Collateral Value and Entrepreneurship: Evidence from a Property Tax Reform*

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Abstract

We study the role of property taxes on entrepreneurial activity using a quasi-natural experiment, which unexpectedly reduced the upper bound of the Portuguese property tax rate for urban properties in 2008. Using a difference-in-differences approach, we find that treated municipalities (i.e., municipalities that had a property tax rate above the new upper bound) experienced higher entry rates in the manufacturing sector *vis-à-vis* control municipalities (i.e., municipalities that had a property tax rate at or below the new upper bound). Taking advantage of firm-level data, we show that start-ups created as a response to the decrease in property taxes in treated municipalities use more debt, invest more, and are more likely to survive.

Keynotes: entrepreneurship, property taxes, savings, Portugal
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1 Introduction

Encouraging entrepreneurship is a key priority shared by many governments around the world. New ventures are credited not only for increasing competition and pushing out unproductive incumbents, but also for accelerating economic growth and disseminating new technologies. There are several tools to encourage entrepreneurial activity. Most advanced economies provide subsidized loans and loan guarantees based on the premise that there are important credit frictions that preclude individuals with positive net present value projects from entering into entrepreneurship. However, although previous research documents a positive correlation between personal wealth and the propensity to become an entrepreneur (Evans and Jovanovic, 1989; Holtz-Eakin et al., 1994), this might occur due to unobserved differences in productivity, or preferences for entrepreneurship, that are correlated with wealth rather than due to liquidity constraints (Hurst and Lusardi, 2004; Hurst and Pugsley, 2011).

We build on this literature by analyzing a local tax reform, decided by the Portuguese central government, which unexpectedly reduced the upper bound of the municipality property tax (*Imposto Municipal sobre Imóveis*, IMI) on July 2, 2008 from 0.5% to 0.4%.[1] We implement a difference-in-difference approach by comparing entrepreneurial outcomes in regions that were forced to reduce the tax rate with those that did not change their tax rate. Underlying our identification strategy is the idea that when property taxes decrease, real estate prices increase (Alvarez and Santos, 2019), and consequently, potential entrepreneurs experience an increase in the value of the collateral available to start a new venture. This allows them to borrow more and thus face less liquidity constraints.

To investigate how changes on the real estate collateral value relates to firm entry, we use a very detailed mandatory survey covering virtually all the firms and employees in the Portuguese private sector. The database contains information on firm's entry year, location, industry and number of employees. We aggregate this information at the municipality level and analyze the period between 2004 and 2011. According with the literature, the reform should be followed by an increase on firm entry in the municipalities that were forced to reduce the tax rate. More specifically, entry should increase for ventures with higher capital needs or facing higher asymmetry of information. In fact, our results suggest that treated municipalities experienced higher entry rates but only in the manufacturing sector *vis-à-vis* control municipalities. The effect was economically sizable: firm entry rate in treated municipalities increased by 14%, relative to control municipalities in the most saturated specification. In contrast, we find no statistically significant impact of the property tax reform in the service sector. In fact, the average capital needs of the service sector are lower than

[1] Peralta and Pereira dos Santos (2018), and Alvarez and Santos (2019) also use the same reform to measure the impact of the tax revenue cut on mayoral decision of seeking re-election and on real estates values, respectively. More specifically, Alvarez and Pereira dos Santos (2019) find that this reform significantly increases the mean real estate values.

in the manufacturing sector. Within the manufacturing sector, we find that the reform induced entry of low-technological new ventures, suggesting that real estate collateral increases matter for medium capital intensive ventures.

Possibly, the reduction on property tax reform increased the average real estate price and the collateral that new ventures could use to raise more debt. To investigate this concern, we take advantage of a detailed firm-level financial database. We select start-ups established between 2004 and 2011 and gather comprehensive information on yearly cash, short and long-term debt up to five years following the creation of the new firms. We find that manufacturing start-ups located in municipalities that were forced to reduce the tax rate raise more short-term debt. These results are robust to controlling for a large set of firm and municipality characteristics.

Besides the liquidity constraints theory, other mechanisms might drive the increase on firm entry following a decrease on property tax rates. A reduction in property taxes increases individual's income and wealth in the region encouraging business creation and possibly increasing the amount of debt raised by both individuals and firms. To address this concern, we collect data on economic activity and credit supply at the municipality level. We find that municipalities that were forced to reduce the tax rate neither experience larger increases in economic activity, nor changed their spending profile, nor changed the credit provided to both individuals and firms.

Alternately, the decrease in property taxes might have change individual's risk preferences making it more attractive for risk-averse individuals to try their changes in entrepreneurship. To this end, we compute the likelihood of a start-up surviving one, three or five years. We find, that in treated municipalities, new ventures are more likely to survive in comparison to the control group. We find a positive effect on survival for both firms in the manufacturing and service sector.

Our study contributes to two strands of the literature. First, our paper contributes to the effects of taxes on entrepreneurial activity. Earlier research has mainly considered a subset of the taxes facing small businesses and entrepreneurs, focusing mainly on federal taxes.[2] Nevertheless, Neubig et al. (2006) show that the state and local tax burden are extremely relevant for the US businesses. Business and entrepreneurs pay a significant amount of property taxes along with a growing menu of local taxes, licenses and fees. Also, local and central governments continue to enact pro-entrepreneurship policies without the benefits of hard data on the effects of those policies on regional economic growth, new venture creation and innovation. The extent to which local taxes policies influence entrepreneurial activity requires further exploration in order to efficiently design better entrepreneurial policies. Finally, we contribute to the literature on financial constraints and entrepreneurship. The relation between entrepreneurial wealth and firm creation has received

[2]There are four main types of taxes: personal income and payroll taxes, corporate income taxes, capital gain and capital income taxes and wealth and inheritance taxes. Corporate tax refers to the tax that corporations pay on their taxable income. Capital gains tax is paid on profits that an investor receives when he or she sells a capital asset for a higher price than the purchase price. Personal income tax is paid on earned income by the self-employed or wage workers. Capital income tax is paid on dividend or interest income (Block, 2016). Property taxes is paid over the buildings and lands owned by firms and individuals.

considerable attention in the literature but the precise economic mechanisms underlying the role of wealth in firm creation are not well understood. Wealthier individuals have a higher probability of becoming entrepreneurs (Holtz-Eakin et al., 1994; Burke et al., 2000). Nonetheless, previous studies use proxies for liquidity (i.e., assets, wealth and housing prices) that are potentially endogenous because entrepreneurs can accumulate wealth before starting a new venture (Xu, 1998). To address this concern, other studies use instruments for unanticipated changes in wealth: inheritance (Holtz-Eakin et al., 1994; Blanchflower and Oswald, 1998; Dunn and Holtz-Eakin, 2000), lottery winnings (Lindh and Ohlsson, 1996), and housing capital gains (Hurst and Lusardi, 2004; Nykvist, 2008; Fairlie and Krashinsky, 2012). However, these instruments have inadequacies. Previous literature interprets the positive correlations between wealth and business formation as evidence of credit market imperfections. Alternative explanations include individual characteristics – tolerance for risk, preference for self-finance (Cressy, 1996) and over-optimism (Meza and Webb, 1999) – and greater access to business opportunities (Hurst and Lusardi, 2004). More recently, Adelino, Schoar, and Severino (2015) and Schmalz, Sraer, and Thesmar (2017) show that financial constraints restrict firm creation and growth using variation in house prices as shocks to the value of real estate collateral. These studies identify the effect of liquidity by comparing full homeowners with partial homeowners and renters as only full owners can fund their venture using their houses as collateral to borrow. These two groups, however, may differ in characteristics such as ability and risk aversion, which are important determinants of entrepreneurship.

We extend previous studies in the following ways: (1) we evaluate the effect of a specific local tax, property tax which simultaneously affects businesses- especially small businesses - and entrepreneurs, (2) we take advantage of quasi-natural experience, which significantly reduced local taxes on some specific municipalities, and (3) we analyze how this tax reform affected the capital investments and funding decisions of the new firms.

The rest of the paper is structured as follows. The next section describes the Portuguese institutional setting. Our data sources, variables, and empirical methodology is presented next. Subsequently, we present our main results, together with a number of robustness checks. In the final section, we present the main conclusions, implications, and limitations of the study.

2 Institutional Background

In December 2003, as a result of a general reform of the Portuguese tax system, a new local tax was created: *Imposto Municipal sobre Imóveis* (IMI) which replaced the previous property tax, Contribuição Autárquica, implemented in 1989. This new tax was automatically applied to new urban constructions and dwellings (reassessed properties). While the fiscal value of the reassessed properties was computed centrally, the tax rate was defined yearly by each municipality within a range previously approved by the Parliament, as displayed in Table 1. Note that the law also applied

to the remaining non-reassessed properties and it included a ten year transition period, during which every urban real estate had to be evaluated using the new rules. During our period of analysis, municipalities had to set two different tax rates, for the reassessed and non-reassessed properties. In this paper, we focus on the property tax on reassessed properties since we are measuring the wealth effects that drive individuals to become entrepreneurs and the capital investments done by start-ups.

Table 1 displays the lower and upper limits for the reassessed urban properties (IMI). On July 2, 2008, the Portuguese Prime-Minister unexpectedly announced a decrease in the maximum local property tax rate, from 0.5% to 0.4% for the reassessed properties. We use this reform as a quasi-natural experiment to define a treated group (i.e., municipalities who were forced, from one year to the next, to decrease the tax rate) and a comparison group (i.e., the municipalities that did not change the tax rate and charge a tax rate between 0.3% and 0.4%).[3]

The map of Portugal with the treated and control municipalities is portrayed in Figure 1. By the end of 2008, 94 municipalities were obliged to reduce their tax rate and 162 municipalities maintained their local tax rates. The treated and control municipalities are fairly dispersed through Portugal.

The reform provides good laboratory to study the effects of local property taxes on entrepreneurship because it is based on a single country where the local governments operate under the same institutional background.[4]

3 Data and Variables

To implement our empirical analysis, we use both municipal and firm-level data. More specifically, we aggregate firm-level information from a matched employer-employee database to the municipal level and use a firm-level financial database. These datasets are from Statistics Portugal (INE).

Our municipal-level data comes from *Quadros de Pessoal* (QP). QP is based upon a mandatory survey submitted annually to the Portuguese Ministry of Employment and Social Security by firms with at least one employee. These data include information on an average 227,000 firms per year, covering virtually all the firms in the Portuguese private sector, but omit the self-employed workers. Firms annually report their entry year, location, industry, number of employees, number of establishments, initial capital, ownership structure, and sales. From QP, we select all new ventures with at least one paid employee, established between 2004 and 2011,[5] operating in the manufacturing

[3]Our results are robust considering the full sample of municipalities that did not change the tax rate. The results are presented on Table 8.

[4]The first municipal elections under democratic rule took place in 1976 and, since then, local government's competencies have increased substantially. They are responsible for the promotion of education, health, communication, and culture and managing the funds from the European Union and central government.

[5]The QP data record the year of firm entry, which we use to calculate the firm age. In cases where the firm employs workers whose firm accession year is prior to the recorded firm entry year, we use the earlier year for our

and service sectors. Accordingly, we also exclude from our analysis start-ups operating in non-profit sectors and start-ups owned by any percentage by the government. In addition, we exclude from our sample firms with no sales for the entire period.

We supplement these data with information from other sources. Information on municipal socio-demographic and economic characteristics was retrieved from Statistics Portugal (INE). Data on local expenditures was obtained from the General Directorate for Local Authority's (*Direcção–Geral das Autarquias Locais, DGAL*) website and the set of political characteristics and electoral results was constructed based on data obtained from the General Directorate for Internal Affairs' (*Direcção–Geral da Administração Interna, DGAI*).

With QP data, we compute firm entry and job creation rates at the municipal-level for 278 mainland Portuguese municipalities for the period between 2004–2011.[6] Entry rate is measured by the number of entrants relative to the number of firms in existence at the beginning of the period.[7] We use a similar approach for job creation rate, by computing the number of jobs created by start-ups relative to the workforce at the beginning of the period. Both outcomes variables are computed separately for the manufacturing and service sectors.[8]

Figure 2 plots the evolution of the average entry rates separately for the manufacturing and services sectors. The figures depict an increasing pattern of firm entry until 2007, followed by downward trend onwards for both industries. For the manufacturing sector, the treatment group experienced higher average birth rates than the comparison counterpart in the pre-treatment period. However, after the reform, the pattern clearly changed. For both manufacturing and service entry rates, our graphical inspection does not seem to show an evolution capable of undermining the parallel trends' assumption. Nevertheless, this assumption will be explicitly tested with the event studies in the results section.

Table 2 presents the summary statistics on municipality's characteristics. The sample contains 1,024 observations. Before 2008, the average entry rate for manufacturing start-ups in the treated and control groups were 4.3% and 4.7%, respectively. After 2008, these number reduced to 3.4% and 3.1%, respectively.

Our firm-level data comes from *Sistema de Contas Integrado da Empresa* (SCIE), an annual firm-level financial database, collected by Statistics Portugal (INE) covering an extensive list of accounting variables (about 80 for the period 2004-2009 and 262 for 2010-2012). The database

measure of firm entry.

[6]There are 308 municipalities in Portugal. We exclude 30 municipalities in the autonomous regions of Azores and Madeira because of their different institutional background and 22 municipalities in mainland Portugal because they charged a tax rate lower than 0.3% before the reform. As a robustness check, we run all empirical analyses considering the full sample of 278 municipalities.

[7]We use the ecological approach because we are attempting to explain why the reform affected the degree of entry varies between the manufacturing and service sectors. Alternatively, we could have used the labor market approach, standardizing the number of entrants with respect to the size of the work force Audretsch and Fritsch (1994).

[8]According to *Classificação das Actividade Económicas (CAE)* Revision 2.1, the manufacturing and service sectors include the industry codes between 15 and 36 and 50 to 93, respectively.

integrates information from *Inquérito Anual às Empresas* (IEH) and from tax information from *Autoridade Tributária* (TA). Currently, its main data source is the *Informação Empresarial Simplificada*(IES3). Every year, firms report their sales, number of employees, assets, debt, equity and capital expenditures. In spite of being a mandatory survey, firms nonetheless sometimes fail to report financial information in some of the years. In these cases, we linearly interpolate the firm's sales, debt and capital expenditures between the surrounding years with reported firm information.[9] Therefore, this database allow us to collect information on start-up's capital expenditures and financial structure.

From SCIE, we select all new ventures established between 2004 and 2011 and impose the same previous restrictions. Additionally, we ensure that start-ups report their debt, sales and capital investments on the entry year. Then, we retrieve start-up's financial information in the next five years.

4 Empirical Strategy

4.1 Municipal-level Analyses

To estimate the effect of the tax reform on firm entry and job creation, we estimate the following difference-in-differences specification for municipality i and year t, from 2004–2011:

$$\mathrm{y}_{it} = \alpha_i + \lambda_t + \gamma\, \mathrm{Treated}_i \times \mathrm{Post\ Period}_{it} + X'_{it}\beta + \epsilon_{it} \tag{1}$$

where y are the outcome variables entry rate and job creation rate previously defined, α_i are the municipality fixed effects, λ_t the time-period fixed effects, $Treated$ is a binary indicator that takes value one if the municipality was forced to reduce the property tax rate, $PostPeriod$ is a binary indicator that takes value one for the period 2009–2011, and X_{it} is a vector of socio–demographic, economic, and political characteristics at the municipal level. To control for socio-demographic factors, we include the *age dependency ratio* and the *share of the workforce with a tertiary degree*.[10] To account for municipal income, we include the *unemployment rate*, measured as the ratio of resident population aged between 15 and 65 years old who is enrolled as unemployed in the Portuguese Institute of Employment and Professional Training (*IEFP*), and the *consumption of electricity per capita*. We also include the *percentage of industrial area* in a given municipality to consider possible synergies of exploring an integrated location with informational spillovers.[11]

[9] All of our empirical analyses are run both including and excluding these interpolated data, with no substantive differences in the results.

[10] Baptista and Mendonça (2010) show that a regional access to an educated workforce significantly impacts Portuguese firm location in specific sectors.

[11] Gilbert et al. (2004) point out the expansion of industrial parks, science and technology incubators as an effective start-up oriented policy. Some examples of targeted-based policies include Zones Franches Urbaines (ZFU) in France (Mayer et al., 2015) and the federally financed New Industrial Policy for the states of Uttarakhand and Himachal

We add two binary variables to account for the availability of *local public goods*: a dummy variable equalling one if there is at least one first instance court, and another dummy variable equalling one if there is at least one highway ramp in a given municipality.[12] As for the political background, we include the *total expenditure per capita in real terms*, net of interest payments and two binary variables: a dummy variable equalling one if the Mayor and the Prime-Minister belong to the same political party, and another dummy variable equalling one if the Mayor holds a majority in the municipal council. Finally, to control for the effects of distinct political ideologies and agendas, we use the fraction of *leftist mandates* in the municipal council.[13] We include the main determinants of new firm formation at the regional level to reduce possible endogeneity concerns in our regressions. The presence of heteroscedasticity and spatial correlation is controlled by clustering the standard errors by municipality since treatment varies at that level (Bertrand et al., 2004). The coefficient of interest in Equation (2) is γ.

There are three main challenges when assessing the causal impact of local taxation on entrepreneurship (Duranton et al., 2011). First, firms choose between a large set of possible number of heterogeneous locations. Many of these location characteristics are typically unobserved. To mitigate this issue, we include several municipal-level covariates. Moreover, we excluded from the control group twenty two municipalities with property tax rates below 0.3 in 2007.[14] In principle, the preferences for public goods and tax rates of the high-tax controlled municipalities are more similar to the treated ones. Second, firms themselves are heterogeneous, and therefore, the sorting of firms according to their characteristics provides another source of bias. We compare entry rates for firms in two sectors of activity: manufacturing and services. Lastly, special features of the tax system may be endogenous to firm entry, which may lead to reverse causality. We circumvent this concern exploiting the unexpected quasi-natural experiment described in the previous subsection.

4.2 Firm-level

The firm-level sample constructed in Section 5 consists of new ventures established in treated and control municipalities. We use this sample, to evaluate the effect of the tax reform on firm's investment and funding decisions. Specifically, let f be a new venture established in year t in municipality i. Our estimating equation is:

$$\mathrm{y}_{fit} = \alpha_i + \lambda_t + \gamma\, \text{Treated}_i \times \text{Post Period}_{it} + X'_{it}\beta + Z'_{jt}\beta\epsilon_{it} \tag{2}$$

Pradesh in India (Chaurey, 2016).

[12] Audretsch et al. (2017) highlight the relevance of highway provision for regional development in Portugal.

[13] In this regard, Reynolds et al. (1994) defended that right-wing conservatism tends to be related with a more resilient entrepreneurial culture.

[14] In the robustness section we show that considering these municipalities yields very similar estimates.

where y are the firm-level outcome variables (short-term debt, capital expenditures and survival). α_i are the municipality fixed effects, λ_t the time-period fixed effects and X_{it} is the previously considered municipal level vector of socio–demographic, economic, and political covariates. At the firm-level, we control for the logarithm of sales and for the logarithm of the number of employees. Again, γ is our coefficient of interest.

5 Main Results

5.1 Municipal-level Baseline Results

Results of Ordinary Least of Squares (OLS) estimation of Equation (1) are presented in Table 3 separately for the manufacturing sector in Panel A and services sector in Panel B. Column (1) includes only municipality and year fixed effects. Column (2) adds specific regional (NUTS2) year fixed effects. Column (3) adds a vector of municipal-level control variables. Finally, in Column (4), we add specific population quartiles year fixed effects.

The estimates of γ reported in Panel A Table 3 are positive and statistically significant at the level 5% level in Columns (1) and (2) and at the level 10% level in Columns (3) and (4) even after including an extremely demanding set of controls and fixed effects.[15] The point estimate of 0.0065 increases to 0.0074 when we control for regional year fixed effects. After controlling for the socio-demographic, economic, and political context and population quartiles year fixed effects, the point estimate drops to 0.0063. The effect we report on Table 3 are of sizable magnitude for the manufacturing sector. Using the point estimates of Column (4), we find that municipalities that were forced to decreased the property tax rate exhibited a 0.63 percentage point increase in firm entry rate. Considering that before the reform, the average entry rate was 4.55%, our estimate corresponds to a 14% increase in firm entry. In contrast, we find no statistically significant impact of the property tax reform in the service sector.[16]

In Table 4 we run the same specifications to examine the impact of the reform on employment. In this case, the dependent variable in 1 is the number of jobs created by start-ups relative to the workforce at the beginning of the period. As expected, for the manufacturing sector (Panel A) the point estimates are positive but only statistically significant in Columns (1) and (2). Using the point estimates of Column (4), we find that municipalities that reduced the property tax rate exhibited a 0.5 percentage point increase in job creation. Once again, we find no statistically significant impact of the property tax reform in the service sector. Since most of the action is taking place for entry

[15] We run an alternative specification including the average real estate prices in the vector of controls. As pointed out by Alvarez and Pereira dos Santos (2019), the reform had a direct impact on real estate prices and therefore it constitutes a bad control in our setting. Nevertheless, if we include it, results remain very similar and are available from the authors' upon request.

[16] If we substitute entry rate by exit rates as our dependent variable, the results are not statistically significant and are available from the authors' upon request.

rates, we will focus on this outcome for the remaining of the municipal-level section.

5.2 Internal Validity

The identification strategy of our baseline results relies on two assumptions that we now discuss: *(i)* characteristics of the local areas must be balanced in treatment and comparison groups; and *(ii)* municipalities must be on parallel trends in the pre-treatment period.

With respect to the first requirement, we tackle it by performing tests of differences in the control variables in the pre-treatment period. These tests show significant socioeconomic differences between the treatment and control groups. However, when we run auxiliary regressions of the same observables on a series of fixed effects and $Treated$, these tests are able to capture most of the differences for these control variables, with the exception of the age dependency ratio and a binary indicator indicating that mayors had a majority in the Municipal Assembly. In both cases, however, the results where economically small. Results for both tests are displayed in Table 5.

Regarding the assumption that the reduction on local property taxes in particular municipalities is not correlated with existing trends in firm formation or economic growth rate we execute three exercises. One common way to test this requirement is to compare the evolution of the different dependent variables in treated and comparison units during the pre-treatment and the treatment periods (Angrist and Pischke, 2009). As discussed, Figure 2 portrays the mean evolution for the municipal-level outcomes. This graphical inspection does not provide evidence of distinct pre-treatment trends between the treatment and comparison groups capable of undermining our identification strategy.

In any case, we further study this assumption by implementing an event study design that has several advantages. First, we can test treatment exogeneity by examining pre-trends more carefully. In the absence of a pre-trend, the identifying assumption requires no systematic factors driving both the shock and the outcomes of interest. Second, the event study enables to evaluate the impact of the shock in the outcome variables in the very short-run. Figure 3 reports the event study for entry rates in Manufacturing and Services. This allows us to check the assumptions underlying the empirical approach as well as paint a more complete picture of the program's short-term dynamics. The interaction terms become significantly positive only after the year 2009. The results imply that in the first year of the reform, there is a statistically significant difference in manufacturing entry rates between the treated and control group. Results related to the services sector provide no evidence of an impact of the reform on entry rates.

Finally, we perform a falsification (placebo) test where we restrict the period of analysis between 2004 and 2007. The treatment and control groups remain the same but the post treatment period is set before the reform was implemented (2003-2007) in Table 6. This exercise displays no statistical significant effects. Therefore, this further strengthens the interpretation of the results as being caused by this specific timing and scope of the property tax reform.

5.3 Robustness Results

Our first robustness exercise modifies Equation (1) to encompass an interaction with the imposed decrease of the tax rate. The treatment intensity effects are obtained by substituting *Treated* by *Intensity*, a non-binary indicator of how much the municipality was forced to decrease the property tax rate. The results, displayed in Table 7, yield very similar conclusions to our baseline.

We also present results for the full sample of Portuguese mainland samples in Table 8. Therefore, this specification includes the twenty two municipalities with very low property tax rates in 2007. In the same table, we also consider our baseline results taking into account only single establishment firms which comprise the large majority of our sample. In both cases, results remain similar to the baseline.

Furthermore, we compute three additional exercises in Table 9. First, we drop 2008, the year when the reform was announced and implemented. Second, we remove the most severe crisis year from our sample (i.e., 2011) when Portugal requested an assistance program to the European Commission, the European Central Bank, and the International Monetary Fund. The goal is to dismiss concerns that our result is being driven by this event. Finally, we compute a geographical exercise dropping all municipalities in the Atlantic coast. These findings further support with our baseline specifications.

5.4 Heterogeneity Results

In this subsection, we distinguish our baseline results for entry rates between high and low technology new ventures. According to OECD (2002), technology-based industries can be divided into high-technology industries (pharmaceuticals, office and computing machinery, radio, TV and communication equipment, medical, precision and optical equipment, aircraft and spacecraft); medium-high-technology industries (chemicals excluding pharmaceuticals, machinery and equipment, electrical machinery and apparatus, motor vehicles and trailers, railroad and transport equipment) and medium-low-technology industries (coke, refined petroleum products and nuclear fuel, rubber and plastic products, other non-metallic mineral products, basic metals, fabricated metal products except machinery and equipment, building and repairing ships and boats) and low-technology industries (food products, beverage and tobacco, textile and textile products, leather and footwear, wood, pulp, paper products, printing and publishing and publishing, and recycling). The results depicted in Table 10 allows us to conclude that our results are being driven by low technology manufacturing firms. Zooming in the manufacturing sector, Figure 4 shows that not all industries were equally affected by the reform.

5.5 Alternative Mechanisms and Firm-level Results

We focus our attention on different alternative mechanisms that can explain the results. One of them is that the reduced tax property tax bill acts as a positive wealth shock for the local area. In such a case, overall increased consumer demand would be driving firm entry rates for some entrepreneurs in treated units. Unfortunately, there is no GDP data at the municipal level to evaluate this. We thus test this possibility by substituting the outcome variable in Equation (1) by other proxies of the economic cycle such as the total ATM cash withdrawal volume and the number of ATM withdrawals. The results are reported in Table 11 and are not statistically different from zero.[17]

Another concern is warranted if municipalities are reacting to the negative shock in their public finances by changing their spending profile and decreasing the level of public good provision. Nevertheless, when we consider primary expenditures as the dependent variable in Equation (1), the results presented in columns (1) and (2) of Table 12 show no statistically significant impact. In addition, we test whether local authorities tried to increase business tax revenues. The findings in columns (3) and (4) of Table 12, although positive, are also not statistically significantly different from zero.

Finally, we look into a panel dataset of all new ventures to study how the property tax reform affected their survival, growth, capital investments' decisions. For the remaining of our paper, odd columns include a vector of firm-level controls, municipality, year, and NUTS 2 specific year fixed effects. Even columns add municipal-level covariates and specific population quartile dummies year fixed effects.

First, we run a linear probability model considering the likelihood of a start-up surviving one, three or five years. Table 13 advances the results. Our findings suggest that, for start-ups in both manufacturing and services sector, the probability of surviving increases about 3% to 5% in the three periods.

Second, we consider differences in financing the activity in the entry year in Table 14. The results show that firms in manufacturing start with substantially higher leverage in the short run than similar firms in the comparison group.

6 Concluding remarks

Entrepreneurial activity is considered to be an important driver of innovation and economic growth. Understanding whether financial constraints significantly deters firm entry has important policy implications as governments tend to subsidize lending to small firms based on the premise that these are indeed constrained. Our study contributes to this debate by taking advantage of quasi-natural reform that changed the property tax rate to a subset of Portuguese municipalities.

[17]The same no-result holds if we use the electricity consumption per capita as the dependent variable.

We find that municipalities that were forced to decrease their property tax rate experienced higher entry rates in the manufacturing sector *vis-à-vis* municipalities that had a property tax rate at or below the new upper bound. The results are not significant for the service sector and are robust to a series of exercises and placebo tests.

We further discuss and test alternative mechanisms that can explain our baseline results. These examinations provide a compelling picture regarding the fact that it seems to be the shock to the wealth of the entrepreneur, via the collateral channel, that is driving observed results. We find that manufacturing start-ups established in treated municipalities are more likely to increase their amount of short-term debt. These findings suggest that the value of housing collateral is important to entrepreneurship in sectors that require some start-up capital such low-technological start-ups. Regarding firm-level evidence, ventures in treated areas had a significantly higher probability of surviving in the short to medium-run. Moreover, the increase in investment in buildings seems to be compensated by a further increase in debt, especially in the short-run.

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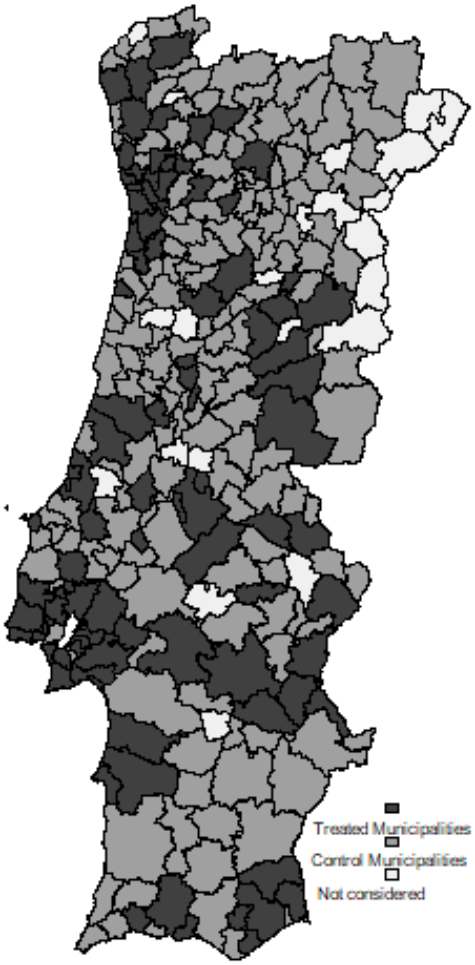
7 Figures

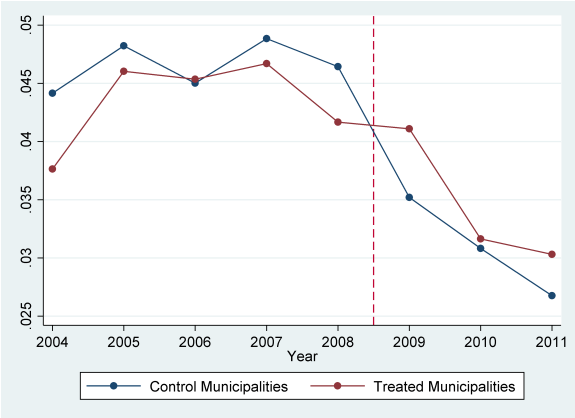
Figure 1: Treated and Control Municipalities



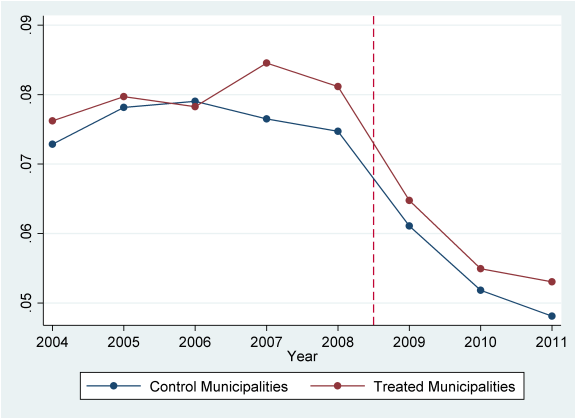
Notes: The figure plots the municipalities who were forced to decrease the tax rate to 0.4% (treatment group) and the municipalities that charged a tax rate between 0.3% and 0.4% before the reform (control group).The remaining municipalities charged a tax rate bellow 0.3% and they were not included in the main analysis.

Figure 2: **Evolution of Entry Rates**

Manufacturing



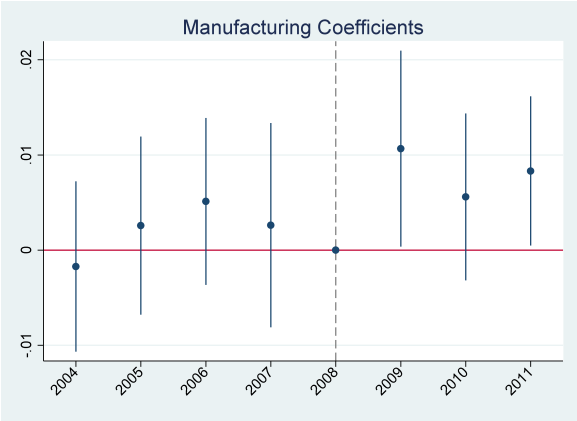
Services



Notes: The figure plots the evolution of the average entry rates for treatment and control groups over the period 2004–2011, separately for the manufacturing and service sectors.

Figure 3: **Evolution of Entry Rates**

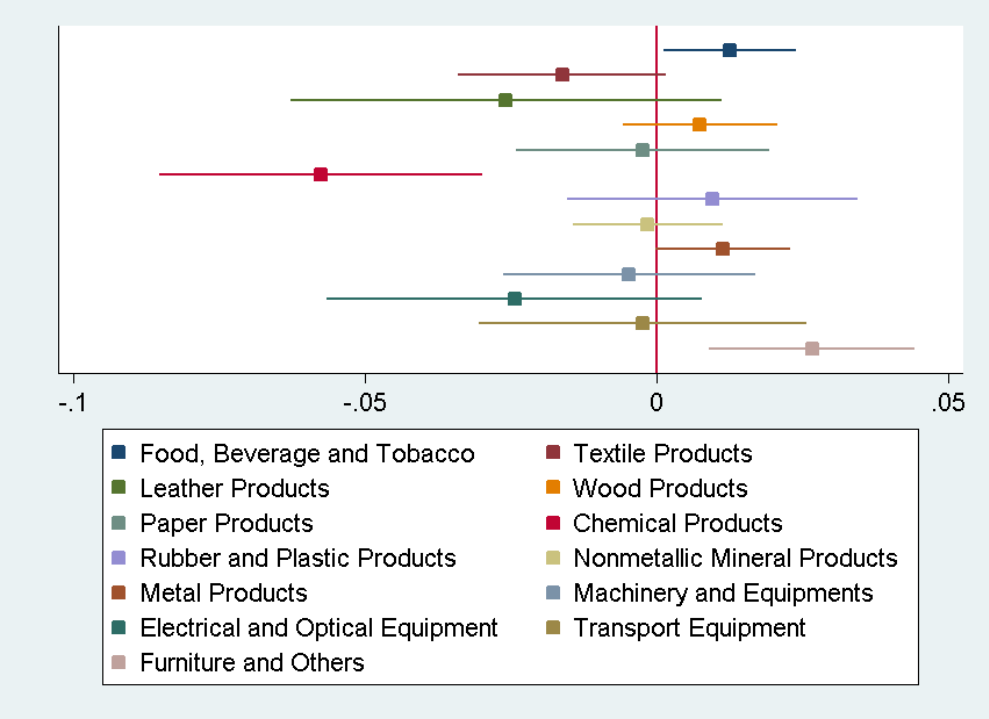
Manufacturing



Services

Notes: 90% Confidence Levels. Standard errors are clustered at the municipal level.

Figure 4: **Heterogeneity Results – Manufacturing Sectors**



Notes: 90% Confidence Levels. Standard errors are clustered at the municipal level.

8 Tables

Table 1: Property Tax Rates: Minimum and Maximum Values

Year	Reassessed (IMI)	
	Min	Max
2003-2007	0.20%	0.50%
2008-2011	0.20%	0.40%

In this study, we focus on the reassessed urban properties tax rate reform.
Source: Portuguese tax authority

Table 2: Summary Statistics for the Municipal-Level Analysis

Variable	Obs.	Mean	Std. Dev.	Min	Max
Dependent variables:					
Manufacturing entry rate	2048	0.0404	0.0352	0	0.3077
Services entry rate	2048	0.0692	0.0255	0	0.2188
Controls:					
age dependency ratio	2048	58.224	11.806	38.239	108.789
workforce with a tertiary degree	2048	0.067	0.033	0.014	0.302
same political party dummy	2048	0.402	0.490	0.000	1.000
highways	2048	0.574	0.495	0.000	1.000
unemployment rate	2048	6.667	2.335	1.439	16.933
consumption of electricity pc	2048	4435.365	4995.522	1372.587	66560.670
primary expenditure pc	2048	0.923	0.459	0.2601	4.633
first instance court dummy	2048	0.758	0.428	0.000	1.000
percentage of industrial area	2048	0.015	0.023	0.000	0.150
share of leftist mandates	2048	0.556	0.255	0.000	1.000
Triple diff-in-diff:					
share full owners	278	0.168	0.092	0.015	0.531
share partial owners	278	0.666	0.163	0.282	0.970
share renters	278	0.170	0.094	0.015	0.521

This table presents the summary statistics for the municipal level sample, which we use to evaluate the reform effects on the entry and job creation rates. The sample period is 2004 and 2011.

Table 3: Baseline Results – Firm Entry Rates

	Entry Rates			
	(1)	(2)	(3)	(4)
	Panel A. Manufacturing			
Treated×Post Period	0.0065**	0.0074**	0.0060*	0.0063*
	(0.0029)	(0.0032)	(0.0033)	(0.0035)
Adjusted R^2	0.0480	0.0440	0.0486	0.0533
	Panel B. Services			
Treated×Post Period	0.0002	0.0016	0.0026	0.0016
	(0.0021)	(0.0023)	(0.0025)	(0.0026)
Adjusted R^2	0.254	0.252	0.256	0.258
Municipality FE	✓	✓	✓	✓
Year FE	✓			
Nuts 2×Year FE		✓	✓	✓
Controls			✓	✓
Pop quartiles×Year FE				✓

Notes: N=2048. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 4: Baseline Results – Job Creation Rates

	Job Creation Rates			
	(1)	(2)	(3)	(4)
	Panel A. Manufacturing			
Treated×Post Period	0.008**	0.008*	0.007	0.005
	(0.004)	(0.005)	(0.005)	(0.004)
Adjusted R^2	0.0137	0.0105	0.0130	0.0165
	Panel B. Services			
Treated×Post Period	0.003	0.003	0.003	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Adjusted R^2	0.0808	0.0741	0.0743	0.0758
Municipality FE	✓	✓	✓	✓
Year FE	✓			
Nuts 2×Year FE		✓	✓	✓
Controls			✓	✓
Pop quartiles×Year FE				✓

Notes: N=2048. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 5: Balance Tests

	Treatment	Control	Diff. (Std. Err.)	Treated (Std. Dev.)
Dependent variables:				
Manufacturing Entry Rate	0.043	0.047	-0.003 (0.002)	-0.002 (0.002)
Service Entry Rate	0.08	0.076	0.004** (0.002)	0.002 (0.002)
Controls:				
lnPopulation	10.487	9.552	0.935*** (0.137)	0.061 (0.058)
age dependency ratio	53.02	60.968	-7.948*** (1.413)	-2.199* (1.168)
percentage of industrial area	0.024	0.01	0.014*** (0.003)	0.006 (0.004)
first instance court dummy	0.819	0.76	0.059 (0.052)	-0.057 (0.046)
workforce with tertiary degree	0.07	0.056	0.014*** (0.004)	-0.0002 (0.004)
majority	0.887	0.89	-0.003 (0.034)	0.0704* (0.038)
same political party dummy	0.419	0.383	0.036 (0.041)	0.048 (0.039)
share of leftist mandates	0.578	0.535	0.043 (0.032)	0.0366 (0.029)
consumption of electricity pc	5116.214	3852.597	1263.617* (724.820)	1099.981 (1086.289)
unemployment rate	6.207	6.038	0.169 (0.256)	0.171 (0.261)
primary expenditure pc	0.77	0.941	-0.171*** (0.052)	0.024 (0.032)
highway dummy	0.721	0.478	0.243*** (0.060)	0.001 (0.055)
Municipality FE				✓
Nuts 2×Year FE				✓
Controls				✓
Pop quartiles×Year FE				✓

Notes: Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 6: Falsification Test (Placebo)

	Entry Rates	
	(1)	(2)
	Panel A. Manufacturing	
Treated×Post Period	0.0034	0.0019
	(0.0048)	(0.0052)
Adjusted R^2	0.00628	0.00825
	Panel B. Services	
Treated×Post Period	0.0002	-0.0029
	(0.0027)	(0.0028)
Adjusted R^2	0.00857	0.0232
Municipality FE	✓	✓
Nuts 2×Year FE	✓	✓
Controls		✓
Pop quartiles×Year FE		✓

Notes: N=1112. Standard errors in parenthesis are clustered at the municipal level. Odd (even) specifications correspond to column (2) (column (4)) of Table 3. The Post Period, in this specification, is set to years 2006 and 2007. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 7: Robustness Checks – Intensity of Treatment

	Entry Rates	
	(1)	(2)
	Panel A. Manufacturing	
Intensity×Post Period	0.0837**	0.0707*
	(0.0389)	(0.0419)
Adjusted R^2	0.0441	0.0534
	Panel B. Services	
Intensity×Post Period	0.0151	0.0153
	(0.0259)	(0.0291)
Adjusted R^2	0.252	0.258
Municipality FE	✓	✓
Nuts 2×Year FE	✓	✓
Controls		✓
Pop quartiles×Year FE		✓

Notes: N=2048. Standard errors in parenthesis are clustered at the municipal level. Odd (even) specifications correspond to column (2) (column (4)) of Table 3. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 8: Robustness Checks – Different Samples

	Entry Rates			
	Full Sample		Single Estab Firms	
	(1)	(2)	(3)	(4)
	Panel A. Manufacturing			
Treated×Post Period	0.0076**	0.0061*	0.0084**	0.0079**
	(0.0032)	(0.0037)	(0.0034)	(0.0037)
Adjusted R^2	0.0435	0.0475	0.0335	0.0395
	Panel B. Services			
Treated×Post Period	0.0007	0.0030	0.0019	0.0019
	(0.0021)	(0.0024)	(0.0024)	(0.0028)
Adjusted R^2	0.243	0.245	0.230	0.238
Municipality FE	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓
Controls		✓		✓
Pop quartiles×Year FE		✓		✓

Notes: N=2224 for the Full Sample. N=2048 for the remaining specifications. Odd (even) models correspond to column (2) (column (4)) of Table 3. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 9: Robustness Checks – Time and Space

	Entry Rates					
	Drop 2008		Drop 2011		Drop Coast	
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Manufacturing			
Treated×Post Period	0.0070**	0.0057	0.0074*	0.0084*	0.0092**	0.0078*
	(0.0034)	(0.0036)	(0.0043)	(0.0048)	(0.0039)	(0.0045)
Adjusted R^2	0.0512	0.0630	0.0246	0.0301	0.0528	0.0577
			Panel B. Services			
Treated×Post Period	0.0023	0.0026	0.0012	0.0013	0.0009	-0.0004
	(0.0026)	(0.0030)	(0.0024)	(0.0027)	(0.0029)	(0.0036)
Adjusted R^2	0.271	0.280	0.185	0.196	0.223	0.231
Municipality FE	✓	✓	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓
Pop quartiles×Year FE		✓		✓		✓

Notes: N=1792 for the first two specifications. N=1632 in the last specification. Odd (even) models correspond to column (2) (column (4)) of Table 3. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 10: Heterogeneity Results – High vs. Low Technology

	Entry Rates			
	High Tech		Low Tech	
	(1)	(2)	(3)	(4)
		Panel A. Manufacturing		
Treated×Post Period	-0.0044	-0.0051	0.0083**	0.0072**
	(0.0153)	(0.0162)	(0.0033)	(0.0036)
Adjusted R^2	0.0107	0.0111	0.0440	0.0556
		Panel B. Services		
Treated×Post Period	0.0057	0.0110	0.0012	0.0005
	(0.0083)	(0.0087)	(0.0023)	(0.0027)
Adjusted R^2	0.0184	0.0320	0.248	0.252
Municipality FE	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓
Controls		✓		✓
Pop quartiles×Year FE		✓		✓

Notes: Standard errors in parenthesis are clustered at the municipal level. Odd (even) specifications correspond to column (2) (column (4)) of Table 3. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 11: Demand

	ln(ATM Withdrawal Value)		ln(Number of ATM Withdrawals)	
	(1)	(2)	(3)	(4)
Treated×Post Period	-0.0177	-0.0120	-0.0126	-0.0095
	(0.0154)	(0.0161)	(0.0158)	(0.0162)
Adjusted R^2	0.323	0.326	0.229	0.236
Municipality FE	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓
Controls		✓		✓
Pop quartiles×Year FE		✓		✓

Notes: N=2048. Odd (even) models correspond to column (2) (column (4)) of Table 3. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 12: Reaction of Municipalities

	ln(Primary Expenditures)		ln(Business Tax Revenue)	
	(1)	(2)	(3)	(4)
Treated×Post Period	-0.0191	-0.0115	0.0228	0.3866
	(0.0194)	(0.0198)	(0.2802)	(0.2822)
Adjusted R^2	0.238	0.270	0.041	0.081
Municipality FE	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓
Controls		✓		✓
Pop quartiles×Year FE		✓		✓

Notes: N=2048. Odd (even) models correspond to column (2) (column (4)) of Table 3. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Standard errors in parenthesis are clustered at the municipal level. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 13: Firm Survival

	Probability of Surviving					
	1 Year		3 Years		5 Years	
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Manufacturing			
Treated×Post Period	0.038***	0.046***	0.041**	0.041**	0.026*	0.030*
	(0.010)	(0.010)	(0.017)	(0.016)	(0.015)	(0.017)
Adjusted R^2	0.0199	0.0200	0.0370	0.0381	0.0418	0.0427
			Panel B. Services			
Treated×Post Period	0.045***	0.050***	0.041***	0.044***	0.025***	0.026***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.007)	(0.008)
Adjusted R^2	0.0419	0.0422	0.0619	0.0621	0.0571	0.0572
Municipality FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓
Pop quartiles×Year FE		✓		✓		✓

Notes: N=17924 in Panel A. N=142265 in Panel B. Standard errors in parenthesis are clustered at the municipal level. Firm controls includes ln(Sales), ln(Employment), and sector level dummies. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 14: Financing the Activity: Year 0

	Short Debt/Assets		ln(Short Debt)	
	(1)	(2)	(3)	(4)
		Panel A. Manufacturing		
Treated×Post Period	0.053*	0.073**	1.603**	2.043**
	(0.030)	(0.035)	(0.786)	(0.822)
Adjusted R^2	0.121	0.118	0.129	0.158
N	479	479	479	479
		Panel B. Services		
Treated×Post Period	0.007	0.008	0.201	0.253
	(0.014)	(0.015)	(0.225)	(0.235)
Adjusted R^2	0.0144	0.0132	0.0840	0.0849
N	4536	4536	4536	4536
Municipality FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓
Controls		✓		✓
Pop quartiles×Year FE		✓		✓

Notes: Standard errors in parenthesis are clustered at the municipal level. Firm controls includes ln(Sales), ln(Employment), and sector level dummies. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Table 15: Capital Expenditure and Financing the Activity: Year 5

	Investment		Financing the Activity			
	ln(CapExp Buildings)		Debt/Assets		ln(Debt)	
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Manufacturing			
Treated×Post Period	0.982**	1.093*	10.265	8.023	1.839*	2.655**
	(0.494)	(0.653)	(12.379)	(11.726)	(1.065)	(1.190)
Adjusted R^2	0.155	0.161	0.0019	0.0253	0.119	0.151
N	448	448	445	445	448	448
			Panel B. Services			
Treated×Post Period	-0.017	0.018	1.817	1.340	-0.448*	-0.548*
	(0.163)	(0.138)	(3.557)	(2.613)	(0.251)	(0.292)
Adjusted R^2	0.0382	0.0406	0.0012	0.0028	0.0782	0.0793
N	4719	4719	4650	4650	4720	4720
Municipality FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Nuts 2×Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓
Pop quartiles×Year FE		✓		✓		✓

Standard errors in parenthesis are clustered at the municipal level. Firm controls includes ln(Sales), ln(Employment), and sector level dummies. The vector of socio-demographic, economic, and political controls includes the age dependency ratio, the share of the workforce with a tertiary degree, the unemployment rate, the consumption of electricity per capita, the percentage of industrial area, a first instance court dummy, a highway dummy, a same political party dummy, a majority dummy, the share of leftist mandates, and the primary municipal expenditure per capita. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).