

Chagas, Andre; Almeida, Alexandre

Conference Paper

The impact of change in MSEs' regulation in municipalities in Sao Paulo state, Brazil

54th Congress of the European Regional Science Association: "Regional development & globalisation: Best practices", 26-29 August 2014, St. Petersburg, Russia

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Chagas, Andre; Almeida, Alexandre (2014) : The impact of change in MSEs' regulation in municipalities in Sao Paulo state, Brazil, 54th Congress of the European Regional Science Association: "Regional development & globalisation: Best practices", 26-29 August 2014, St. Petersburg, Russia, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/124500>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

**The impact of change in MSEs' regulation in municipalities in Sao Paulo state, Brazil
(Draft version)**

André Luis Squarize Chagas

University of São Paulo,
Department of Economics
achagas@usp.br

Alexandre Nunes de Almeida

University of São Paulo, ESALQ,
Department of Economics
alex.almeida859@gmail.com

Thiago Pastorelli

Research of FIPE, São Paulo
rodrigues.t@gmail.com

Abstract

In 2006 was approved, in Brazil, a new regulatory framework, named General Law of Micro and Small Enterprises (MSEs), regulating and expanding special conditions for MSEs - that representing more than 90% of companies in Brazil. The Law introduces differential treatment to MSEs for starting a business, reducing legal requirements, and providing differential treatment for government purchases, among others. In São Paulo state, the Law was promulgated in late 2007. About 340 municipalities (out of 648) approved local laws in the same way of National one. Among these, in 91 municipalities already there evidence that these points are actually implemented. The objective of this study is to estimate the effect of regulation of the MSEs' General Law in municipalities of the state of São Paulo over economic indicators. We use a treatment effect analysis, and we distinguish the municipalities that received treatment (implemented the local laws) who did not (other municipalities). The municipalities, however, do not have the same probability of belonging to one group or another. Observables variables can distinguish the two groups, such as the importance of industry and specialized services, activities of trade associations, formalization rate of hand labor, number of micro and small enterprises before implementation, etc. Specifically, factors such as location and proximity to other cities that implemented the Act may also influence. In a sense, the spatial distribution of the implementation of Law over time can also be considered as an important factor for future implementations. This fact introduces a selection bias when comparing sets of municipalities whose possibilities were different, and that therefore the best answer is different. We use a spatial propensity score matching to control the potential effect of neighbor municipalities through the probability of selection. Thus, we select those municipalities that have not implemented the law with similar observables characteristics to cities that implemented, to constitute a control group for purposes of evaluating the performance of treated municipalities. As the effect of the treatment can be given in time, can also, depending on the available database, subdivide the group of municipalities treated over time, making sure the effect is greater in those who longest time implemented the Law.

Keywords: Institutional change; impact analysis; spatial propensity score matching; micro and small enterprises

JEL Code: C21, C31, L5

1. Introduction

In Brazil, as in many other countries, micro and small enterprises (MSEs) represent a big part of the number of enterprise and jobs. Based in official statistics, that covers only the economy's formal sector, more than 90% of Brazilian companies are MSE. In December 2006, it was implemented the National Law of the Micro and Small Enterprises, named General Law (GL). This new regulation extended special conditions to MSE, such as differentiated business tax, preference in public procurement, facilitation to access to credit market, among other benefits. The expectation was that this new law would contribute to increase the number of MSE companies, jobs, and wages.

However, the specificity of juridical system in Brazil, requires that the Federal law is regulated by local govern, such as states and municipalities (counties), which difficult a fast effect of the law. Sebrae is an official institution that monitors, evaluates and subsidies local policy makers to implement the new law. There are local offices of Sebrae in each state of Brazil. In Sao Paulo, one of the main Brazilian state in economics project, the Sebrae-SP office develops its activities with MSEs, associations, syndicates, and governments. In Sao Paulo, there are 33 regional offices subordinate to headquarter office of the Sebrae-SP.

Within the 648 municipalities, 183 already regulated the law. Further, the experience of the Sebrae's technicians suggests that the formal adoption of the law is insufficient to cause impact. They developed a set of criteria to verify the law's implementation, that is, empirical evidences that policy makers are in fact enforcing the law prescription. Among the municipalities that regulate the general law in more than 80 of them already, there is strong evidence that the law is implemented.

The objective of this work is to study the impacts of the general law in the municipalities. The work is divided into two parts. In the first part, the goal is to estimate the impact of regulation of the GL by aggregates data. In the matching literature effects, this is interpreted as the effect of treatment on the treated (ATET). It then distinguishes the municipalities that received treatment (implemented the law) who did not (other municipalities). The municipalities, however, do have the same probability of belonging to one group or another. Observable characteristics can distinguish the two groups, such as the importance of industry and specialized services, presence of Sebrae's regional offices, activities of trade associations, formalization's rate of labor, number of micro and small businesses before implementation etc. Others factors may also influence, such as location and proximity to other cities that have also implemented the Law, a spillover effect. In the second part, we introduce spatial controls to improve the matching and consequently try to improve the impact estimates. We follow the proposal of Chagas et al (2012). The measure of the effects is over the number of new establishments of micro and small enterprises; number of employees employed in MPE, and total wages of employees employed in MPE.

This paper report results of the work in each of these parts, as is shown in sequence. In the next section, we present the GL and its change in the Brazilian institutional systems. Then, we analyze the impacts of the GL on aggregated data, using the usual methods of treatment and control. The third section considers the potential spatial interactions between municipalities. We end the last section with final remarks and conclusions.

2. The National Law of the Micro and Small Enterprises (General Law)

In December 2006, it was sanctioned the National Status of Micro and Small Enterprises, named as the General Law of Micro and Small Enterprises (General Law) - Complementary Law 123/06, 12/14/2006. The law consolidates the existing laws in Brazil about these developments, improving the general environment for these businesses through reducing taxes, bureaucracy and creating new business opportunities, which meets the main demands of this segment. Special treatments are established, both as business tax, as the particularities related to bids public, additionally regulated by Decree 6.204/2007 of 05/09/2007.

The GL (GL) was designed with the broad participation of civil society, business entities, Legislative, and Executive. Have gone through four rounds of amendment (Laws Complementary 127/2007, 128/2008, 133/2009, and 139/2011), which improved certain devices for the development

and competitiveness of micro and small Brazilian companies, such as generating labor, employment, income distribution, social inclusion, reduce informality and strengthening the economy.

The GL establishes general rules relating to differential treatment and favored to be dispensed to the Microenterprise (ME) and the Small Enterprises (SE) within the powers of the Union, the states, the Federal District and the municipalities, in accordance with Articles 146, 170 and 179 of the Federal Constitution.

The main benefits provided by GL are:

- a) Unified system of calculation and payment of taxes and contributions to the Union, the states, the Federal District and the municipalities, including simplification of accessory tax obligations;
- b) Tax exemption of export earnings and tax substitution;
- c) Exemption from compliance with certain labor and social security obligations;
- d) Simplification of the opening, modification, and closing processes;
- e) Facilitating access to credit market;
- f) Preferably in public procurement;
- g) Stimulate technological innovation;
- h) Encourage the formation of associations in consortia for fostering business;
- i) Encourage the formation of consortia for access to safety and occupational health services;
- j) Regulating the figure of small business, creating conditions for its formalization;
- l) Payment of tax debt to Simple adherence to National.

The states and municipalities were regulating the GL gradually. The State of São Paulo sanctioned the State Law (Decree 52.228/2007) on 10/05/2007, and since then, about 340 municipalities approved local laws. Besides the approval of the GL, it is need to adopt specific actions by municipalities towards the implementation of their benefits, and four are the main points of implementation, namely:

- Debureaucratization: development of mechanisms that simplify the process of opening and low micro and small enterprises through the integration of municipal registration agencies;
- Individual Microenterprise (IME): municipality distinguished service to the people who work for themselves and are formalized as a small business by opting National Simple, with gross annual revenues of up to R \$ 60,000.00, on average \$ 5,000.00 per month ;
- Market Access: Insert the micro and small enterprises in important government procurement market through simplified and preferential treatment in tenders held by public bodies;
- Local Development Agent: indicated by the mayor, with the duties of organizing a work plan to implement appropriately the benefits of the GL on municipalities; identify and mobilize the public, private and community leaders, who can collaborate with the Project; assemble official working groups with representatives of institutions; and assist the municipal government in enrollment and engagement of individual microenterprise.

3. Assessing the impact of GL municipalities in the state of São Paulo - impact analysis

The purpose of this section is to identify and analyze the impact on the numbers of establishments, employees, and average wages in MSE in the counties that have implemented the GL, compared to municipalities that have not implemented, without the application of spatial controls. We constructed the analysis from information contained in the Annual Report of Social Information (ARSI) 2012, an administrative database provided by the Ministry of Labor and Employment.

The hypothesis guiding this analysis is that with the implementation of the GL, a significant contribution to the increase in the number of establishments, employees, and wage MSE. In order to measure this impact, we used the methodology of the estimator of the Average Treatment Effect (ATE), in conjunction with the technique of matching by propensity score. The latter tool allows pairing characteristics of municipalities to create a control group, which enables comparison between implementers and non-implementers of the GL, and has the desirable feature adjacent eliminating possible sample selection biases. In the sequence, we do a brief description of the two methodologies used in the impact assessment, followed by the description of the data and results of the estimates.

3.1 Assessment of Average Treatment

In general, the evaluation of treatment (ATE) involves the measurement of the difference in outcomes of interest between agents participating in a treatment (an intervention evaluated) and another group that does not participate. In the ATE literature, the "non-participants" are termed as "counterfactual" or control group. Formally, for a municipality i in a period t , the conditional average treatment effect on treated (ATET) is given by (1)

$$ATE_T = E[Y_i^T | D_i = 1] - E[Y_i^C | D_i = 0] \quad (1)$$

where Y_i is the potential outcome, the impact to be measured, D_i is a dummy variable indicating whether the municipality received treatment ($D_i = 1$), and ($D_i = 0$) is not part of the treatment.

Clearly, both results cannot be observed at the same time for the same municipality i , establishing itself as the main analytical problem in the impact assessment. The method of Propensity Score Matching (PSM), discussed below, is the method that not only allows the construction of a counterfactual group (control), but also assists in eliminating possible bias in the sample selection in observed variables (Rosenbaum and Ruby, 1983).

3.2 Matching by propensity score

The main objective of the propensity score matching method is to generate a "score" equal to the probability of receiving treatment, considering both treated and untreated from a given set of predetermined covariates (Cameron and Trivedi, 2005). In principle, any binary choice model can be used to measure the probability of participating in an intervention or not, but logistic regressions have been widely used (Becker and Ichino, 2002). After the estimation of binary choice including participants and non-participants, and assuming that some conditions are met (See Caliendo and Kopeinig 2008 for details), the next step is to build a treated group using the propensity score (expected probability), therefore generating the counter-factual situation. In the impact assessment literature, many pairing techniques (matching) are available, and there is not a technique definitely better than the other (Caliendo and Kopeinig, 2008). This report will use the most commonly employed techniques, such as nearest neighbor (nearest neighbor), nearest neighbor with preset distance (Radius Matching), non-parametric regression (Kernel Matching) and Mahalanobis (Covariate Matching).

3.3 Data

Table 1 shows mean and standard deviation of the variables used in the analysis for 643 counties of the Sao Paulo state¹. The data used for analysis in this work are municipal data from three sources, namely: Sebrae, IBGE (the Brazilian official statistical department) and ARSI.

For this impact analysis, 2012 is the base year, but have also included data for 2011 and 2014 allowing for robust analysis according to the proposed methodology.

In 2012, only 12.8% of counties had implemented the GL. About 4.2% of the municipalities are the home of the Regional Office. Based on the ARSI, the average growth rate in the number of establishments in the state between 2011 and 2012 was negative (-1.063%). On the other hand, the supply of workers showed growth (20.8%). The average area of 383km² while municipalities corresponds to the average population was 46,658 individuals. Only 10% of municipalities belonged to corresponding metropolitan area in the state.

TABLE 1 HERE

¹ We exclude the municipality of Clementina by lack of information regarding the ARSI was deleted in 2012. We also exclude the capital because the average values of the information used to distance themselves from the average state. This feature is known as "outlier data" in the sample and can affect / impair significantly the result of the impact.

In order to assess the impact proposed by this work, two variables were also constructed, from the information relating to Sebrae's action in the year 2014. The "proportion" variable represents the sum of the municipalities that participated in the course for the Local Development Agent (LDA) in 2014 on the municipalities that compound the Sebrae Regional Office (RO) area. In addition, the "implepartic" variable represents the sum of the municipalities that participated in the course for the LDA in 2014 on the sum of the GL that implemented in 2012. These two pieces of information, in turn, serve as a target to simulate if the action of Sebrae would contribute to increase the likelihood of the municipality to implement the GL or not.

3.4 Results

Table 2 presents the results obtained in the estimation of logit econometric models used to obtain the propensity scores by assessing the probability of the counties to implement the GL or not. The differentiation of the groups is given by a binary to classify municipalities that implemented the law ($D = 1$) and those not implemented ($D = 0$), corresponding to the treatment groups and the control, respectively code. Six models in accordance with the level of robustness through the gradual addition of variables based on the model 1 were tested.

TABLE 2 HERE

Overall, the results were quite satisfactory with the expected signs and the level of statistical significance. For example, Model 1 shows that the city which is the seat of the ER have increased likelihood of implementing the GL. It is interesting to point out that the area and population of a municipality also influence; this is when the largest municipality in the greater geographical area and its population, the greater the likelihood of implementing the GL.

In this exercise we were also estimated to include information provided by Sebrae-SP on the number of course participants for local development agent in 2014. Notice that this information is imputed to the year 2012, the year of interest of this analysis. Therefore, the results should be analyzed with relative caution. Of the two variables constructed, "proportion" and "implepartic", the results of the logistic regression coefficients were statistically significant. The "proportion" variable that is the sum of the municipalities that participated in the course for the Local Development Agent (ADL) in 2014 on the municipalities that comprise the ER, increasing the signals that such participation, the greater the likelihood that the municipality implement the GL.

In contrast, the variable "implepartic", which is the sum of the municipalities that participated in the course for the LDA in 2014 on the sum of the GL that implemented in 2012, although statistically significant, did not show the expected signal.

Although both above information has only served as indicators in the simulation (to control the action of Sebrae), it is worth pointing out that the first information indicate that, by increasing the "proportion" of the participating municipalities in LDA training, can contribute substantially in spatial terms (spillover effect) for the implementing the GL in all adjacent municipalities to the RO².

Following the literature of the average treatment effect in conjunction with propensity scores (expected probability) obtained from the logit model, the next step below, in possession of this information, is to make the matching of the samples to calculate the impact of treatment. As described in the methodology, there are several algorithms in the literature. However, apply in this report only the most commonly employed by the works of the impact assessment.

Once done matching, the next key step is to check whether the treatment and control samples did not show statistically significant differences (balancing test). A simple student t test serves this purpose well. If there are no statistical differences, one can say that it succeeded in replicate a

² The spatial spillover effects occur when the effect of one variable at a given location also impacts the neighboring localities.

random experiment, in which sample selection biases that affect the quality of the result, are naturally eliminated.

We calculated Logit estimates of the six models, but we report the impact only for the last three scores (Model 4, Model 5 and Model 6). The criterion adopted considered the significance levels of the coefficients and the robustness of the model.

Before making any inference about the impact of the GL on the growth in the number of workers and establishments, key point of the analysis, it is important to check the balancing tests of the covariates variables (explanatory variables) used in the models chosen for the propensity scores. These results are shown in Table 3 and Table 4. Two statistical comparisons are present. The first one is the "p-value", or p-value. This measures the probability of obtaining a test statistic equal to or more extreme than the one observed in a sample under the null hypothesis. In general, values greater than 0.10 indicate that the null hypothesis that there are no statistical differences between treatment and control groups cannot be rejected. The second one measure of comparison is the standardized bias (SB). This is calculated by dividing the difference in means of each covariate between the treatment and control groups by the standard deviation of them. In general, it takes less than a criterion of 20% to infer that there is no bias in the sample selection among treatment and control groups.

In Table 3 and Table 4 are possible to observe that in almost all algorithms of the five chosen models except the kernel algorithm, there are no statistically significant differences between treatment groups and control for each covariate. Therefore, only results from the impact of nearest neighbor, caliper, and mahalonobis algorithms are validated and measuring the treatment effect "per se", a random experiment was performed.

TABLE 3 HERE

TABLE 4 HERE

The results of the impact of implementing the GL on the growth rate of the number of workers (Table 5), the number of establishments and the rate of salary of workers, were calculated for the last two years of available ARSI, 2011 and 2012 and are shown in Tables 3, 4 and 5, respectively.

For most of the algorithms used, the growth rate of the number of workers was not significant and some did not show the expected signs. However, in the logit model 4 Mahalonobis algorithm, the result was positive and expected. That is, the impact in implementing the GL, is that the supply of workers grow about 10 pp, per annum, more than the municipalities that have not implemented the GL.

TABLE 5 HERE

Regarding the growth in the number of establishments (Table 6), the results were more consistent. We did not observe distorted signs and the magnitude of the impact coefficients showed similarities except the nearest neighbor algorithm, which used the propensity score of the model 4, but its result was not statistically significant. Following the approach that there is no statistical difference between the covariates, used to obtain the propensity score in Logit model 5, in conjunction with the nearest neighbor algorithm, it is possible see that with the implementing of the GL there would be a growth in the number of establishments about 3% per year.

TABLE 6 HERE

The impact of implementing the law on the mass of the wage rate (Table 7) was similar to the number of establishments, with the most consistent, positive results, although the coefficients were

not statistically significant. In short, implementing the GL could be an impact on the rate of wages of approximately 6% to 32% in each municipality, on average.

Annex 1 shows the results for municipalities that have up to 200 thousand in the year 2012, based on the same methodology. The results of the impact testing and balancing is performed in the same way as described in the preceding lines.

TABLE 7 HERE

4. Evaluating the impact of general law municipalities in the state of São Paulo - spatial analysis

The purpose of this section of the work is to evaluate the impact of general law municipalities in the state of São Paulo on measures of local economic activity, employment of space control techniques. Such measures, along with micro and small enterprises (MSEs) activities, are extracted from the ARSI. Thus, the variables of interest are: amount of MPE, number of employees and payroll.

According to data from ARIS, shown in Table 8, between 2006 (year of the promulgation of Complementary Law No. 123) and 2012 (base year for this study), the number of stores grows 15%, while the number of employees and salaries grow 44% and 34%, respectively.

TABLE 8 HERE

Despite the growth over time, the distribution of these variables is not homogeneous in space. Figure 1 shows the spatial distribution of the amount of MPE, number of employees and payroll, respectively, in 2012. The eastern part of the state, especially the quad covering Sao Paulo, Sorocaba, Campinas and São José dos Campos has a higher concentration of municipalities in the last quartile of the distribution of variables.

FIGURE 1 HERE

The impact of the General Law is assessed through the effect of the regulation and implementation of the law on municipalities. The regulation refers to the approval of the relevant bylaw, while implementation is related to the effective implementation of the regulated actions. According to Sebrae data presented in Table 9, between 2007 and 2012, 28% of municipalities in the state of São Paulo regulated and 13% have implemented the law. Thus, among the municipalities that have regulated, only 45% implemented.

TABLE 9 HERE

Figure 2 show the distribution of the regulation and implementation of the General Law. Figure 2 (a) suggests the existence of clusters of municipalities that regulated the law, especially in the eastern part of the state, the region with the highest number of municipalities in the last quartile of the distribution of the variables of interest, as seen in Figure 1. Accordingly, Figure 4 suggests a correlation between regulation and measures of economic activity MPE. On the other hand, the implementation of law, shown in Figure 2 (b) has an apparent random distribution in space. Thus, the correlation between the variables of interest and the implementation is less clear.

FIGURE 2 HERE

Table 10 shows the average of the variables of interest to three groups of municipalities. Group 1 consists of municipalities that regulated the law (treatment) and regulated by municipalities that do not (control). Group 2 consists of municipalities that implemented the law (treatment) and municipalities that have not implemented and not regulated (control). Finally, the third group

consists of municipalities that implemented the law (treatment) and municipalities that have not implemented, but regulated (control).

TABLE 10 HERE

According to the table, the second group has the greatest difference between treatment and control. In this group, the municipalities that implemented the law have on average 76% more stores 97% more jobs and wages 78% higher, compared to municipalities that have not implemented and not regulated. The smallest difference, although significant, is in group 1, in which the law that regulated municipalities have on average 63% more firms 55% more jobs and wages 61% higher. These results suggest that the regulation and implementation of the General Law can be correlated with greater economic activity MPE in São Paulo, which warrants a more detailed investigation of the effect of this policy.

Therefore, in order to assess the effect of general law municipalities in the state of São Paulo, two methods are employed: by pairing propensity score matching and regression. Additionally, due to the nature of the observed spatial units spatial approaches are considered.

4.1. Matching³

4.1.2 Matching regression

In addition to the matching methods of section 3, we consider the matching by regression. The linear regression model can also be viewed as a pairing estimator. For ATT using linear regression, the propensity score as an explanatory variable is used. In this case, it is estimated a simple linear regression of Y on P (X) for the subsample of municipalities untreated, and the estimated values of this regression are used to predict the values of the results of treated municipalities if they do not receive treatment.

Being valid conditional independence assumptions and the existence of common support (see (Caliendo and Kopeinig 2008)), we defined the ATT estimator as:

$$ATT = \frac{1}{N_T} \sum T [Y - \hat{\mu}(X)]$$

where $\hat{\mu}(X)$ is the predicted value for the treatment group using the coefficients estimated by simple regression in the control group. The linear regressions for the treatment group and control are estimated using the propensity score as a control variable.

4.2 Variables and Spatial Dependence

4.2.1 Variables

In this study, the dependent variables are the measures of local economic activity associated with micro and small enterprises (MSEs): Natural logarithm of the number of establishments (lnmpe), natural logarithm of the number of workers (lntrab) and natural logarithm of wages (lnsal) in this segment. Again, these variables are ARSI database to the year 2012.

Treatment variables are binary indicating whether a municipality has implemented (implemented) or regulated (regulated) the GL between 2007 and 2012. Such variables are extracted from the monitoring system of the Sebrae. The definitions and rules of implementation of the law are based on the following items: using purchasing power, bureaucratization, individual microenterprise (MEI) or the Local Development Agent (LDA). The law is considered regulated by a municipality if there is evidence of regulation of use purchasing power or other items. In turn, the law is considered implemented by the monitoring system, if effectively occurred actions accordingly.

³ Based on Gertler *et al.* (2011), Kandker *et al.* (2010) and Pinto (2012).

The independent variables are incorporated into this study as variables that explain the probability of a municipality or regulation implementing the General Law as well as control variables. The variables that attempt to explain the probability of a municipality or implementing regulatory law can be divided into groups featuring: the effort Sebrae-SP; the political environment of the municipality; local demographic and economic characteristics.

We control the effort of Sebrae-SP by some variables. The first one is a binary indicating whether the municipality is head office to the regional office (ro). The second one is the ratio between municipalities that participated in the course of LDA related to the number of municipalities for regional office in 2014, as a proxy of individual effort of the regional office (Adler). The third one is the proportion of municipalities that participated in the course of LDA related to the number of municipalities that law regulations by regional office were subjected (adlregul), as a proxy of the regional office of the effort to implement the law. These variables are constructed from data provided by Sebrae-SP.

To control the political environment of the municipality we use a binary indicating whether the mayor belongs to the party of the current Chief Minister of the Department of Micro and Small Enterprises between 2006 and 2012 (pref). We uses to a binary indicating whether the party the mayor belongs to the support base of the Governor of the State between 2006 and 2012 (gov); and a binary indicating whether the party the mayor belongs to the support base of President between 2006 and 2012 (pres). We used information extracted from Superior Electoral Court (SEC).

To explain the probability of a municipality or implement regulatory GL we use demographic and economic variables, such as the natural logarithm of the population (lnpop); the natural logarithm of municipal gross domestic product (lnpib); natural logarithm of the tax revenue of the municipality (lntrib); and the ratio of number of workers employed in MPE related to total formal employees of the municipality (txtrab). These variables refer to the year 2006, the year of enactment of GL. The demographic and economic variables are extracted from IBGE and the database of the National Treasury Secretariat (FINBRA / STN). These variables refer to the year 2006, year of the promulgation of Complementary Law No. 123, during which the regulation and implementation of the GL on Municipalities may be established. The demographic and economic variables are extracted from the Brazilian Institute of Geography and Statistics (IBGE) and the Finance of Brazil base of the National Treasury Secretariat (FINBRA / STN).

Finally, additional control variables incorporated into the work are: 1) natural logarithm of the amount of individual microenterprise the municipality (lnmei) in 2012 and, 2) the municipal GDP 2012 forecast (lnpib12). These variables are provided by Sebrae and refer to December 2012. Table 11 shows the summary statistics of the variables used in the study.

TABLE 11 HERE

4.2.2 Spatial Dependence

The unit of interest in this study are the municipalities of the state of São Paulo. Due to the spatial nature of the binary implementation and regulation, shown in Figure 2, the possibility of spatial dependence between observed units should be considered. By means of spatial weights matrices, featuring the kind of neighborly relationship between the municipalities, we introduced the spatial dependence. Table 12 shows the summary statistics of the spatial weight queen type, where two municipalities are considered neighbors if they share a common weighted matrix related to physical boundary. Using geographic coordinates of the municipal headquarters, provided by IBGE, we calculated the distance between the cities.

TABLE 12 HERE

According to this table, the municipalities of the state of São Paulo have an average of 6 contiguous neighbors, and the greater distance they are 60 miles or so. In order to check what kind of

neighborhood relationship is associated with better spatial dependence, two types of weights matrix is constructed: k nearest neighbors (kdn) and inverse distance (idist). The kdn matrix provides the same weight to each neighbor. Already idist matrix establishes inversely proportional to the distance of each neighbor to the municipality of reference weights. Based on Table 4, and to ensure that each array has at least the same number of contiguous neighbors, the distances considered in the construction of matrices are 90, 100, 110, and 120 kilometers.

Table 13 shows the value of Moran's I statistic for the implem and regul. According to the table, you can reject the null hypothesis of no spatial dependence for these binary at a significance level of 10%, i.e., there is evidence of spatial dependence for the implementation and regulations of the law, which corroborates the nature spatial data analysis. On the other hand, considering only the municipalities that regulated the law (equivalent to group 3 of Section 4.1), through implem* binary, there is no evidence of spatial dependence related to the implementation of the binary.

TABLE 13 HERE

Given the evidence of spatial dependence of the treatment variables, it must be determined whether the spatial dependence persists after estimating the probability of a municipality receiving treatment. Thus, Moran's I is estimated in two stages. We estimate the probability of a municipality receiving treatment T (implement or regulate the GL) in the first stage. It is estimated Moran's I statistic of residuals both in the first stage and the second.

Formally, the first stage consists of estimating the following logit model:

$$P(T = 1|X) = \Phi(\beta_0 + \beta_1 adler + \beta_2 adlregul + \beta_3 er + \beta_4 pref + \beta_5 gov + \beta_6 pres + \beta_7 lnpop + \beta_8 lnpiib + +\beta_9 lntrib + \beta_{10} tstrab)$$

where the treatment variables (T) are *implem*, *implem** and *regul*; $\Phi(\cdot)$ is logit function; β_k are parameters associated to k explicative variables. When estimating the logit model for the variable *regul* treatment is imposed the restriction $\beta_2 = 0$, to eliminate possible endogeneity of *adlregul* variable. Table 6 shows estimated results.

TABLE 14 HERE

Table 15 shows the Moran's I statistics of residuals of model (4). According to the table, binary regulated for all values are positive and statistically significant at 10% and the largest value corresponds to knd90 matrix; the same result is found when considering the binary implementer. As for the binary implem*, the estimated values for Moran's I are not statistically significant.

TABLE 15 HERE

Therefore, the results suggest the existence of spatial dependence in the regulation and implementation of the GL on municipalities, which indicates that the spatial dimension should be considered in the impact analysis. As the spatial weight matrix k neighbors at a distance of 90 km (knd90) shows higher Moran's I, this neighborhood relationship is incorporated in the analysis.

4.3 Results

The impact of GL in municipalities in the state of São Paulo is assessed by means of the effect of treatment on the treated (ATT). For this it is necessary to estimate the propensity score $P(X)$ based on the explanatory variables X .

4.3.1 Propensity Score

The probability of participation in treatment T , conditional on X , is estimated for 2006, before the possibility of implementing regulations or the General Law for all municipalities year. To compare

the results of treated municipalities ($T = 1$) with those not treated ($T = 0$), this probability is estimated by a logit model space.

Note that the inclusion of many explanatory variables X in treatment equation should be avoided, because over-specification of the model can result in high standard errors for the estimated propensity score $P(X)$. This can also result in perfect prediction of participation for many municipalities $P(X = 1)$, which in this case would lead to exclusion of the municipalities from the common support. Thus, we opted by a parsimonious model, since, as indicated above, it is more important to obtain a distribution of the probability of treatment to determine the share itself.

The LM tests applied to logit models indicate that the spatial logit model that best fits the data is the spatial error model (SEM) over the spatial autoregressive model (SAR). This indicates that the probability of a municipality to implement or regulate the GL may be related to unobservable characteristics of their neighbors. Thus, the SEM model is estimated by Bayesian methods, considering the introduction of a spatial lag associated with $knd90$ array at the end of the model (4) error. Tables 16 and 17 show the results.

TABLE 16 HERE

TABLE 17 HERE

According to the tables, we can see that the lambda parameter space, associated with spatial lag at the end of the model error is significant for regul, which corroborates the spatial nature of this variable, suggested by Tables 6 and 7. Already in the model corresponding to implem, the lambda parameter space is not statistically significant at 10%, however, this result does not invalidate the use of this model, given the evidence of spatial existence found in Section 4.2.

After the estimation of spatial models, the predicted values of T are extracted. The predicted results represent the estimated probability of treatment, i.e., the propensity score. In the case of binary implem*, shows no evidence that spatial dependence, the predicted value of T is taken directly from the model corresponding to the equation (4).

4.3.2 Common support and balanced

The common support region is defined within a range in which the distributions of the propensity score for the control and treatment groups overlap. Observations outside the region of common support are excluded from the sample.

Figure 3 shows the common support for the propensity score estimated by binary logit models of regul, implem and implem*. According to the figures, we can see that the assumption of common support is validated, ie, there is an overlap of propensity score of treated and untreated municipalities.

FIGURE 3 HERE

Balancing tests are conducted to determine whether, within each quartile of the distribution of the propensity score, the mean of the explanatory variables X are the same between treated and untreated municipalities within the region of common support. Tests conducted by quintile of the distribution, not reported, confirm the balance.

4.3.3 Matching regression

Matching regression method is estimated a simple linear regression of Y on $P(X)$ for the subsample of municipalities untreated, and the estimated values of this regression are used to predict the values of the results of treated municipalities if they do not receive treatment.

Tables 18 to 20 show estimated ATT results. Model 1 considers only the difference between the mean values for treated and untreated. Model 2 includes the propensity score (pscore) as a control

variable. Finally, model 3 includes as additional controls the propensity score, $\ln p_{ib12}$, and $\ln m_{ei}$ variables.

Table 18 shows that the ATT, estimated based on the matching regression method, is positive and statistically significant at 10% for $\ln m_{pe}$ and $\ln tr_{ab}$ variables. These results suggest that regulation of the GL affects the number of establishments and the number of workers, but does not raise wages. According to the table, based on the model 3, the regulation of law increases in 8 pp the number of establishments and in 4 pp the number of workers.

TABLE 18 HERE

Table 19 shows that the ATT is positive and statistically significant at the 10% level for the variables of interest $\ln m_{pe}$ and $\ln tr_{ab}$. These results suggest that the implementation of the general law affects the number of establishments and workers, but does not raise wages, as in the case of regulation (Table 18). According to the table, based on model 3, the implementation of law increases in 4.2 pp the number of establishments and in 3.5 pp the number of workers.

TABLE 19 HERE

Table 20 shows the ATT is statistically significant at 10% for all variables of interest ($\ln m_{pe}$, $\ln tr_{ab}$ and $\ln sal$). These results suggest that considering only municipalities that have regulated the law, its implementation negatively affects local economic activity MSE. According to the table, based on the model 3, the implementation of the GL reduces in 4 pp amount of establishments, in 2 pp the number of workers, and decreases the total wage in 5 pp, compared to municipalities that regulated but do not implemented the GL. However, these counter-intuitive results may arise from the small number of observations.

TABLE 20 HERE

In summary, the results suggest that the regulation and implementation of the GL positively impact the number of establishments and the number of workers in the cities of São Paulo, but there is no evidence of rising wages in these localities. It is worth noting that the ATT estimated by regression method may contain bias due to (unobservable) omitted relevant variable. This problem tends to be mitigated by the PSM method.

4.3.4 Propensity Score Matching

Different PSM criteria can be used to associate treated and untreated. The parametric PSM methods use a subset of untreated to matching. Already, the nonparametric PSM methods use all untreated. Thus, as in parametric method the control may be proportionally small for some groups analyzed, it is recommended to use a nonparametric PSM kernel, which uses the weighted average of all untreated, within the region of common support, to build the counterfactual pairing of treaties. Formally, if P_i is the propensity score matching of the treated municipality i and P_j the propensity score of j , the weights for the kernel pairing are given by:

$$\omega(i, j) = \frac{K\left(\frac{P_j - P_i}{a_n}\right)}{\sum K\left(\frac{P_j - P_i}{a_n}\right)}$$

where $K(\cdot)$ is a kernel function and a_n a *bandwidth* parameter.

Tables 21-23 show the estimated ATT for each variable of interest ($\ln m_{pe}$, $\ln tr_{ab}$ and $\ln sal$) according to treatments considered (regul, implem and implem*).

Table 21 shows that the estimated ATT, based on kernel PSM, is not statistically significant at 10% for all variables of interest ($\ln m_{pe}$, $\ln tr_{ab}$ and $\ln sal$). This result suggests that the regulation of the

GL in the municipalities of São Paulo does not affect the number of establishments, employees and total wage of MSE.

TABLE 21 HERE

Table 22 that the estimated ATT is statistically significant at the 10% to Intrab and Insal, while for Inmpe the estimated ATT is significant only at the 15% level. This result suggests that the implementation of the GL affects local economic activity MSE. According to the table, the implementation of the GL increases in 17 pp the number of establishments, in 24 pp the number of workers, and raises the total wage in 23 pp, compared to municipalities that have not implemented the law.

TABLE 22 HERE

Table 23, whose treatment is implem* shows that the ATT estimates based on kernel PSM is not statistically significant at 10% for all variables of interest (Inmpe, Intrab and Insal). This result suggests that the implementation of the GL municipalities in the state of São Paulo does not affect the number of establishments, employees and total wage of the MSE with respect to regulated and municipalities that have not implemented the law.

TABLE 23 HERE

In short, the results suggest that the implementation only of the GL positively impacts the number of establishments, number of employees and salaries in the cities of São Paulo. However, when considering only the municipalities that regulated the law, the impact of the implementation can be zero, not allowing differentiating the effects between municipalities that regulated the GL of those that implemented.

5. Final Remarks

The objective of this study was to assess the impact of the General Law of Micro and Small Enterprises in the municipalities. We adopted the strategy of divide the study into two parts: the first part, the goal is to estimate the effect of regulation of the GL by aggregates data, using traditional methods in the impact evaluation literature. The second part introduced spatial control to estimate the spatial propensity score matching.

Using traditional methods, we found that most of the algorithms used, the growth rate of the number of workers was not statistically different between treatment groups and control - and some coefficients did not show the expected signs. However, in the single algorithm that showed statistically significant effect, the result was positive, i.e, to implement the GL, the impact of the stock number of workers would increase up to 10 pp more than in municipalities that have not implemented the GL.

The impact of implementing the law on the mass of wages was more consistent than on the number of jobs in the sense that estimation registered a negative impact. However, effects were not statistically significant.

Regarding the growth in the number of establishments, the results were more consistent. No negative signals were observed, and the magnitude of the impact coefficients between models showed similarities, with the exception of one model. For three models the results were significant at 10% and indicate that the implementation of the GL would increase the number of establishments MSE from 1.2 pp to 3 pp per year, more than in municipalities that have not implemented the Law

To investigate these effects, we attempted control for possible spatial spillovers in the implementation of the Law.

The estimated results for the treatment effect in the treated are sensitive to the method used again. In this case, the results were generally more positive, possibly representing an increase of 4.2 pp more on the amount of stores, for municipalities that do not implement the GL, and 3.5 pp more on the quantity of jobs. When compared to municipalities that regulated, but not implemented the GL, however, the results disappear, suggesting that regulation and implementation of the Act seem to follow similar spatial determinants.

The findings, nonetheless, are not completely definitive. The high variability of results between models allows identifying indisputably positive effects of the implementation of the GL on the variables analyzed. However, we can infer that there are no negative effects related to the implementation of the Act and, as such effects are identifiable, they are positive. This result should be investigated further in a new job in a few years, during which time possibly be better able to discern the effects of the Law

In spite of the positive results identified, to large number of other topics analyzed the results were not significant. This does not mean to say that there are no effects related to GL. Only suggests that the time elapsed between the implementation and its perception may not have been long enough that it could capture when we look at the aggregated data. This fact reinforces the need for maturation of the results obtained so far, with the investigation of a new survey in the future.

References

- Becker, S. O. e Ichino A., (2002) Estimation of average treatment effects based on propensity scores, *The Stata Journal*, 2, 358-77.
- Cameron, A. e Trivedi, P. (2005). *Microeconometrics: Methods and Applications*. Cambridge:Cambridge University Press.
- Caliendo, M. and Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1), 31-72.
- Chagas, A. L. S.; Toneto, R.; Azzoni, C. R. A spatial propensity score matching evaluation of the social impacts of sugarcane growing on municipalities in Brazil. *International Regional Science Review*, v. 35, n. 1, p. 48-69, 2012.
- Gertler, P. J.; Martinez S.; Premand, P.; Rawlings, L. B., Vermeersch, C. M. *Impact Evaluation in Practice*. Washington: World Bank Publications, 2011.
- Khandker, S. R.; Koolwal, G. B.; Samad, H. A. *Handbook on Impact Evaluation: Quantitative Methods and Practices*. Washington: World Bank Publications, 2010.
- Pinto, C. C. X. Pareamento. In: MENEZES FILHO, N. (Org.). *Avaliação Econômica de Projetos Sociais*. São Paulo: Dinâmica Gráfica e Editora, 2012. Cap. 5.
- Rosenbaum, P. and Rubin, D. (1983) The central role of the propensity score in observational Studies for Causal Effects, *Biometrika*, 70, 41-55.

Table 1 – Average and Standard Deviation

Variable	Description	Average	St Dev	Source
Implement	= 1 if implement the GL in 2012	0.128	0.334	Sebrae
head office	= 1 if the municipality has a head office of Sebrae-SP	0.042	0.201	Sebrae
Grwthestab	Growth rate of establishments between 2011 e 2012	-1.063	9.277	ARSI
Grwthworker	Growth rate of workers between 2011 e 2012	20.857	366.340	ARSI
Grwthwage ¹	Growth rate of total wage between 2011 e 2012	2,119.71	51,791.56	ARSI
Area	Municipality area	383.365	317.208	IBGE
Pop	Population in 2012	46,658.840	108,539	IBGE
MR	=1 if the municipality is in a metropolitan region	0.103	0.304	IBGE
Proportion	Sum of the municipalities that participated in the course	0.1415	0.10716	Sebrae
Implepartic	Sum of the municipalities that participated in the course	1.452	1.006	Sebrae

¹ We exclude the municipalities of Bom Jesus dos Perdões, Nova Canaã Paulista, Castilho, Ribeirão Grande, Ibirarema, Lucianópolis, Turmalina, Onda Verde, and Mesópolis because their average values distanced themselves from the average of state. This feature is known as "outlier data" in the sample and can affect / impair significantly the result of the impact.

Table 2- Estimation results to Logit model

Variáveis	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Coef	Coef	Coef	Coef	Coef	Coef
head office	2.3265 (0.4083***)	2.0149 (0.4281***)	1.7887 (0.4381***)	1.1497 (0.5875*)	2.0913 (0.4680***)	1.3883 (0.6237**)
area		0.0009 (0.0003**)	0.0012 (0.3569**)	0.0012 (0.0004***)	0.0011 (0.0004***)	0.0011 (0.0004***)
mr			1.2597 (0.3474***)	0.9294 (0.4118**)	0.7918 (0.3912**)	0.414 -0.4631
pop				0.00000219 -0.00000137		0.00000232 (0.00000141**)
proportion					6.935 (1.3899***)	6.9204 (1.3883***)
implepartic					-0.9001 (0.1922***)	-0.9128 (0.1950***)
_cons	-2.1034 (0.1294***)	-2.4551 (0.1978***)	-2.7661 (0.2270***)	-2.8069 (0.2295***)	-2.5794 (0.3145***)	-2.608 (0.3177***)
N	643	643	643	643	643	643
LR chi2(9)	30***	36.13***	47.87***	50.6***	87.99***	90.93***
Pseudo R2	0.0611	0.0736	0.0975	0.1031	0.1793	0.1853

Note 1: *, **, ***, significance level of 10%, 5% e 1%, respectively.

Note 2: Standard errors in parenthesis.

Table 3 – Covariate balance test

Algorithm	Comparison	head	area	mr	pop	proportion	implepartic	Model 4	Model 5	Model 6
Model 4										
Nearest neighbor	p-value	0.531	0.763	0.708	0.605					
	SB %	12.5	-5.4	-7.0	9.9					
Caliper	p-value	0.703	0.58	0.734	0.466					
	SB %	7.6	-10.6	6.1	14.3					
Kernel	p-value	0.001	0.011	0.047	0.00					
	SB %	53.9	41.0	31.7	56.1					
Mahalonobis	p-value	0.843	0.790	1.000	0.950			0.859		
	SB %	-4.2	-4.7	0.0	-1.3			-3.6		
Model 5										
Nearest neighbor	p-value	0.501	0.598	0.828		0.706	0.973			
	SB %	13.3	-9.9	3.7		-5.4	0.5			
Caliper	p-value	0.801	0.959	0.934		0.904	0.894			
	SB %	4.90	-1.00	1.50		1.70	2.00			
Kernel	p-value	0.002	0.012	0.162		0.150	0.033			
	SB %	49.40	40.90	21.70		19.70	-34.50			
Mahalonobis	p-value	1.00	0.940	0.696		0.299	0.931		0.447	
	SB %	0.00	-1.30	7.00		16.50	1.20		14.20	
Model 6										
Nearest neighbor	p-value	0.28	0.829	0.422	0.217	0.985	0.912			
	SB %	20.8	-3.9	13.9	23.6	0.3	-1.5			
Caliper	p-value	0.519	0.643	0.887	0.311	0.269	0.923			
	SB %	-13.3	-8.5	2.6	-23.1	18.7	-1.4			
Kernel	p-value	0.005	0.026	0.07	0.004	0.024	0.033			
	SB %	47.4	36.4	29.3	49.5	36	-33.1			
Mahalonobis	p-value	0.843	0.766	0.847	0.693	0.313	0.661			0.64
	SB %	-4.2	-5.1	3.5	8.2	16.1	6.1			9.0

Table 4 - Covariate balance test¹

Algoritmo	Comparação	head	area	Mr	pop	Proportion	implepartic	Model 4	Model 5	Model 6
Model 4										
Nearest neighbor	p-value	0.531	0.876	0.578	0.611					
	SB %	12.5	-2.8	-10.4	9.8					
Caliper	p-value	0.711	0.565	0.729	0.457					
	SB %	7.4	-11.0	6.2	14.6					
Kernel	p-value	0.001	0.011	0.050	0.00					
	SB %	53.8	40.8	31.3	55.9					
Mahalonobis	p-value	0.843	0.790	1.000	0.950			0.858		
	SB %	-4.2	-4.7	0.0	-1.3			-3.7		
Model 5										
Nearest neighbor	p-value	0.501	0.732	0.828		0.549	0.939			
	SB %	13.3	-6.3	3.7		-8.8	-1.1			
Caliper	p-value	0.801	0.968	0.939		0.910	0.889			
	SB %	4.9	-0.8	1.3		1.6	2.1			
Kernel	p-value	0.002	0.012	0.170		0.155	0.034			
	SB %	49.3	40.8	21.4		19.5	-34.2			
Mahalonobis	p-value	1.00	0.940	0.696		0.299	0.931		0.446	
	SB %	0.00	-1.30	6.9		16.50	1.20		14.1	
Model 6										
Nearest neighbor	p-value	0.280	0.698	1.000	0.286	0.743	0.908			
	SB %	20.8	-7.1	0.0	20.4	5.4	-1.5			
Caliper	p-value	0.661	0.742	0.878	0.481	0.473	0.866			
	SB %	-9.0	-6.1	2.7	-15.3	11.6	-2.4			
Kernel	p-value	0.005	0.026	0.073	0.004	0.025	0.034			
	SB %	47.3	36.2	29.0	49.4	35.8	-32.8			
Mahalonobis	p-value	0.843	0.753	0.847	0.692	0.313	0.661			0.641
	SB %	-4.2	-5.4	3.5	8.2	16.2	6.0			9.0

¹ We exclude the municipalities of Bom Jesus dos Perdões, Nova Canaã Paulista, Castilho, Ribeirão Grande, Ibirarema, Lucianópolis, Turmalina, Onda Verde, and Mesópolis because their average values distanced themselves from the average of state. This feature is known as "outlier data" in the sample and can affect / impair significantly the result of the impact.

Table 5 – Estimate ATE to growth rate of workers between 2011 e 2012

	Model 4	Model 5	Model 6
Nearest neighbor	4.1966 (5.249)	5.688 (5.544)	5.1581 (5.554535)
Caliper	-4.0401 (28.008)	-0.982 (33.289)	-0.2658 (3.425923)
Kernel	-14.051 (17.214)	-12.561 (17.363)	-12.365 (17.65446)
Mahalonobis	9.9466* (5.313)	7.303 (5.854)	5.66286 (5.6322)

Note 1: *, **, ***, significance level of 10%, 5% e 1%, respectively.

Note 2: Standard errors in parenthesis.

Table 6 - Estimate ATE to growth rate of establishments between 2011 e 2012

	Model 4	Model 5	Model 6
Nearest neighbor	-0.3029 (1.048)	2.997 (1.2279)**	1.7302 (1.091)
Caliper	0.8565 (0.9352)	1.604 (1.062)	0.9132 (1.062)
Kernel	1.255 (0.7533)*	1.3565 (0.7833)*	1.2401 (0.759)*
Mahalonobis	0.816 (0.9708)	2.139 (1.374)	1.3867 (1.122)

Note 1: *, **, ***, significance level of 10%, 5% e 1%, respectively.

Note 2: Standard errors in parenthesis.

Table 7 - Estimate ATE to growth rate of total wage between 2011 e 2012

	Model 4	Model 5	Model 6
Nearest neighbor	28,1898 (22,0259)	23,4776 (23,8495)	5,9863 (24,4336)
Caliper	21,0534 (22,7555)	22,4194 (24,8837)	22,2554 (23,9732)
Kernel	13,8104 (21,4453)	17,0262 (22,7068)	13,9673 (21,4791)
Mahalonobis	32,7053 (21,8628)	32,4145 (22,8646)	30,6715 (22,8379)

Note 1: *, **, ***, significance level of 10%, 5% e 1%, respectively.

Note 2: Standard errors in parenthesis.

Table 8: Economic Activity to MSE, by year

Year	Establishments	Workers	Total wage
2006	1,644,391	3,286,804	3,420,956
2007	1,684,646	3,462,202	3,596,507
2008	1,746,436	3,727,594	3,826,737
2009	1,797,408	3,841,749	3,950,949
2010	1,834,464	4,124,759	4,242,796
2011	1,897,315	4,419,078	4,454,809
2012	1,898,721	4,742,940	4,568,059

Note: Establishments include negative notation in ARSI. Total wage in R\$ thousand in constant value of 2006.

Source: ARSI

Table 9: Regulation and implementation of General Law (2012)

	Unregulated	Regulated	Total
Not implemented	463	100	563
Implemented	0	82	82
Total	463	182	645

Source: Sebrae.

Table 10: Descriptive statistics (average of 2012)

Group		Obs	Establishments	Workers	Total wage
1	Implemented	82	4,716	12,425	11,915
	Control	563	2,686	6,304	6,689
	Difference		2,031	6,121	5,226
2	Implemented	82	4,716	12,425	11,915
	Control*	100	3,458	8,948	8,755
	Difference		1,259	3,477	3,160
3	Regulated	182	4,025	10,515	10,179
	Control	463	2,519	5,733	6,243
	Difference		1,506	4,782	3,936

Note: Control* are the municipalities with regulated but not implemented. Total wage in R\$ thousand in constant value of 2006.

Source: ARSI

Table 11 – Statistical summary

Variable	Obs	Average	St. Dev	Minimum	Maximum
lnmpe	645	6.297	1.567	3.219	13.407
lntrab	645	6.816	1.875	2.485	14.232
lnsal	645	13.898	1.974	9.290	21.716
implem	645	0.127	0.333	0.000	1.000
regul	645	0.282	0.450	0.000	1.000
adlregul	645	0.537	0.350	0.000	1.333
adler	645	0.141	0.105	0.000	0.500
er	645	0.043	0.204	0.000	1.000
pref	645	0.191	0.393	0.000	1.000
gov	645	0.798	0.401	0.000	1.000
pres	645	0.371	0.483	0.000	1.000
lnpop	645	9.620	1.425	6.719	16.215
lnpib	645	12.043	1.631	9.292	19.461
lntrib	645	16.798	1.416	0.000	23.565
txtrab	645	0.233	0.106	0.004	0.650
lnmei	645	5.222	1.560	1.609	12.272
lnpib12	645	10.081	1.606	7.288	17.453

Table 12: – Statistical summary of Queen Matrix type

Matrix	Description
Dimension	650 x 650
Connection	3,661
Minimum	1
Average	6
Maximum	23
Distance (km)	
Minimum	1.400
Average	21.942
Maximum	89.224

Table 13: Moran's I

Matrices	Regul		implem		implem*	
	Moran's I	P-Value	Moran's I	P-Value	Moran's I	P-Value
idist90	0.265	0.000	0.175	0.000	0.058	0.437
idist100	0.269	0.000	0.172	0.000	0.039	0.598
idist110	0.268	0.000	0.185	0.000	0.062	0.408
idist120	0.269	0.000	0.187	0.000	0.062	0.406
knd90	0.260	0.000	0.143	0.000	-0.015	0.842
knd100	0.260	0.000	0.129	0.001	-0.047	0.530
knd110	0.253	0.000	0.151	0.000	-0.006	0.941
knd120	0.252	0.000	0.152	0.000	-0.007	0.923
N	645		645		182	

Note: In the *implem** binary we consider only the municipalities that regulated the General Law, as control.

Table 14: Logit

Variable	regul		implem		implem*	
	Coef.	St. Error	Coef.	St. Error	Coef.	St. Error
adler	1.527	0.961	4.992	1.665	2.498	1.983
adlregul			-1.312	0.566	-0.386	0.701
er	-0.269	0.510	0.927	0.502	1.529	0.633
pref	-0.326	0.276	-0.538	0.392	-0.241	0.461
gov	0.080	0.271	0.019	0.344	-0.074	0.427
pres	-0.102	0.228	-0.125	0.297	-0.073	0.362
lnpop	0.668	0.242	0.627	0.314	0.632	0.521
lnpib	0.094	0.197	-0.132	0.256	-0.099	0.438
lntrib	0.068	0.123	0.020	0.125	-0.541	0.643
txtrab	-0.339	1.174	-1.122	1.585	-2.924	2.186
Obs	645		645		182	
Pseudo R2	0.193		0.155		0.055	

Note: In the *implem** binary we consider only the municipalities that regulated the General Law, as control.

Table 15: Logit Moran's I

Matrices	Regul		implem		implem*	
	Moran's I	P-Value	Moran's I	P-Value	Moran's I	P-Value
idist90	0.153	0.000	0.058	0.140	0.005	0.942
idist100	0.146	0.000	0.047	0.232	-0.012	0.872
idist110	0.141	0.000	0.059	0.132	0.005	0.944
idist120	0.145	0.000	0.063	0.113	0.002	0.981
knd90	0.154	0.000	0.064	0.102	-0.047	0.530
knd100	0.125	0.001	0.036	0.367	-0.072	0.335
knd110	0.109	0.005	0.058	0.144	-0.034	0.649
knd120	0.112	0.005	0.059	0.133	-0.034	0.647
Obs.	645		645		182	

Not Note: In the *implem** binary we consider only the municipalities that regulated the General Law, as control.

Table 16: Logit *regul*

Variable	Logit		SEM	
	Coef.	St. Error	Coef.	St. Error
adler	1,527	0,961	1,063	0,665
er	-0,269	0,510	-0,207	0,341
pref	-0,326	0,276	-0,215	0,178
gov	0,080	0,271	0,056	0,178
pres	-0,102	0,228	-0,033	0,151
lnpop	0,668	0,242	0,435	0,172
lnpib	0,094	0,197	0,071	0,141
lntrib	0,068	0,123	0,068	0,110
txtrab	-0,339	1,174	-0,195	0,782
constant	-9,954	1,388	-7,000	1,142
yviz			0,339	1,481
lambda			0,494	0,195
Obs	645		645	
Pseudo R ²	0,193		0,456	
LM Lag	0,028			
LM Lag Robust	2,390			
LM Error	15,334			
LM Error Robust	17,696			
ndraws/nomit			5.000/500	
Moran's I	0,154			

Table 17: Logit *implem*

Variable	Logit		SEM	
	Coef.	St. Error	Coef.	St. Error
adler	4,992	1,665	3,313	1,190
adlregul	-1,312	0,566	-0,890	0,380
er	0,927	0,502	0,534	0,335
pref	-0,538	0,392	-0,361	0,253
gov	0,019	0,344	0,012	0,222
pres	-0,125	0,297	-0,073	0,198
lnpop	0,627	0,314	0,450	0,218
lnpib	-0,132	0,256	-0,105	0,181
lntrib	0,020	0,125	0,048	0,123
txtrab	-1,122	1,585	-0,873	1,048
constant	-6,679	1,557	-5,101	1,309
yviz			-0,526	3,525
lambda			0,297	0,291
Obs	645		645	
Pseudo R ²	0,155		0,463	
LM Lag	0,013			
LM Lag Robust	0,545			
LM error	2,126			
LM error Robust	2,658			
ndraws/nomit			5.000/500	
Moran's I	0,064			

Table 18: Estimate ATT to municipalities that regulated the General Law

Variable	(1)		(2)		(3)	
	ATT	t test	ATT	t test	ATT	t test
lnmpe	1.548	12.961	0.106	9.631	0.083	9.355
lntrab	1.810	12.543	0.095	7.738	0.044	5.295
lnsal	1.891	12.427	0.075	6.348	0.009	1.233
Control						
pscore	No		Yes		Yes	
lnmei	No		No		Yes	
lnpib12	No		No		Yes	
Obs	639		639		639	

Table 19: Estimate ATT to municipalities that implemented the General Law

Variable	(1)		(2)		(3)	
	ATT	t test	ATT	t test	ATT	t test
lnmpe	1.144	6.719	0.304	12.877	0.042	7.685
lntrab	1.352	6.596	0.370	13.482	0.035	7.411
lnsal	1.399	6.438	0.361	12.401	-0.006	1.182
Control						
p_score	No		Yes		Yes	
lnmei	No		No		Yes	
lnpib12	No		No		Yes	
Obs	547		547		547	

Table 20: Estimate ATT to municipalities that implemented the General Law (municipalities that regulated but not implemented as control)

Variable	(1)		(2)		(3)	
	ATT	t test	ATT	t test	ATT	t test
lnmpe	-0.217	-1.016	0.030	1.261	-0.042	-3.503
lntrab	-0.262	-1.025	0.085	2.419	-0.024	-2.528
lnsal	-0.248	-0.910	0.069	1.856	-0.050	-5.331
Control						
p_score	No		Yes		Yes	
lnmei	No		No		Yes	
lnpib12	No		No		Yes	
Obs	179		179		179	

Table 21: PSM *regul*

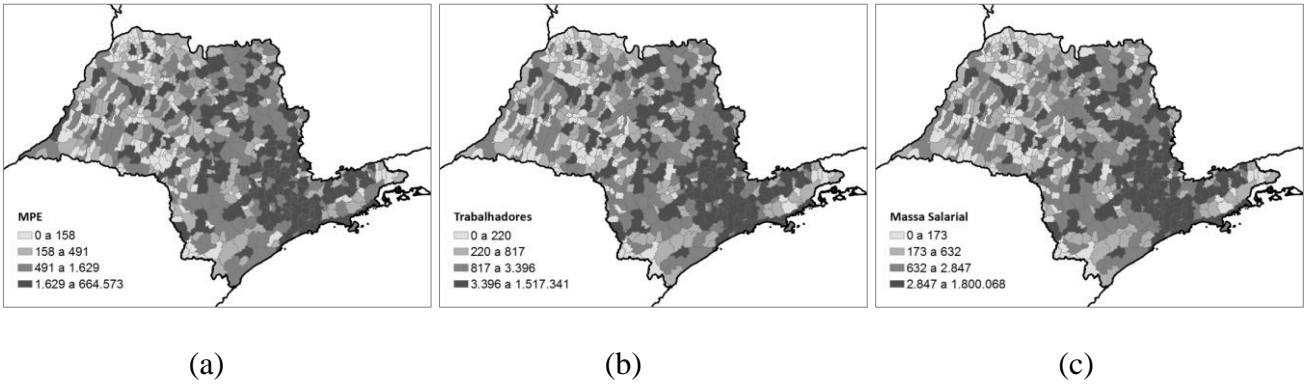
Group	MPE			Obs
	lnmpe	lntrab	lnsal	
Treatment	7,413	8,125	15,265	182
Control	7,328	8,024	15,173	456
ATT	0,086	0,101	0,092	
t Test	1,270	1,344	1,281	

Table 22: PSM *implem*

Group	MPE			Obs
	lnmpe	lntrab	lnsal	
Treatment	7,539	8,280	15,410	82
Control	7,366	8,042	15,188	479
ATT	0,173	0,238	0,222	
t Test	1,764	2,355	1,610	

Table 23: PSM *implem**

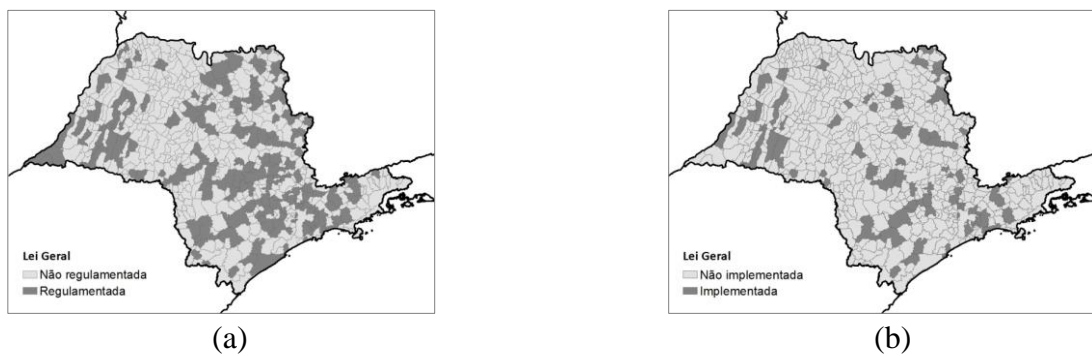
Group	MPE			Obs
	lnmpe	lntrab	lnsal	
Treatment	7,539	8,280	15,410	82
Control	7,671	8,387	15,550	97
ATT	-0,131	-0,107	-0,140	
t Test	-0,705	-0,443	-0,559	



Source: ARSI

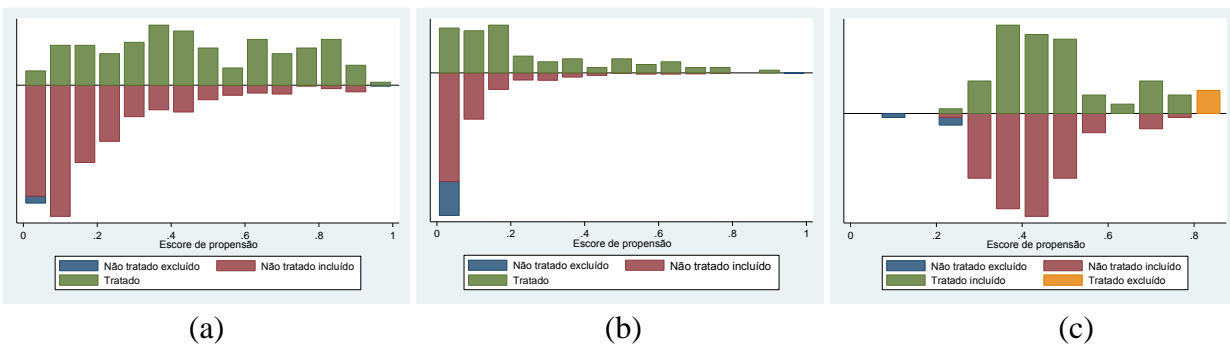
Note: Total wage in R\$ thousand in constant value of 2006.

Figure 1: Establishment (a), workers (b), and total wage (c) by quartile (2012)



Source: Sebrae.

Figure 2: Regulation and Implementation of General Law (2012)



Common Support

(0,0204408; 0,9661706)

(0,0136915; 0,8961711)

(0,2292826; 0,7894127)

Figura 3: Common support to *regul* (a), *implem* (b), and *implem (c)**