0851***	0.0853***	0.0852***	0.0416***	0.0415***	0.0417***
	(0.00452)	(0.00452)	(0.00454)	(0.00454)	(0.00446)	(0.00446)	(0.00446)
Year FE	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES
Trend*State FE	NO	NO	YES	NO	YES	NO	YES
$Trend^2$*State FE	NO	NO	NO	YES	NO	YES	YES
Covariates	NO	NO	NO	NO	YES	YES	YES
Observations	1,773,680	1,773,680	1,773,680	1,773,680	1,773,680	1,773,680	1,773,680
Number of Firms	177,368	177,368	177,368	177,368	177,368	177,368	177,368

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Finally, placebo tests were conducted to analyze the chances of our results proceed from spurious regression (Imbens, 2004). In this sense, we consider estimating treatment effects on outcomes that in theory should not respond to the program implementation. If results show up as significant on these untargeted outcome, one may question the vigour of our interpretations. We check the effects of the policy on employees weekly workload. Since the Brazilian labour workload is regulated by the Ministry of Labour and has a maximum duration of 44 hours on a week, we expect that the Simples Nacional program - a policy that aimed, in special, job generation and formalization of new firms - have no effect over workload. Results for this type of test are presented on Table 10 for the Commerce, Table 11 for Industry and Table 12 for the Service sector.

As can be seen for the Industry and Service Sectors, the Simples Nacional program had the disered no efect over employees workload. Particularly for the Commerce sector, the policy had mostly no effect over the employees workload, even so the coefficients turn out to be statistically significant for 1 year and for 4 years of program adoption. But, before judging our results as been driven by mere spurious regression, is worth noting that the biggest coefficient (0.0603 for 4 years of program adoption) is really small relative to a pre-treatment mean of 43.48 hours of weekly workload. In this sense, adopting the Program for 4 years correspond to an average 0,14% (or approximately 3,90 minutes increase in the employees workload), an insignificant increase that do not invalidates our findings.

Table 10: Robustness of estimated impact of time of Simples Nacional program on weekly workload, Brazilian Commerce sector, 2003-2012.

Variables	(1)
SN - 1 Year	0.0475**
	(0.0217)
SN - 2 Years	0.0204
	(0.0255)
SN - 3 Years	0.0326
	(0.0311)
SN - 4 Years	0.0603*
	(0.0334)
SN - 5 Years	0.0445
	(0.0457)
SN - 6 Years	0.0595
	(0.0429)
Year FE	YES
State FE	YES
Trend*State FE	YES
$Trend^2$*State FE	YES
Covariates	YES
Observations	465,360
Number of Firms	46,536

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Table 11: Robustness of estimated impact of time of Simples Nacional program on weekly workload, Brazilian Industry sector, 2003-2012.

Variables	(1)
SN - 1 Year	0.0194
	(0.0426)
SN - 2 Years	0.0489
	(0.0427)
SN - 3 Years	0.0659
	(0.0487)
SN - 4 Years	0.0467
	(0.0547)
SN - 5 Years	-0.0383
	(0.0825)
SN - 6 Years	-0.0641
	(0.107)
Year FE	YES
State FE	YES
Trend*State FE	YES
$Trend^2$*State FE	YES
Covariates	YES
Observations	125,980
Number of Firms	12,598

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Table 12: Robustness of estimated impact of time of Simples Nacional program on weekly workload, Brazilian Service sector, 2003-2012.

Variables	(1)
SN - 1 Year	0.0436
	(0.0331)
SN - 2 Years	0.0363
	(0.0391)
SN - 3 Years	0.0199
	(0.0447)
SN - 4 Years	-0.0560
	(0.0528)
SN - 5 Years	-0.0368
	(0.0669)
SN - 6 Years	-0.0452
	(0.0902)
Fixed Effects	YES
Covariates	YES
Trends	YES
Observations	1,773,680
Number of Firms	177,368

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

6 CONCLUSION

Small and Micro sized enterprises (SMEs) are particularly important in the developing countries as they play a key contribution to employment, innovation and economic growth. The majority of the countries in the Western world have some differentiated tax treatment for those types of enterprises as they might be a great moving force on job generation and a potentially fount of productivity growth. The objective of the present work was to evaluate the impact of the brazilian tax compliance reduction policy regime, Simples Nacional, benefiting smal and micro enterprises that join it, over firm growth.

We employ a differences-in-differences model that allow for heterogeneous post-treatment effects in order to capture the referred effect. Having in hand the complete history of the Simples Nacional adoption by firms, starting in 2007, we found consistence evidence of causality of this program's performance over growth rate in the 2003-2012 period for firms in the Brazilian Activity Sectors. Our results are robust, for the Commerce and Industry sector, to a set of hypothesis about endogeneity that could be influencing the estimated effect, reinforcing our interpretation of causality. Unfortunately, the Service sector failed the Leads and Lags robustness test and the rise in firm growth rate appears to be correlated with previous trends not captured by the model.

For Commerce, the estimated effect appears to be stronger in the first year of program adoption, remaining relatively stable over the following two years, and decreasing thereafter but not losing statistical significance over the analyzed period. For Industry, the estimated effect in also positive in the first year of program adoption and negative for five years of exposure; for all the remaining years we find no effect. For Service, apart from failing at a robustness test, we find a mixed effect of the Simples Nacional program, with a positive effect for the first two years of exposure and a negative effect thereafter.

This work appears as a first attempt to capture the causal effect of the adoption of a tax compliance cost reduction regime over the growth rate of Brazilian firms. Even with the limitation of the data in relation to the total set of firms that may exist in the Brazilian Commerce, Industry and Service sector, the results discovered points to the effectiveness of this type of program.

The challenge for future studies should be to study and comprehend the effects of this type of policy over investment and productivity of Brazilian SMEs as they face hard capital constraints and the are a particular determinant of productivity growth.

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Appendices

Appendix A.1 - Commerce Sector Description

Table 13: Commerce sector description at a 3 digit level based on CNAE 2.0 classification.

CODE	DESCRIPTION	FREQUENCY
451	Commerce of Automotive Vehicles	16,629
452	Maintenance and Repair of Automotive Vehicles	1,181
453	Parts and Accessories Commerce for Automotive Vehicles	22,546
454	Commerce, Maintenance and Repair of Motorcycles, Parts and Accessories	4,377
461	Commercial Representatives and Commerce Agents, Except of Automotive Vehicles and Motorcycles	14,259
462	Wholesale Commerce in Raw Materials and Live Animals	6,324
463	Wholesale Commerce Specialized in Food, Beverages and Tobacco	14,465
464	Wholesale Commerce in Non-Food Consumption Products	14,534
465	Wholesale Commerce in Information and Communication Technology Equipment and Products	868
466	Wholesale Commerce in Machinery, Devices and Equipment Technologies, Except Information and Communication	11,893
467	Wholesale Commerce in Wood, Hardware, Tools and Electrical and Construction Materials	6,546
468	Wholesale Commerce Specialized in other Products	18,121
469	Non-Specialized Wholesale Commerce	5,072
471	Non-Specialized Retail Commerce	22,332
472	Retail Commerce in Food, Beverages and Tobacco	4,761
473	Retail Commerce in Fuels for Automotive Vehicles	128,516
474	Retail Commerce in Construction Materials	0
475	Retail Commerce in Computer and Communcation Equipment; Equipment and Articles for Domestic Use	38,760
476	Retail Commerce in Cultural, Recreational and Sportive Articles	4,359
477	Retail Commerce in Pharmaceutical Products, Perfumery and Cosmetics; and Medical, Optical and Orthopedic Products	32,824
478	Retail Commerce in New Products Not Specified Above and of Used Products	96,993
TOTAL		465,360

Appendix A.2 - Industry Sector Description

Table 14: Industry sector description at a 3 digit level based on CNAE 2.0 classification.

CODE	DESCRIPTION	FREQUENCY
Extractive Industry		
050	Extraction of Coal	182
060	Extraction of Oil and Natural Gas	45
071	Extraction of Iron Ore	199
072	Extraction of Non-Ferrous Metal Ores	314
081	Extraction of Stone, Sand and Clay	4,473
089	Extraction of other Non-Metallic Minerals	2,303
091	Support Activities for the Extraction of Oil and Natural Gas	148
099	Support Activities for the Extraction of Minerals, other than Oil and Natural Gas	0
Manufacturing Industry		
101	Slaughter and Meat Products Manufacuring	1,016
102	Preservation of Fish and Manufacture of Fish Products	190
103	Vegetables and Fruit Canning Manufacturing	728
104	Manufacture of Oils and Vegetable and Animal Fats	377
105	Laticy	6,177
106	Grinding, Manufacture of Amilace Products and Animal Foods	6,130
107	Manufacture and Refining of Sugar	205
108	Towing and Coffee Grinding	1,192
109	Manufacture of other Food Products	3,094
111	Manufacture of Alcoholic Beverages	2,660
112	Manufacture of Non-Alcoholic Beverages	1,121
121	Industrial Processing of Tobacco	0
122	Manufacture of Tobacco Products	390
131	Preparation and Wiring of Textile Fibers	1,200
132	Weaving, Except Knit	2,438
133	Manufacture of knitted Textile	594
134	Woven Finish, Textile Fabrics and Artifacts	378
135	Manufacture of Textile Artifacts, except Clothing	579
141	Confection of Accessories and Clothing Articles	6,076
142	Manufacture of Articles of Knitting and Tricoting	282
151	Tanning and other Leather Preparations	511
152	Manufacture of Articles for Travel and Miscellaneous Leather Arts	259
153	Footwear Manufacturing	1,327
154	Manufacture of Parts for Footwear, of any Material	0

(To Be Continued)

Appendix A.2 - Industry Sector Description - Continuation

Table 15: Industry sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Manufacturing Industry		
161	Wood Splitting	1,870
162	Manufacturing of Wood, Cork and Tressed Material, Except Furniture	2,182
171	Manufacture of Cellulose and other Pastes for the Manufacture of Paper	130
172	Manufacture of Paper, Paperboard and Paper-Cardboard	387
173	Manufacture of Paper Packaging, Paperboard, Paper-Cardboard and Corrugated Cardboard	1,651
174	Manufacture of Several Paper, Paperboard, Paper-Cardboard and Corrugated Cardboard Products	931
181	Printing Activity	1,331
182	Pre-Printing and Graphic Finishes Services	715
183	Reproduction of Recorded of any Support	67
191	Coke Manufacture	22
192	Manufacture of Oil Derivative Products	96
193	Manufacture of Biofuels	103
201	Manufacture of Inorganic Chemicals	2,328
202	Manufacture of Organic Chemicals	817
203	Manufacture of Resins and Elastomers	340
204	Manufacture of Artificial and Synthetic Fibers	26
205	Manufacture of Agricultural Defensives and Domesanitary Disinfestants	211
206	Manufacture of Soaps, Detergents, Cleaning, Cosmetics, Perfumery and Personal Hygiene Products	1,456
207	Manufacture of Inks, Varnishes, Enamels, Lacquers and Related Products	1,507
209	Manufacture of Several Chemical Preparations and Products	4,411
211	Manufacture of Pharmochemical Products	221
212	Manufacture of Pharmaceutical Products	980
221	Manufacture of Rubber Products	2,469
222	Manufacture of Plastic Material Products	7,648
231	Manufacture of Glass and Glass Products	392
232	Cement Manufacture	238
233	Manufacture of Concrete, Cement, Fibrocement, Plaster and Similar Materials	2,297
234	Ceramic Products Manufacture	1,466
239	Stone Appliances and Manufacture of other Non-Metallic Mineral Products	2,462

(To Be Continued)

Appendix A.2 - Industry Sector Description - Continuation

Table 16: Industry sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Manufacturing Industry		
241	Production of Pig Iron and Iron Garters	285
242	Steel Industry	729
243	Production of Steel Pipes, Except Seamless Pipes	345
244	Metalurgy of Non-Ferrous Metals	842
245	Foundry	1,305
251	Manufacture of Metallic Structures and of Heavy Boiler Works	2,325
252	Manufacture of Tanks, Metallic Reservoirs and Boilers	349
253	Forging, Stamping, Powder Metalurgy and Metal Treatment Services	2,925
254	Manufacture of Cultery, Locksmith Articles and Tools	984
255	Manufacture of Heavy Duty Equipment, Weapons and Ammunition	40
259	Manufacture of Metal Products Not Previously Specified	4,844
261	Manufacture of Electronic Components	696
262	Manufacture of Computer Equipment and Peripherals	496
263	Manufacture of Communication Equipment	244
264	Manufacture of Receiving, Reproducing, Recording, and Amplification of Audio and Video Apparatus	154
265	Manufacture of Measuring, Test and Control Equipments and Instruments; Chronometers and Watches	859
266	Manufacture of Electromedic and Electrotherapeutic Devices and Irradiation Equipment	811
267	Manufacture of Optical, Photografic and Cinematographic Equipment and Instruments	0
268	Manufacture of Virgin, Magnetic and Optical Medias	7
271	Manufacture of Generators, Transformers and Eletric Motors	403
272	Manufacture of Batteries, and Electric Accumulators	10
273	Manufacture of Equipment for Distribution and Control of Electrical Energy	1,193
274	Manufacture of Lamps and other Lighting Equipments	331
275	Manufacture of Home Appliances	180
279	Manufacture of Electrical Equipment and Devices not Previously Specified	1,168

(To Be Continued)

Appendix A.2 - Industry Sector Description - Continuation

Table 17: Industry sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Manufacturing Industry		
281	Manufacture of Engines, Pumps, Compressors and Transmission Equipments	1,268
282	Manufacture of Machinery and Equipments of General Use	4,397
283	Manufacture of Tractors, Machinery and Equipment for Agriculture and Livestock	1,314
284	Manufacture of Tool Machines	701
285	Manufacture of Machine and Equipment of Use in Mineral Extraction and Construction	275
286	Manufacture of Machinery and Equipments of Specific Industrial Use	3,499
291	Manufacture of Automobiles, Vans and Utilities	92
292	Manufacture of Trucks and Buses	30
293	Manufacture of Cabins, Bodies and Trailers for Automotive Vehicles	373
294	Manufacture of Parts and Accessories for Automotive Vehicles	2,045
295	Reconditioning and Recovery of Motors for Automotive Vehicles	151
301	Construction of Vessels	201
303	Manufacture of Rail Vehicles	67
304	Manufacture of Aircrafts	18
305	Manufacture of Military Combat Vehicles	0
309	Manufacture of Transport Equipment not Previously Specified	241
310	Manufacture of Furniture	2,868
321	Manufacture of Jewelry, Imitation Jewelry and Similar Itens	302
322	Manufacture of Musical Instruments	73
323	Manufacture of Artifacts for Fishing and Sports	80
324	Manufacture of Toys and Recreational Games	227
325	Manufacture of Instruments and Materials for Medical and Dental Use and Optical Articles	
329	Manufacture of Miscellaneous Products	665
331	Maintenance and Repair of Machines and Equipments	1,163
332	Instalation of Machines and Equipments	0
TOTAL		125,980

Appendix A.3 - Service Sector Description

Table 18: Service sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Transportation, Storage and Mail		
491	Railway and Subway Transport	77
492	Road Transportation of Passengers	14,559
493	Cargo Road Transport	19,947
494	Pipeline Transportation	11
495	Tourist Trains, Telephares and Similars	0
501	Maritime Transport of Cabotage and Long-Term Course	270
502	Transport for Inland Navigation	483
503	Support Navigation	928
509	Other Waterway Transportation	119
511	Air Transport of Passengers	1,257
512	Cargo Air Transportation	0
513	Space Transport	0
521	Storage, Loading and Unloading	3,534
522	Auxiliary Activities of Land Transport	2,944
523	Auxiliary Activities of Waterway Transport	4,888
524	Auxiliary Activities of Air Transport	736
525	Activities Related to the Organization of Cargo Transport	0
531	Mail Activities	205
532	Express Mail and Delivery Activities	219
Accommodation, and Food		
551	Hotels and Similar	5,599
559	Other Types of Accommodation Not Previously Specified	652
561	Restaurants and Other Food and Beverage Services	5,508
562	Catering Services, Buffet and Other Prepared Food Services	1,101
Information and Communication		
581	Edition of Books, Newspapers, Maganizes and Other Editing Activities	763
582	Integrated Edition of Books, Newspapers, Magazines and Other Publications	2,029
591	Cinematographic Activities, Production of Videos and Television Programs	2,520
592	Sound Recording and Music Editing Activities	29

Appendix A.3 - Service Sector Description - Continuation

Table 19: Service sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Information and Communication		
601	Radio Activities	6,151
602	Television Activities	1,276
611	Wire Telecommunications	0
612	Wireless Telecommunications	0
613	Satellite Telecommunications	3,148
614	Pay Television Operators	0
619	Other Telecommunication Activities	0
620	Activites of Information Technology Services	8,124
631	Data Processing, Internet Hosting and Other Related Activities	1,743
639	Other Activities of Information Services Provision	285
Financial Activities, Insurance and Related Services		
641	Central Bank	0
642	Monetary Intermediation - Deposits	111,192
643	Non-Monetary Intermediation - Other Instruments of Caption	748
644	Lease	60
645	Capitalization Companies	130
646	Activities of Participation Companies	3,527
647	Investment Funds	21
649	Financial Services Activities Not Previously Specified	7,147
651	Life and Non-Life Insurances	5,018
652	Health Insurances	0
653	Reinsurances	87
654	Complementary Security	2,782
655	Healthcare Plans	3,143
661	Auxiliary Activities of Financial Services	2,842
662	Auxiliary Activities of Insurance, Complementary Security and Healthcare Plans	19,650
663	Administration Activities of Funds by Contract or Commission	0
Real State Activities		
681	Real State Activities of Own Property	23,406
682	Real State Acitivites by Contract or Commission	25,177

Appendix A.3 - Service Sector Description - Continuation

Table 20: Service sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Professional, Scientific and Technical Activities		
691	Legal Activities	44,306
692	Accounting, Consultancy and Audit and Tax Accounting Activities	42,463
702	Activities of Consultancy in Business Management	9,317
711	Architecture and Engineering Services and Related Technical Activities	14,904
712	Technical testing and Analysis	779
721	Research and Experimental Development in Physical and Natural Sciences	717
722	Research and Experimental Development in Social and Human Sciences	413
731	Publicity	8,426
732	Market Research and Public Opinion	628
741	Interior Design and Decoration	0
742	Photographic and Similar Activities	166
749	Professional, Scientific and Technical Activities not Previously Specified	0
750	Veterinary Activities	1,757
Administrative Activities and Complementary Services		
771	Rental of Transports Without Driver	2,162
772	Rental of Personal and Domestic Objects	337
773	Rental of Machines and Equipment Without Operator	1,388
774	Management of Intangible Non-Financial Assets	141
781	Labor Agency and Selection	0
782	Temporary Labor Location	1,930
783	Supply and Management of Human Resources for Third Parties	0
791	Travel Agencies and Tour Operators	3,327
799	Reservation Services and Other Tourism Services not Previously Specified	0
801	Monitoring Activities, Private Security and Transport of Securities	1,076
802	Monitoring Activities of Security Systems	0

Appendix A.3 - Service Sector Description - Continuation

Table 21: Service sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Administrative Activities and Complementary Services		
803	Private Investigation Activities	0
811	Combined Services for Building Support	669,775
812	Cleaning Activities	2,100
813	Landscape Activities	0
821	Office and Administrative Support Activities	0
822	Teleatendiment Activites	0
823	Activities of Organization of Events, Except Cultural and Sportive	0
829	Other Service Activities Provided Mainly to Companies	28,059
Public Administration and Social Secutiry Services		
841	State, Economic and Social Policies Administration	26,201
842	Collective Services Provided by the Public Administration	2,355
843	Mandatory Social Security	788
Education		
851	Children Education and Fundamental Teaching	12,992
852	High School	6,234
853	College Education	1,835
854	Professional Education of Technical and Technological Level	2,488
855	Education Support Activities	0
859	Other Teaching Activities	19,906
Human Health and Social Services		
861	Hospital Care Activities	21,526
862	Mobile Services for Urgencies and Removal of Patients	2,017
863	Ambulatorial Attention Activities Carried Out by Doctors and Dentists	64,986
864	Activities of Diagnostic and Therapeutic Complementation Services	52,092
865	Professional Activities of the Health Area, Except Doctors and Dentists	24,293

Appendix A.3 - Service Sector Description - Continuation

Table 22: Service sector description at a 3 digit level based on CNAE 2.0 classification

CODE	DESCRIPTION	FREQUENCY
Human Health and Social Services		
866	Support Activities for Health Management	0
869	Humam Health Care Activities Not Previously Specified	24,064
871	Assistance Activities for Elderly, Disabled, Immunocompromised and Convalescents Patients, and Infrastructure and Support for Patients Provided in Collective and Particular Residencies	0
872	Activities of Psychosocial and Health Assitance to Carriers of Psychic Disorders, Mental Deficiency and Chemical Dependence	0
873	Social Assistance Activities Provided in Collective and Particular Residencies	14,634
880	Social Assistance Services Without Accommodation	11,926
Arts, Culture, Sports and Recreation		
900	Artistic, Creative and Spectacular Activities	2,843
910	Activities Linked to Cultural and Environmental Heritage	951
920	Exploitation Activities of Gambling and Betting Games	0
931	Sport Activities	31,355
932	Recreation and Leisure Activities	7,254
Other Service Activities		
941	Activities of Patronial, Business and Professional Associations Organizations	30,742
942	Activities of Union Organizations	59,014
943	Activities of Social Rights Defense Associations	0
949	Activities of Associative Organizations Not Previously Specified	216,770
951	Repair and Maintenance of Computer and Communication Equipment	823
952	Repair and Maintenance of Personal and Domestic Objects and Equipment	586
960	Other Activities of Personal Services	6,735
Domestic Services		
970	Domestic Services	64
TOTAL		1,773,680

Appendix B.1 - Leads and Lags - Commerce sector

Table 23: Robustness of estimated impact of Simples Nacional Program on firm growth rate, Leads and Lags, Brazilian Commerce sector firms, 2003-2012.

Variables	(1)
3 Years Before SN	0.012
	(0.011)
2 Years Before SN	0.012
	(0.009)
1 Year Before SN	0.018*
	(0.010)
SN - 1 Year	0.080***
	(0.012)
SN - 2 Years	0.072***
	(0.015)
SN - 3 Years	0.042***
	(0.012)
SN - 4 Years	0.029**
	(0.011)
SN - 5 Years	0.036***
	(0.012)
SN - 6 Years	0.036***
	(0.013)
Year FE	YES
State FE	YES
Trend*State FE	YES
$Trend^2$*State FE	YES
Covariates	YES
Observations	465,360
Number of Firms	46,536

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Appendix B.2 - Leads and Lags - Industry sector

Table 24: Robustness of estimated impact of Simples Nacional Program on firm growth rate, Leads and Lags, Brazilian Industry sector firms, 2003-2012.

Variables	(1)
3 Years Before SN	0.036
	(0.046)
2 Years Before SN	-0.023
	(0.026)
1 Year Before SN	0.014
	(0.034)
SN - 1 Year	0.162***
	(0.059)
SN - 2 Years	0.037
	(0.034)
SN - 3 Years	-0.026
	(0.039)
SN - 4 Years	-0.037
	(0.044)
SN - 5 Years	-0.082**
	(0.039)
SN - 6 Years	-0.047
	(0.045)
Year FE	YES
State FE	YES
Trend*State FE	YES
$Trend^2$*State FE	YES
Covariates	YES
Observations	125,980
Number of Firms	12,598

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Appendix B.3 - Leads and Lags - Service sector

Table 25: Robustness of estimated impact of Simples Nacional Program on firm growth rate, Leads and Lags, Brazilian Service sector firms, 2003-2012.

Variables	(1)
3 Years Before SN	0.005
	(0.006)
2 Years Before SN	0.019***
	(0.007)
1 Year Before SN	0.051***
	(0.009)
SN - 1 Year	0.168***
	(0.013)
SN - 2 Years	0.088***
	(0.012)
SN - 3 Years	-0.030***
	(0.009)
SN - 4 Years	-0.082***
	(0.008)
SN - 5 Years	-0.082***
	(0.012)
SN - 6 Years	-0.063***
	(0.024)
Year FE	YES
State FE	YES
Trend*State FE	YES
$Trend^2$*State FE	YES
Covariates	YES
Observations	1,773,680
Number of Firms	177,368

Note: ***, ** and * represent $p < 1\%$, $p < 5\%$ e $p < 10\%$. Standard error at clustered at firm level. Covariates are the ones presented in Table 1 available from (RAIS microdata) and also include sector dummy at a 3 digit level based on CNAE2.0 classification.

Appendix C - Standard Differences-in-differences Model

The standard differences-in-differences model was especified as shown below:

$$\begin{aligned} Y_{it} =& \beta_0 + \beta_1 Post_t + \beta_2 SimplesNacional_{it} + \beta_3 Post_t * SimplesNacional_{it} + \\ & \alpha X'_{it} + \lambda_s + \lambda_t + \theta Trends_t + \epsilon_{it}, \end{aligned} \tag{3}$$

as well as our main especification, Y_{it}, the explained variable, represents the growth rate of firm i at year t; $Post_t$ and $SimplesNacional_{it}$ are dummy variables representing the years after intervention and if firm i at time t is declare taking part in the Simples Nacional Program. X_{it} represents firm controls, sector dummies at a 3 digit level and two time trends (linear and quadratic). λ_s and λ_t stands for state and year fixed effects, respectively. Moreover, the standard error has been clustered at firm level, making the calculation of robust standard error to correlation and heteroscedasticity (Bertrand, Duflo, Mullainathan (2004); Angrist, Pishke (2009)).

Our parameter of interest is β_3 that captures the difference in difference between the conditional expected value of firm growth rate before and after the policy intervention for each group of enterprises. It means that, with no controls X_{it}:

$$\begin{aligned} \beta_3 = & E[Y_{it}|SimplesNacional = 1, Post = 1] - E[Y_{it}|SimplesNacional = 1, Post = 0] \\ & - E[Y_{it}|SimplesNacional = 0, Post = 1] - E[Y_{it}|SimplesNacional = 0, Post = 1] \end{aligned} \tag{4}$$