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The effect of public sector efficiency on firm-level productivity growth: The Italian case

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ABSTRACT/RESUMÉ

The effect of public sector efficiency on firm-level productivity growth: The Italian case

Milenko Fadic, Paula Garda and Mauro Pisu

This paper investigates the causal effect of public administration efficiency on firm-level productivity. To this purpose, we combine newly available data from Italy on public administration efficiency of subnational governments with geo-localised firm-level data for the years 2004-2014. Italy provides a relevant setting to examine the relationship between public administration efficiency and firm productivity because of large and persistent spatial disparities in economic performance and local administrative capacity. The identification strategy exploits discontinuities that occur in local public-administration efficiency across provincial borders. The results suggest that local public administration efficiency has a large effect on firms' productivity growth. Increasing local public administration efficiency from the 25th percentile to the 75th percentile would raise the firm-level labour productivity in Italy by 2.4 percentage points.

Key words: productivity; firm performance; firm growth; public administration; public goods; public services; local public services; local government expenditures; interjurisdictional differentials.

JEL: D24; H41; H72; H73; L25.

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L'effet de l'efficacité du secteur public sur la croissance de la productivité des entreprises: le cas italien

Cette étude examine l'effet de causalité de l'efficacité de l'administration publique sur la productivité au niveau de l'entreprise. À cette fin, nous combinons des données nouvellement disponibles pour l'Italie sur l'efficacité des administrations publiques sous-nationales avec les données géolocalisées au niveau de l'entreprise pour les années 2004-2014. L'Italie offre un cadre approprié pour examiner la relation entre l'efficacité de l'administration publique et la productivité des entreprises en raison des disparités spatiales importantes et persistantes en matière de performance économique et de capacité administrative locale. La stratégie d'identification exploite les discontinuités qui se produisent dans l'efficacité de l'administration publique locale à travers les frontières des provinces. Les résultats suggèrent que l'efficacité de l'administration publique locale a un effet important sur la croissance de la productivité des entreprises. Augmenter l'efficacité des administrations publiques locales du 25e au 75e centiles augmenterait la productivité du travail au niveau de l'entreprise en Italie de 2,4 points de pourcentage.

Mots clés: productivité; performance de l'entreprise; croissance de l'entreprise; administration publique; biens publics; services publics; services publics locaux; dépenses des administrations locales; différences entre juridictions.

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The effect of public sector efficiency on firm-level productivity growth: The Italian case

Milenko Fadic, Paula Garda and Mauro Pisu[1]

Introduction

Recent research has shown that regional disparities in economic performance and prosperity within a country can be large and persistent (Acemoglu and Dell, 2010[1]; Tabellini, 2010[2]; Breinlich, Ottaviano and Temple, 2014[3]; Gennaioli et al., 2014[4]; OECD, 2011[5]). Various factors could explain these differences, including geography, market access, openness, transport infrastructure, local institutions, social norms, entrepreneurship and skills (Breinlich, Ottaviano and Temple, 2014[3]).

This paper examines the role of local institutions and locally provided public goods as a source of these large and persistent spatial economic disparities, focusing on the case of Italy. Italy is an ideal setting for such an investigation because of existing large disparities in living standards and in the functioning of the public administration across the country (especially along the 'north-south divide'). We use data on public administration efficiency sourced from OpenCivitas, a unique and, to the best of our knowledge, hitherto unexploited dataset that provides quantitative and objective information on public administration activities of local governments. We merge this data with a geo-localised firm-level administrative dataset (ORBIS) covering the period 2004-2014. The identification strategy of the effect of public administration efficiency on firm productivity relies on a spatial discontinuity approach, which exploits jumps in local public administration efficiency across local administrative boundaries. By investigating the effect of public-administration efficiency within the same country, this paper overcomes some of the methodological challenges facing the cross-country studies that have focused on the impact of the quality of public institutions on growth, such as difficult-to-compare public-sector efficiency measures and endogeneity problems.[2]

The results indicate that public administration efficiency has a positive and economically significant effect on firm-level labour productivity growth. Raising province-level public administration efficiency from the 25th to the 75th percentile (e.g. from the level of Catanzaro in Calabria to that of Monza in Lombardia) would increase growth of firm-level labour productivity (computed as value added per worker) in Italy by 2.5 percentage points.

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2. A large literature has already identified a link between public sector efficiency and economic prosperity across countries. These studies have focussed mainly on survey based measures of the quality of institutions (Mauro, 1995[57]; Keefer and Knack, 1997[8]; Hall and Jones, 1999[58]; Rodrik, 1999[59]; Oto-Peralías, 2014[60]), objective measures of bureaucratic quality (Evans, 1999[56]) and the strength of property rights (Acemoglu, Johnson and Robinson, 2001[61]). Micro-economic studies have examined the effect of the strength of property rights, based on survey-based measures, on firm investment (Besley, 1995[62]; Xu and Lixin, 2005[63]).

The effect on labour productivity is driven by rising output while there is no significant effect on employment. We also find that public sector efficiency has a smaller but still significant impact on multifactor productivity growth. Using the different components of the public administration efficiency index suggest that general administrative, management and control functions as well as public transportation have the largest effects.

Our study is connected to several strands of the literature. Giordano et al. (2015[6]) and Giacomelli and Menon (2016[7]) investigate the effect of public-administration and judicial efficiency on firm performance in Italy. Giacomelli and Menon (2016[7]) use a spatial discontinuity approach and find that faster civil proceedings result in larger firms. Giordano et al. (2015[6]) find a positive association between the local public administration efficiency and firms' performance.

This study also speaks to the literature reporting a positive link between social capital and economic growth (Keefer and Knack, 1997[8]; Zak and Knack., 2001[9]; Banerjee and Lyer, 2005[10]; Algan and Cahuc, 2010[11]; Tabellini, 2010[2]). Seen through the lens of this literature, our results identify the efficiency of the local public administration as one channel through which social capital affects economic performance. In his seminal paper, Putnam (1993[12]) argues that differences in social capital among Italian regions had far-reaching economic consequences, mainly through local government effectiveness. Still, as highlighted by Ponzetto and Troiano (2018[13]), the specific causal channels through which social capital contribute to growth are not fully understood. The definition of social capital – e.g. "connections among individuals, social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000[14]) – while informative is too broad to pinpoint any specific channel. However, empirical evidence in the political science and public administration literatures corroborates the hypothesis that social capital improves with the effectiveness of public service delivery (Halpern, 2004[15]; Andrews, 2012[16]). In any community, social capital constitutes the stock of material, cultural and human resources that can be mobilised for the delivery of public goods and services. At the same time, the efficiency of local public institutions may be a key determinant of social capital of communities (Wallis and Dollery, 2002[17]; Andrews, 2012[16]), though evidence supporting this hypothesis is still tentative.

This study is also related to the vast literature on Italy's low aggregate productivity growth. Recent detailed firm-level analyses (Linarello, 2017[18]; Calligaris, 2016[19]) have shown that the slowdown in aggregate productivity growth can be attributed to declining firm-level productivity growth and, to a lesser extent, resource misallocation across firms. Previous empirical studies have ascribed low firm-level productivity growth in Italy to specific factors including: the sectoral specialisation of Italian manufacturing firms (Ciriaci and Palma, 2008[20]); firms' structure and extensive use of temporary workers (Daveri and Parisi, 2010[21]); the failure to adopt information and communications technology (Pellegrino and Zingales, 2017[22]); the high share of small firms in the economy (European Commission, 2016[23]); labour market rigidities (OECD, 2015[24]) and a lack of human capital and/or managerial knowhow (Bandiera, Prat and Valletti, 2009[25]; Brasili and Loredana, 2008[26]). Others have highlighted the lack of reform in credit, product and labour markets (Manasse, 2013[27]) and capital and labour misallocation (Hassan and Ottaviano, 2013[28]). Our results underline the importance of public administration reforms to raise firm-level, and thus aggregate, productivity growth.

The rest of the paper is divided as follows: the next section describes the data. Section III discusses the methodology. Section IV provides the results and robustness checks. Section V concludes.

Data

Public administration efficiency indicators come from OpenCivitas, an online portal (www.opencivitas.it) created and maintained by the Italian Ministry of Finance and SOSE. SOSE is a state-owned company charged with data analysis on fiscal issues. OpenCivitas provides a large array of detailed and publicly available data on the performance of local governments (municipalities, provinces and regions) based on actual expenditure and public services provided. The Law 42/2009 mandates the collection of such data at regular intervals. The new legislation on fiscal federalism reforms the methodology to transfer fiscal resources (horizontal fiscal equalisation) to Italian regions. Specifically, local governments will receive funds from the central government based on their expenditure needs and not based on historical expenditure. The share of funds allocated to local governments based on the expenditure-needs approach is being increased gradually and will reach 100% in early 2020s.

SOSE uses the data provided by local governments to estimate their standard expenditure needs and standard levels of services. The estimation considers geographic and socio-demographic characteristics of the resident population. For instance, at the municipal level, the overall standard expenditure need is constructed considering: population and demographic characteristics, levels of services provided (number of students, and assistance to children with handicaps), geographic features (earthquake risks, altitude, surface area), input prices (rental housing index), social hardships (number of families in absolute poverty), traffic and vehicles, tourism (number of tourists and museum visitors), investment over the past five years and other factors. Brunello et al. (2015[29]) and Ballanti et al. (2014[30]) provide a detailed explanation of the methodology.

SOSE computes the local governments' public administration efficiency index combining the expenditure gap and the output gap. The expenditure gap is the difference between actual expenditure and the estimated standard expenditure needs. This can be considered as an input-oriented efficiency index. The output gap is the difference between the actual level of services provided and the estimated standard level of services. This can be considered as an output-oriented efficiency index as it captures the effectiveness of public service provisions of provinces and municipalities with respect to their needs. These two indexes are converted to a 1-10 scale and the final efficiency indicator is a weighted average of the expenditure effectiveness (40%) and the public provision effectiveness (60%). A score of five on the scale represents that the province is in line with the services provided or the average expenditure with respect to other provinces with similar characteristics.

Italy is not the first country to adopt such a methodology to assess the performance of local governments or agencies – especially with regard to expenditure needs. Recent examples include the Comprehensive Performance Assessment in England, the Australian Review of Government Service Provision and Norway's KOSTRA system (Phillips, 2018[31]; Mizell, 2008[32]). Italy's methodology to estimate expenditure needs and the efficiency of sub-national governments is one of the most advanced across OECD countries.

For this study, we use the public administration efficiency indicator at the municipal level, the lowest level of disaggregation available. The index is available for the years 2010 and 2013. We use the efficiency indicator for 2013, but results are robust to using the 2010 indicator.[3] The municipal efficiency index is subdivided in different components capturing the activities under the remit of municipalities. These are: general administrative, management and control functions (tax office; technical office, which deals with building

3. The legislation changed in 2012 as a new law (Law 95/2012) increased from six to ten the number of fundamental functions managed by municipalities. The data available up to 2013 refers still to the old system.

permit and manages the real estate; civil registry office; other general services), local police (municipal and local administrative police), education (school construction; organization and management of school services), transport (roads and local public transport); land use and environmental functions (land management and planning; environmental protection and waste management); social care (child care and other social services excluding child care). Municipalities located in autonomous provinces and regions (Friuli-Venezia Giulia, Valle d'Aosta, Sardegna, Sicilia, and Trentino-Alto Adige) are excluded from the analysis because of lack of data. The indicator is available for 6 313 municipalities and in 86 provinces.[4]

Firm level data for the years 2004-2014 come from the ORBIS dataset. These are collected by Bureau van Dijk (BVD), an electronic publishing firm, from annual balance sheet and income statements. See Gal (2013[33]) for more information on the firm-level dataset. Following most of the literature, labour productivity is computed as real value added per worker. The estimation for multifactor productivity (MFP) relies on a value added based production function with the number of employees and real capital as inputs. The production function is estimated using the one-step GMM method proposed by Wooldridge (2009[34]). This mitigates the endogeneity problem of input choices by using material inputs as proxy variables for productivity and (twice) lagged values of labour as instruments (see Andrews et al. (2016[35])) for more details on the estimation of multifactor productivity). Each firm is localised based on their registered address at the zip code level. The company zip code was matched to Italian municipalities using geographical information obtained from the Italian Statistical Agency (ISTAT).

The firm-level data do not allow us distinguish between single- and multi-plant firms. This is a challenge for our identification strategy since production plants may be located in different municipalities, provinces or regions than the registered address (i.e. the headquarter). This is especially problematic for large firms as they are more likely than small firms to have multiple plants. However, Italy's economy is dominated by small and micro firms. For instance, in mid-2010s firms with up to 20 employees accounted for nearly 60% of total employment and 40% of total value added, some of the largest shares among OECD countries (OECD, 2017[36]).Moreover, according to the OECD Structural and Demographic Business Statistics, the average number of employees per firm is 3.8. The Italian statistical office reports a similar number: 3.7 (5.6 in the industry sector, 3.1 in services) (ISTAT, 2018[37]). As comparison, according to the OECD Structural and Demographic Business Statistics, the average firm has about 20 employees in the United States and Switzerland, 13 in Canada, 12 in New Zealand and Japan, and 11 in Germany. That Italian firms are on average so small suggests that multi-plant firms are likely to be rare. Second, Italian small firms are fairly well represented in the ORBIS dataset, especially in the manufacturing sector, though coverage is not exhaustive (Kalemli-Ozcan et al., 2015[38]).

Table 1 provides descriptive statistics of the efficiency index of municipalities in the sample across regions. The average municipality is small, having just above 9 000 inhabitants. The dispersion within regions of the public administration efficiency at municipal level is high; virtually all regions have municipalities with the lowest level of the efficiency index and others approaching to or at the maximum. However, in southern regions municipalities are on average less efficient than those in centre and northern regions. The mean of the municipal efficiency index is 4.7 for the southern regions, and 5

[4]. To check the robustness of the result, other measures of public efficiency were used that included the newly created provinces and the provinces belonging to autonomous regions. The results remain unaffected. These results are not included in the robustness checks but are available upon request.

for centre regions and 5.9 for northern ones. Table 2 shows basic descriptive statistics for the municipal level efficiency indicators. The largest variation of the indicator concerns the general administrative, management and control functions (with the exception of the civil registry office), and environmental protection and waste management. Recent papers have focused on the efficiency of the tribunals or the justice system on firms' performance. Our indicators do not cover the justice system as in Italy this is under the remit of the central government and not of local ones. Table 3 shows the correlation coefficients of the sub-indexes. As expected, most of them are positively correlated.

Table 1. Regional statistics

Regions	Number municipalities	Average population of municipality	Number provinces	Municipal level public administration efficiency index		
				Mean	Min	Max
Abruzzo (South)	285	7564	4	5.2	1	10
Basilicata (South)	127	2524	2	4.2	1	8.8
Calabria (South)	399	3042	5	4.2	1	10
Campania (South)	524	10721	5	5.6	1	10
Emilia-Romagna(North)	310	18146	9	5.4	1	9
Lazio (Centre)	350	9907	5	4.2	1	9.4
Liguria (North)	225	20212	4	4.7	1	10
Lombardia (North)	1471	6995	12	5.9	1	10
Marche (Centre)	227	7937	5	6.2	1	10
Molise (South)	131	1351	2	5.0	1	9.6
Piemonte (North)	1127	2266	8	6.1	1	10
Puglia (South)	236	30681	6	4.1	1	8.8
Toscana (Centre)	260	14230	10	4.7	1	10
Umbria (Centre)	89	11143	2	4.7	1	8.8
Veneto (North)	552	11313	7	7.4	3.4	10

Note: The following table presents descriptive statistics for Italian regions. The municipal level public administration efficiency index refers to the average score for the region in OpenCivitas.
Source: OpenCivitas and authors computation.

Table 2. Municipal-level administrative efficiency by sub-components

	Mean	SD	CV	Min	Max
General administrative, management and control functions					
Tax office	5.46	1.12	0.21	2.93	8.05
Technical office	5.40	1.03	0.19	3.04	7.35
Civil registry office	5.43	0.68	0.13	3.90	7.90
Other general services	5.25	1.09	0.21	2.63	7.51
Local police	4.97	0.55	0.11	3.60	6.68
Education	5.52	0.63	0.11	3.94	7.43
Public roads and transport					
Roads	4.73	0.65	0.14	3.00	6.27
Local Public transport	4.30	1.31	0.30	1.80	7.52
Land use and environmental functions					
Land management and planning	5.12	0.58	0.11	3.40	6.31
Environmental protection and waste management	5.97	1.45	0.24	3.44	9.25
Social care					
Child care	6.40	0.84	0.13	3.24	8.02
Social services (excluding child care)	5.14	0.68	0.13	3.56	7.15

Note: The following table presents descriptive statistics of the municipal-level administrative efficiency from OpenCivitas.SD stands for standard deviation; CV stands for coefficient of variation (the standard deviation to average ratio).
Source: OpenCivitas.it and authors computation.

Table 3. Correlation table of local municipal-level public administration sub-indexes

	Tax office	*Technical office*	*Civil registry*	*Other services*	*Local police*	*Education*	*Roads*	*Transport*	*Land*	*Environment*	*Child care*
Technical office	0.68										
Civil registry	0.06	0.03									
Other services	0.67	0.66	-0.02								
Local police	0.06	0.08	0.04	0.07							
Education	0.16	0.14	-0.01	0.11	0.12						
Roads	0.11	0.09	0.10	0.08	0.04	-0.03					
Transport	0.29	0.25	0.01	0.27	-0.08	-0.08	0.09				
Land	0.30	0.19	0.03	0.33	0.04	0.03	0.01	0.10			
Environment	0.54	0.49	0.01	0.52	-0.05	0.07	-0.13	0.06	0.25		
Child care	0.17	0.12	-0.08	0.19	-0.02	0.14	-0.02	0.02	0.06	0.10	
Other social services	0.24	0.21	0.15	0.27	0.07	0.04	0.07	0.03	-0.03	0.04	0.03

Source: OpenCivitas and authors computation.

Empirical Strategy: spatial discontinuity design

To provide the causal effects of public efficiency on firm productivity, we use a spatial discontinuity approach first introduced by Black (1999[39])and Holmes (1998[40]). Recent examples of studies using the same approach include Giacomelli and Menon (2016[7]), duranton et al. (2011[41]) and Giua (2017[42]). The methodology consists on restricting the sample to observations that are located near a spatial discontinuity affecting only the variable of interest (local public administration efficiency) and in mean-differentiating all the variables within the group of observations sharing the same discontinuity. Formally, the reduced form equation we estimate takes the form:

$$y_{ijk} = \alpha + \beta_1 Z_j + \boldsymbol{X}_{ijk}\beta_2 + \boldsymbol{\theta}_k + \varepsilon_{ijk} \quad (1)$$

where y is the performance of firm i, located in the province j, and in the municipalities sharing the border k; Z is the index of local public efficiency at the provincial level, which is the provincial average of the public administration efficiency indicators of municipalities, $\boldsymbol{X}_{ijk}$ is a vector of additional controls including firm characteristics (size, age), province-level GDP per capita, and industry and regional dummies; $\boldsymbol{\theta}_k$ is a vector of border group dummies, which are one for municipalities in the border group k and zero otherwise, and used to mean-differentiate all the variables within the group of observations sharing the same border k; ε is an i.i.d error term. Standard errors are clustered at the provincial level.

The identification strategy of the causal effect of the public administration efficiency hinges on three assumptions: 1) discontinuity in public administration efficiency at the border; 2) continuity in the two-dimensional score; 3) and compound treatment irrelevance (Keele and Titiunik, 2015[43]). The compound treatment irrelevance implies that other boundaries that overlap with provincial borders do not affect the variable of interest. The continuity in two dimensional scores requires that the average potential outcomes under treatment and control be continuous at all points on the boundary, meaning that there should be no discontinuity in any other variables on either side of the border under study.

Given these assumptions and the data at hand, the identification strategy relies on using the discontinuity in public efficiency due to provincial borders. The detailed reasons are the following. The Italian system of government is divided into four levels: state (i.e. central government), regional, provincial, and municipal. Italy's constitution (art. 117) grants legislative powers only to the state and regions whereas provinces and municipalities only have administrative powers. Because of this institutional setup, adjacent municipalities located along provincial borders are likely to belong to the same broad economic area, sharing the same labour and product markets, and have the same industrial structure. Provincial borders demark administrative and not economic and social areas. However, in some cases provincial borders overlap with those of local labour market areas (i.e. commuting areas) and judicial districts. This could violate the third assumption of the spatial discontinuity approach ("compound treatment irrelevance"). In the robustness checks section, we perform various tests to be sure the assumption concerning the "compound treatment irrelevance" holds in our data and to correctly identify the effect of local public administration efficiency on firms' productivity.

We use provincial rather than regional borders as regions have ample legislative powers (shared with the state) covering important economic and social areas, such as employment protection and safety, professional services, health care, ports and airports relationships with foreign states and the EU (e.g. regions are responsible for attracting and managing EU structural funds) and many others. Thus, regional borders, unlike provincial ones, are likely to create large discontinuities not only in public administration efficiency but also in other factors affecting firms' performance, violating the assumption concerning the continuity in the two dimensional score. We use provincial rather than municipal borders because there exists a vast number of municipal borders, making estimation infeasible.

In the regressions, we use the province-level public administration efficiency index computed as the average of public-administration efficiency of municipalities within the same province. We do not use the province-level efficiency index available in OpenCivitas, calculated using data on expenditure and services of provincial administrations because it is only available for the year 2010 and municipalities have substantially stronger administrative and spending powers than provinces. For instance, in 2010 the public expenditure relating to municipalities' functions was six times larger than that relating to

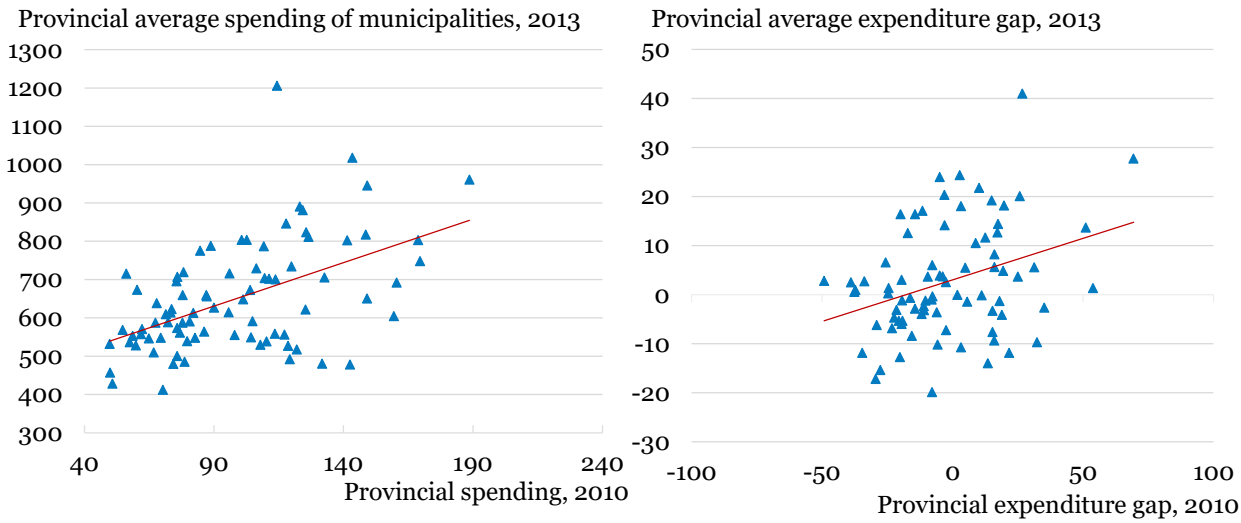
provinces. At the same time, provinces have an important strategic coordination role of municipal activities. Figure 1 shows that for both the level of spending and the expenditure gap (i.e. difference between actual and the standard expenditure needs) there is high correlation between the efficiency index for provinces computed by SOSE in the y axis in Figure 1) and provincial averages of municipalities' indexes used in this study (in the x axis).

A Shapley-based decomposition (Israeli, 2007[44]) of the R-squared of the linear regression of the public administration efficiency at municipal level on a constant plus provincial and regional fixed effects shows that provincial fixed effects explain 70% more of the variance of municipal public administration efficiency than regional fixed effects. This indicates that the provincial border provides a useful discontinuity in public administration efficiency to estimate its casual effect on firms' performance.

Table 4 reports the main descriptive statistics of the variables used in the empirical analysis, for the full or the estimation sample. The unrestricted sample consists of 366 347 observations whereas the restricted sample, composed of firms that share a provincial border, has about 100 000 observations. During the period 2004-2014, the average firm's labour productivity (measured by value added per worker) decreased by 0.7%. There are no statistically significant differences between the full and estimation samples.

The average firm in the sample is 12 years old and has 15 employees. The small size of Italian firms in the ORBIS dataset reflects the prevalence of small and micro firms in Italy's economy, as highlighted in the previous section.

Figure 1. Average efficiency at the municipal level is highly correlated with the provincial level



Note: Spending is expressed in million euros and expenditure gaps are the difference between historical and standard levels in percentage of standard.
Source: Authors' computation based on OpenCivitas.

Table 4. Descriptive statistics of firms

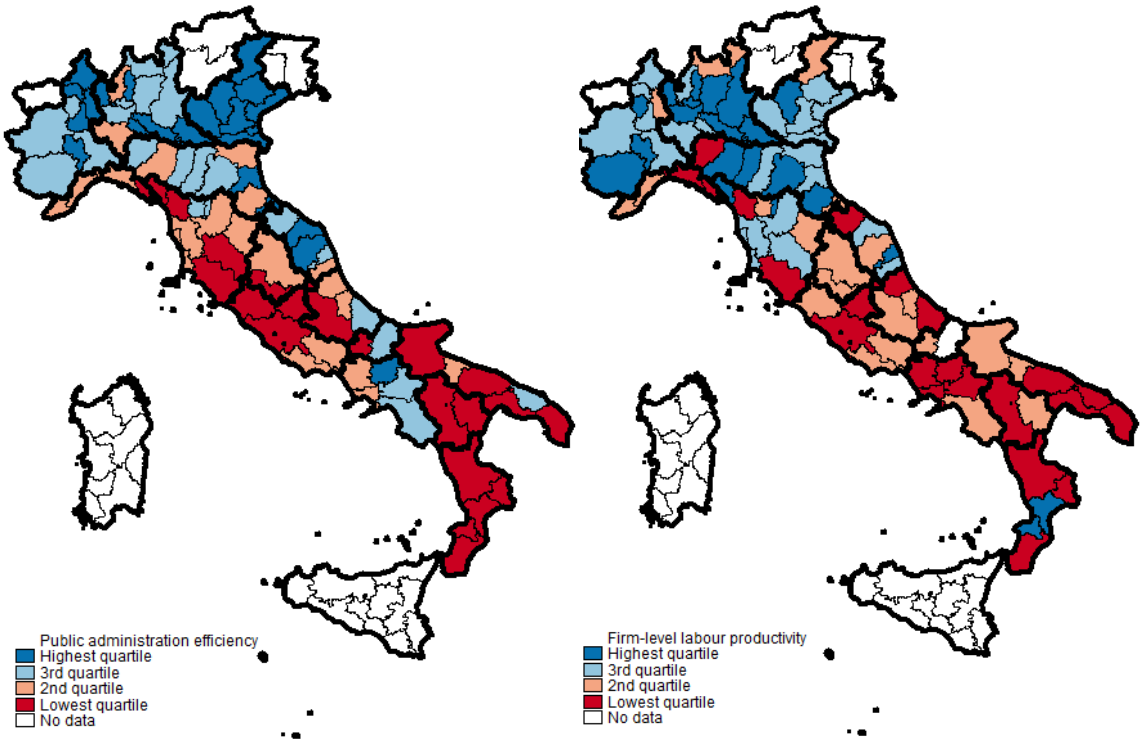
2004-14 average

	All sample (1)		Estimation sample (2)		All continuing firms 2004-14 (3)		All firms 2011-14 (4)	
	Number of observations							
	366 347		100 800		67 655		73 219	
	Firm-level descriptive statistics							
	Mean	*St. dev.*	*Mean*	*St. dev.*	*Mean*	*St. dev.*	*Mean*	*St. dev.*
Number of employees	14.9	12.1	15.2	10.4	18.0	11.7	14.1	10.8
Age	12.2	0.1	12.6	0.1	15.0	12.4	13.2	12.5
Labour productivity (log)	10.4	0.9	10.5	0.8	10.6	0.7	10.4	0.9
Labour productivity growth	-1.0	0.5	-0.7	0.5	0.0	0.3	0.0	0.5
Value added growth	0.0	0.5	0.5	0.5	0.0	0.3	0.0	0.5
Multifactor productivity growth (MFP)	0.0	0.1	-0.3	0.1	0.0	0.0	0.0	0.1

Note: The table above presents descriptive statistics in the sample of Italian firms available in ORBIS that were geo-localised. All sample (column 1) refers to all firms in ORBIS. The Estimation sample (column 2) refers to those firms located in a municipality that share a provincial border. All continuing firms (column 3) refers to all present during the period 2004-14. All firms (column 4) during the period 2011-14.
Source: Authors' computation based on ORBIS.

A visual inspection of the data reveals that provinces with higher public sector efficiency tend to have higher firm-level labour productivity (Figure 2). This visual inspection does not necessarily imply that public sector efficiency affects firm-level productivity. Provinces with low public sector efficiency may have different industrial structure, different average firm size, and may differ in a host of other ways that affect firm level performance productivity, independently of public administration efficiency.

Figure 2. Average firm level labour productivity is higher in areas with more efficient public administration

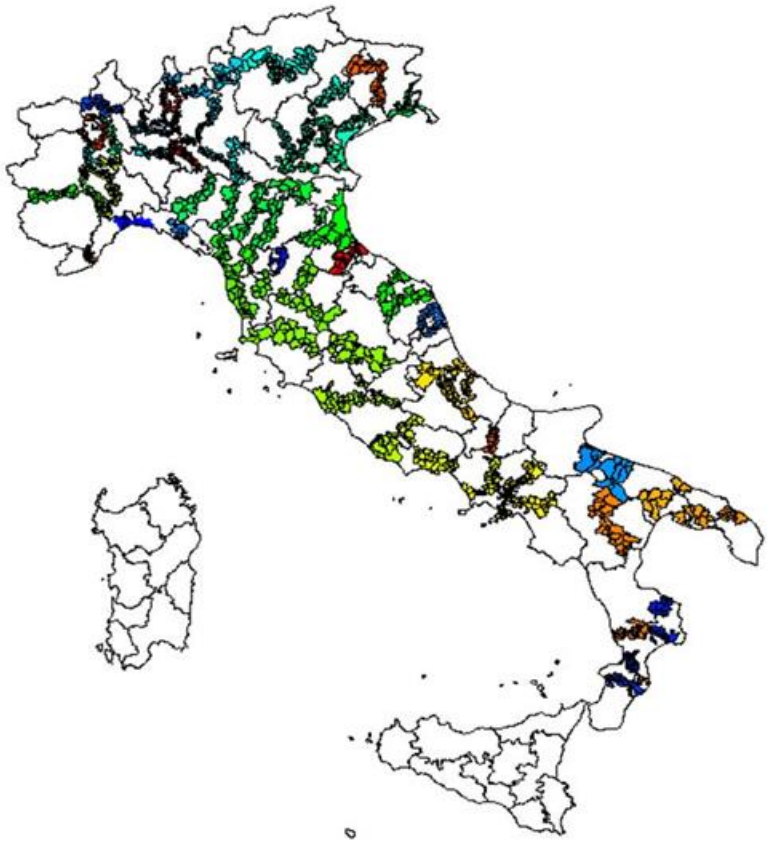


Note: The analysis uses firm-level data for the years 2004-14 from the ORBIS dataset and public administration efficiency indicators at the provincial level obtained from OpenCivitas. The public administration efficiency indicator varies from 1 to 10. The indicator is available at municipal level but it is then aggregated at provincial level for the year 2013. Productivity is measured as real value added per worker at firm level and averaged within provinces. Colours in the maps represent quartiles of the public administration efficiency and productivity-level distributions, red being the lowest quartile and dark being blue the highest quartile.
Source: Authors' calculations using ORBIS and OpenCivitas data.

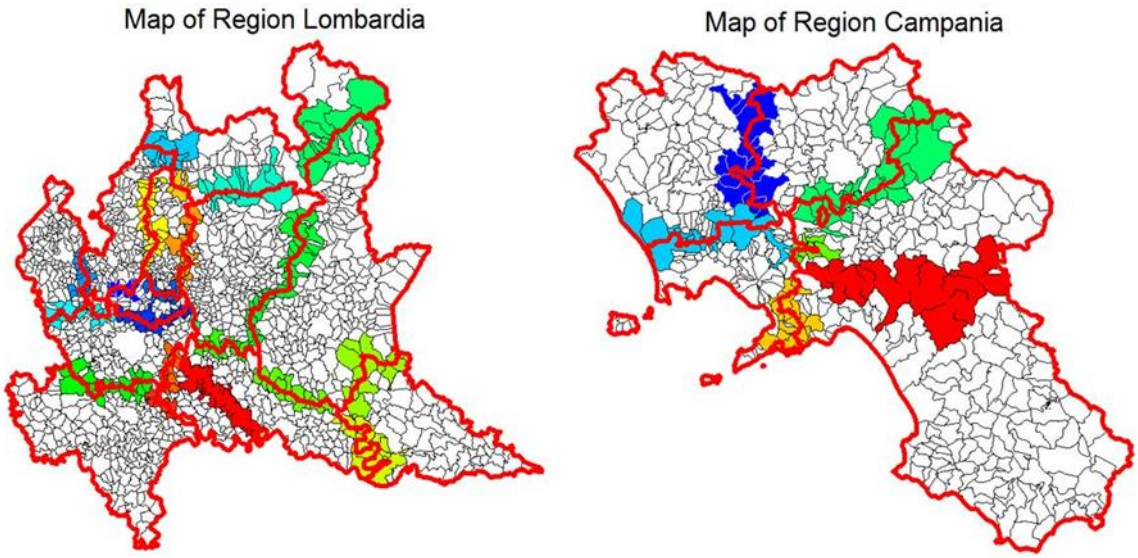
Figure 3 (Panel A) shows a map of all the municipalities included in the estimation sample along with the provincial borders. Each border group is represented by a colour. The estimation sample consists of firms located in communities at either side of the provincial borders. Overall, there are a total of 135 different border groups. Panel B of the same figure shows more detailed information for the regions of Lombardia and Campania.

Figure 3. Neighbouring municipalities and provincial borders within the same region used in the estimation sample

Panel A. Italy



Panel A. Italy



Source: Authors' computations using OpenCivitas data.

Results

Table 5 presents the results of the baseline specification of equation 1 using all firms in the sample and without including the border group dummies ($\boldsymbol{\theta}_k$). As seen in Table 5, the coefficients of the local public administration efficiency are positive but are small and not statistically different from zero.

Table 5. Main results OLS all firms in the sample

	Labour productivity growth		Value added growth		MFP growth	
	1	2	3	4	5	6
Local public administration efficiency	0.001		0.003		0.000	
	(0.002)		(0.002)		(0.000)	
Small firm (revenues < p35)	-0.056***	-0.056***	-0.085***	-0.085***	-0.006***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)
Medium firm (p35 < revenues <p75))	-0.010***	-0.010***	-0.019***	-0.019***	-0.001***	-0.001***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)
Log of age of firm	-0.084***	-0.084***	-0.112***	-0.112***	-0.008***	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.000)	(0.000)
Log of provincial GDP per capita	0.000	0.000	-0.002	-0.001	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)
Constant	0.348**	0.337**	0.684***	0.681***	0.011	0.010
	(0.155)	(0.155)	(0.145)	(0.145)	(11.002)	(11.002)
Two-digit industry and region fixed effects	YES	YES	YES	YES	YES	YES
Observations	319,489	319,489	319,489	319,489	306,477	306,477
R-squared	0.030	0.030	0.054	0.054	0.018	0.018

Note: p35 refers to the 35th percentile ; p75 refers to the 75th percentile. Standard errors clustered at the provincial level. Statistical significance levels: *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table 6 shows the estimates using the spatial discontinuity approach. Results in the first three columns indicate that local public-administration efficiency has a positive impact on labour productivity. A one point increase in the index of local public administration

efficiency would increase firm labour productivity growth by 1.3 percentage points at the 1% significance level. The results in columns 4-7 show that the positive impact on labour productivity growth is driven by an increase in the growth of value added (1.2 percentage points). Column 8 shows that there is also a smaller but still significant positive effect on multifactor productivity growth (0.2 percentage points). That results are stronger for labour productivity than multifactor productivity suggests that local public administration efficiency may also boost investment and capital accumulation. The dataset we use is not well suited to explore this issue in more details as it provides only the book value of capital stock. Overall, the evidence is consistent with the results of recent research, showing that some specific aspects of the local public administration, such as shortening civil proceedings (Giacomelli and Menon, 2016[7]) and streamlining local regulation (Amici et al., 2015[45]), have a positive effect on firms' performance. As a first robustness check, we run the regression specification in column 1 of Table 6 with the public administration efficiency index averaged considering only the municipalities sharing a provincial border (instead of averaging considering all the municipalities with the province). Table A1 shows the results are robust, though the estimated coefficient of the public administration index is somewhat lower.

Table 6. Main results using spatial discontinuity design

	Labour productivity growth			Values added growth			Multi-factor productivity growth		
	1	2	3	4	5	6	7	8	9
Local public administration efficiency	0.013***	-0.005	0.015***	0.011***	-0.012	0.014***	0.002***	-0.001	0.002***
	(0.004)	(0.008)	(0.006)	(0.004)	(0.008)	(0.005)	(0.001)	(0.001)	(0.001)
Efficiency * log(age)		0.009***			0.011***			0.001***	
		(0.003)			(0.004)			(0.000)	
Efficiency * log(employees)			-0.002*			-0.003**			-0.000
			(0.001)			(0.001)			(0.000)
Small firm (revenues<p35)	-0.052***	-0.052***		-0.084***	-0.084***		-0.005***	-0.005***	
	(0.004)	(0.004)		(0.004)	(0.004)		(0.001)	(0.001)	
Medium firm (p35 <revenues <p70)	-0.008**	-0.007*		-0.019***	-0.018***		-0.000	-0.000	
	(0.004)	(0.004)		(0.004)	(0.004)		(0.001)	(0.000)	
Log of age	-0.082***	-0.132***		-0.111***	-0.175***		-0.008***	-0.014***	
	(0.004)	(0.018)		(0.005)	(0.022)		(0.000)	(0.002)	
Log of provincial GDP per capita	-0.007	-0.007	-0.005	-0.009**	-0.009**	-0.008*	-0.001*	-0.001*	-0.001
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)
Log of employees			0.033***			0.034***			0.004***
			(0.008)			(0.008)			(0.001)
Constant	0.311***	0.118**	-0.182***	0.564***	0.240***	-0.151***	0.007	0.008	-0.025***
	(0.051)	(0.055)	(0.045)	(0.040)	(0.055)	(0.037)	(21.988)	(0.007)	(0.006)
Industry, region, border fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	100,218	100,218	100,276	100,218	100,218	100,276	96,143	96,143	96,193
R-squared	0.030	0.030	0.008	0.053	0.054	0.010	0.019	0.019	0.008

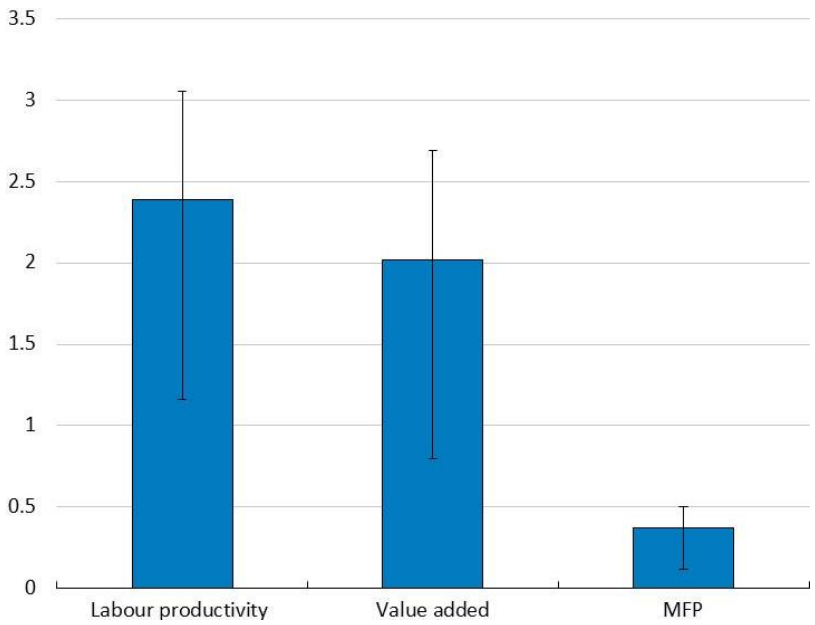
Note: p35 refers to the 35th percentile ; p75 refers to the 75th percentile. Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

These findings have important economic implications. The estimates in Table 6 (column 1, 4, and 8) indicate that raising public sector efficiency from the level of Catanzaro in Calabria (which is the 25th percentile of the province-level distribution of public administration efficiency) to the level of Monza in Lombardia (which is the 75th percentile) would increase firm-level labour productivity growth by 2.4 percentage points (Figure 4). The impact on multifactor productivity is smaller but still sizeable at 0.4 percentage points.

The results in Table 6 also suggest that raising local public administration efficiency may be particularly beneficial for smaller firms. Smaller firms may be more dependent than larger ones on locally provided public services, either because their activities are concentrated in the area of their registered address or because they have less resources to circumvent the obstacles generated by an inefficient local public administration or both. The stronger effect of local public administration efficiency on small firms rather than large ones indicate that our results are not affected by multi-plant firms as small firms are unlikely to have multiple production sites. Figure 5 shows that increasing the local public administration efficiency from the 25th percentile to the 75th percentile would raise the labour productivity of a firm with 15 employees (the average in the sample) by 1.1 percentage points. The impact on a firm with five employees (the median in the sample) would be larger: 1.7 percentage points.

The results also show that the impact of increasing efficiency is larger for older firms. Indeed, for a 12 year-old firm (average in the sample) the impact of increasing public efficiency from the 25th percentile to the 75th percentile increases firm labour productivity growth by 3.6 percentage points, while for three a year-old firm (the 25th percentile of firm-size distribution) the impact is smaller: 1.1 percentage points. This result could be driven by the fact that older firms tend to be more formal and hence suffer more the inefficiencies of tax collection administration, for example.

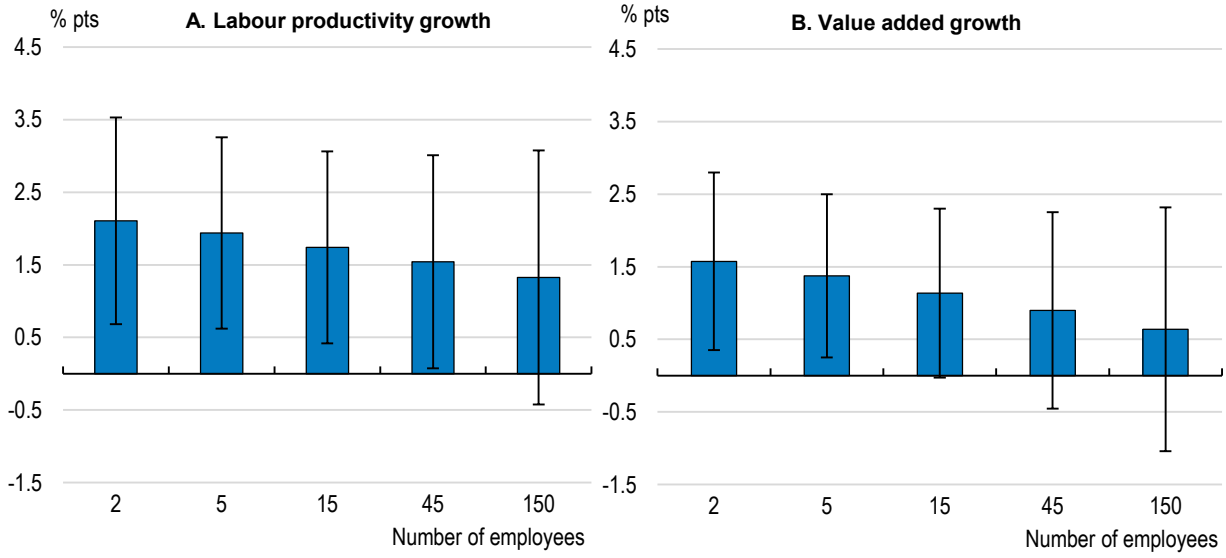
Figure 4. Impact of an increase from the 25th to the 75th percentile in local public efficiency



Note: The bar shows the estimated effect on firm performance of an increase in public administration efficiency from the 25th percentile of the province-level distribution – as in Catanzaro (Calabria) – to the 75th percentile – as in Monza (Lombardia). The fine lines are the confidence intervals at 10% significance level. Estimates are obtained through a regression discontinuity design approach exploiting provincial boundaries within the same region. Regressions control for firm size, firm age, provincial GDP per capita, (2-digit) industry and regional effects.
Source: Authors' computation based on OpenCivitas and ORBIS.

Figure 5. The impact of increasing public administration efficiency is larger for small firms

Effect of raising the local public administration efficiency from the 25th percentile of the province-level distribution to the 75th percentile



Note: The bar shows the estimated effect of an increase in public administration efficiency from 25th percentile of the province-level distribution – as in Catanzaro (Calabria) – to the 75th percentile – as in Monza (Lombardia) – by the size of the firm.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table 7 and Figure 6 show the results of the regressions exploiting the different components of the local public administration efficiency index. We insert the different components in the regression one by one because of multicollinearity problems. Hence, these results should be interpreted with caution as each component of the efficiency index could also capture the effect of the omitted ones that are highly correlated with it. The estimated coefficients suggest that that tax collection and fiscal services, technical office services, registry services and local transport services have largest impact on firm-level labour productivity growth. These estimated coefficients suggest that improving the effectiveness and efficiency of the tax administration through for instance better use of information and technology system would contribute to raise firm-level productivity as well as generating additional tax receipts. Opening up local transport services to competition – as the ongoing public administration reform in Italy envisages – could enhance the efficiency of local transport services but also help increase productivity in the business sector.

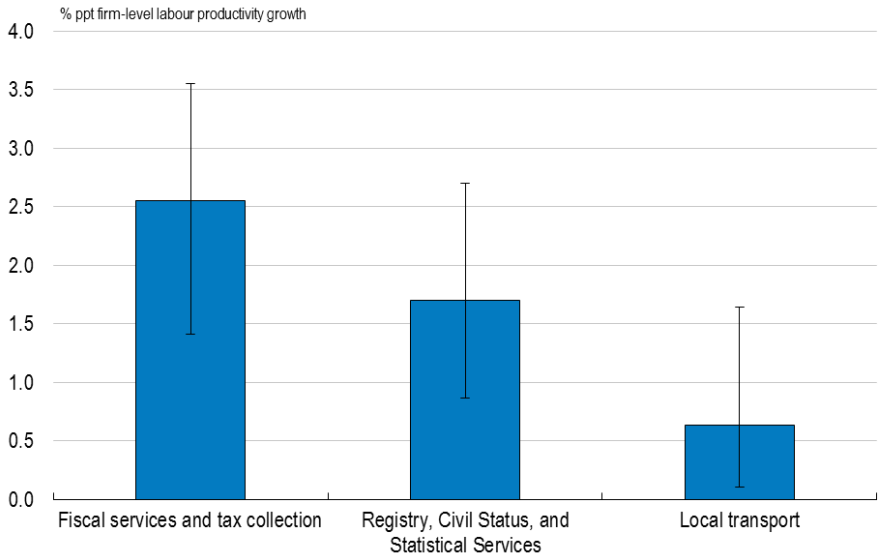
Table 7. Results by sub-components

	Labour productivity growth	Value added growth	MFP growth
Public administration efficiency:			
Tax collection and fiscal services	0.015***	0.015***	0.002***
	(0.004)	(0.003)	(0.000)
Technical office	0.013***	0.013***	0.002***
	(0.005)	(0.004)	(0.001)
Registry, civil status and statistical services	0.017***	0.013***	0.002***
	(0.005)	(0.004)	(0.001)
Other services	0.010**	0.009**	0.001**
	(0.004)	(0.003)	(0.001)
Local police	0.003	-0.002	0.001*
	(0.005)	(0.004)	(0.001)
Education	0.003	0.003	0.000
	(0.005)	(0.005)	(0.001)
Roads	0.008	0.009*	0.001
	(0.005)	(0.005)	(0.001)
Local Public Transport	0.004*	0.003	0.000
	(0.002)	(0.002)	(0.000)
Land use	0.004	0.006	0.001
	(0.006)	(0.005)	(0.001)
Environmental	0.007**	0.005*	0.001**
	(0.003)	(0.003)	(0.000)
Child care	0.004	0.004*	0.001**
	(0.003)	(0.002)	(0.000)
Other social services excluding child care	-0.000	-0.003	0.001
	(0.006)	(0.006)	(0.001)
Small firm (revenues<p35)	-0.052***	-0.084***	-0.005***
	(0.004)	(0.004)	(0.001)
Medium firm (p35<revenues<p70))	-0.008**	-0.019***	-0.000
	(0.004)	(0.004)	(0.001)
Log of age	-0.082***	-0.111***	-0.008***
	(0.004)	(0.005)	(0.000)
Log of provincial GDP per capita	-0.005	-0.009***	-0.001
	(0.004)	(0.003)	(0.001)
Constant	0.316***	0.560***	0.008
	(0.048)	(0.038)	(66.046)
Industry, region, border fixed effects	YES	YES	YES
Observations	100,218	100,218	96,143
R-squared	0.030	0.054	0.019

Note: The components of the public administration efficiency index enter the regression once at the time. Regressions include (2-digit) industry and regional dummies. Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Figure 6. The impact of increasing efficiency different types of local public administration services

Effect of raising the local public administration efficiency from the 25th percentile of the province-level distribution to the 75th percentile



Note: The bar shows the estimated effect of an increase in public administration efficiency from 25th percentile of the province-level distribution – as in Catanzaro (Calabria) – to the 75th percentile – as in Monza (Lombardia) – by the size of the firm. The fine lines are the confidence intervals at 10% significance level.
Source: Authors' computation based on OpenCivitas and ORBIS.

To provide insight on what would be the aggregate effect of improving the local public administration efficiency in Italy, we simulate the effect of raising the public administration efficiency of provinces below the provincial mean to the mean. For this exercise, we use the coefficients obtained in our main estimation in Table 6 (column 1). The results suggest that in this hypothetical case the firm-level labour productivity and value added growth would be about 0.5 percentage points higher (Table 8). The gain in multifactor productivity growth would be lower (0.1 percentage point).

Table 8. Simulation results: aggregate productivity gains from increasing local public administration efficiency to the mean

Variable	Actual mean (%)	Simulated mean (%)	Difference (percentage points)
Value added growth	-0.8	-0.3	0.5
Labour productivity growth	0.4	0.8	0.4
MFP growth	-0.3	-0.2	0.1

Note: Actual mean shows the average growth of firm level variables shows in the rows; Simulated mean shows the average growth of firm-level variables shown in the rows assuming the public administration efficiency of provinces below the provincial mean to the mean. The simulated mean has been computed using the firm-level growth rates based on coefficients in Table 6 (column 1).
Source: Authors' computation based on OpenCivitas and ORBIS.

Robustness checks

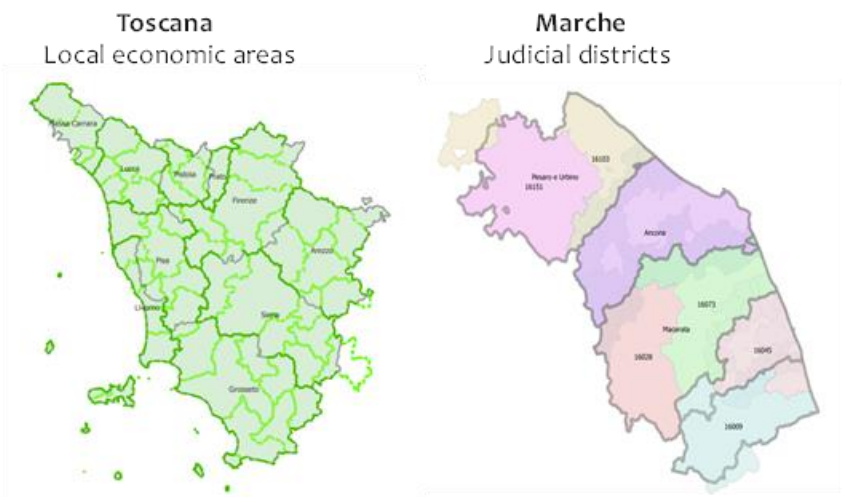
These results are robust to using the local public administration indicator, using a weighted average (with provincial population weights), instead of the simple average, or using the local public administration efficiency for the 2010 (Table A2 and A3 in the Annex). Also, restricting the sample to 2011-2014 gives the same results (Table A4 in the Annex).

Controlling for labour market areas and judicial districts

The main cause of concern for our empirical strategy is the possible partial or total overlap of provincial borders with those of labour market areas and judicial districts. The Italian Statistical Office (ISTAT) defines labour market areas as sub-regional geographical areas where the bulk of the labour force lives and works, and where establishments can find the largest amount of the labour force necessary to fill job offers. They are defined on a functional basis, the key criterion being the proportion of commuters who cross the labour market area boundary on their way to work as recorded in the General Censuses of Population and Housing. According to the latest census, dating back to 2011, in Italy there are 611 labour market areas; 56 of labour market areas (9% of total) cut across regional boundaries and 185 (30%) span across different provinces (ISTAT, 2014[46]). Industrial districts are a subset of labour market areas and account for 23% of all labour market areas (ISTAT, 2015[47]). Though labour market areas are not designed to respect administrative boundaries, their borders sometimes overlap with those of provinces (see Figure 7 as an example). The overlap of provincial borders with those of labour market areas borders might then bias our results, as these might be partially capture the agglomeration effects of labour market areas and industrial districts.

Another potential identification problem regards the role of judicial districts. Giacomelli and Menon (2016[7]) find a positive effect of the efficiency of civil courts on firm size. This has also been shown to be associated with productivity at firm and aggregate level (Dougherty, 2014[48]; Bento and Restuccia, 2017[49]; Andrews et al., 2016[50]). Italian regions and provinces play no role in the functioning of the judicial systems However, in some cases judicial district and provincial borders overlap, potentially impacting our estimates.

Figure 7. Examples of borders of labour market areas and judicial districts overlapping with provincial borders



Source: Authors' computations based on ISTAT data .

To account for these potential problems, we first run the baseline specification with a restricted sample that excludes all the observations for which judicial and provincial boundaries totally coincide (Table 9, column 2); additionally we include a set of judicial district fixed effects (Table 9, column 3). We perform the same exercise for labour market areas (Table 10, column 2-3). Overall, these regressions corroborate the findings of the baseline specification (Table 6, column 1): the coefficient of the local public administration efficiency is very similar to that of the baseline specification and statistically significant at 1% level.

As an additional robustness check, for labour market areas, the sample is further restricted to include only those provincial border groups which are entirely within the same labour market area (Table 10, column 4). That is, all the municipalities comprising a border group are within the same labour market area. The coefficient of the local public administration index remains positive and significant. The point estimate is markedly larger than in the baseline specification. This might be attributable to the loss in the representativeness of the sample as the number of observations used in this specification is markedly lower (less than 2%) than in the baseline specification; only four border groups remain in the sample.

Finally, we run a regression controlling at the same time for the effect of judicial districts and labour market areas (Table 11, column 2-3). Again, the main result of the baseline specification is robust. The point estimate of the specification that includes fixed effects for labour market areas and judicial districts (Table 11, column 3) is 40% lower than in the baseline specification but remains significantly different from zero at 1% level. Using this point estimate, raising the local public administration efficiency from the 25th to the 75th percentile of the province-level distribution would result in an increase in the firm-level yearly labour productivity growth by 1.5 percentage points.

Table 9. Robustness check: controlling for judicial districts

	Labour productivity growth		
	Baseline (as in Table 6 column 1)	Excluding provinces whose borders totally overlap with that of judicial districts	+ Including dummies for judicial districts
	1	2	3
Local public administration efficiency	0.013***	0.013***	0.015***
	(0.004)	(0.004)	(0.005)
Small firm (revenues < p35)	-0.052***	-0.052***	-0.052***
	(0.004)	(0.004)	(0.004)
Medium firm (p35 < revenues <p75))	-0.008**	-0.008**	-0.007*
	(0.004)	(0.004)	(0.004)
Log of age of firm	-0.082***	-0.082***	-0.082***
	(0.004)	(0.004)	(0.004)
Log of provincial GDP per capita	-0.007	-0.007	-0.022***
	(0.005)	(0.005)	(0.005)
Constant	0.311***	0.063	0.045
	(0.051)	(851.363)	(0.028)
Industry, region, border fixed effects	YES	YES	YES
Observations	100,218	99,886	99,886
R-squared	0.030	0.030	0.031

Note: Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table 10. Robustness check: controlling for local economic areas

	Labour productivity growth			
	Baseline (as in Table 6 column 1)	Excluding provinces whose borders totally overlap with that of local economic areas	+ Including dummies for local economic areas	Only borders in the same economic areas (4 borders)
	1	2	3	4
Local public administration efficiency	0.013***	0.013***	0.015**	0.120**
	(0.004)	(0.005)	(0.006)	(0.047)
Small firm (revenues < p35)	-0.052***	-0.052***	-0.052***	-0.044
	(0.004)	(0.004)	(0.004)	(0.029)
Medium firm (p35 < revenues <p75))	-0.008**	-0.007*	-0.007*	-0.039**
	(0.004)	(0.004)	(0.004)	(0.011)
Log of age of firm	-0.082***	-0.082***	-0.082***	-0.081***
	(0.004)	(0.004)	(0.004)	(0.010)
Log of provincial GDP per capita	-0.007	-0.007	0.003	0.088**
	(0.005)	(0.005)	(0.008)	(0.032)
Constant	0.311***	0.204***	-0.065	-0.878***
	(0.051)	(0.032)	(0.051)	(0.167)
Industry, region, border fixed effects	YES	YES	YES	YES
Observations	100,218	98,292	98,292	1,760
R-squared	0.030	0.030	0.033	0.058

Note: Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table 11. Robustness check: controlling for judicial districts and local economic areas

	Labour productivity growth		
	Baseline (as in Table 6 column 1)	Excluding provinces whose borders totally overlap with that of economic areas OR judicial districts	+ Including dummies for local economic areas and judicial districts
	1	2	3
Local public administration efficiency	0.013***	0.013***	0.008**
	(0.004)	(0.005)	(0.004)
Small firm (revenues < p35)	-0.052***	-0.052***	-0.052***
	(0.004)	(0.004)	(0.004)
Medium firm (p35 < revenues <p75))	-0.008**	-0.007*	-0.007*
	(0.004)	(0.004)	(0.004)
Log of age of firm	-0.082***	-0.082***	-0.082***
	(0.004)	(0.004)	(0.004)
Log of provincial GDP per capita	-0.007	-0.007	-0.017***
	(0.005)	(0.005)	(0.005)
Constant	0.311***	0.133***	0.007
	(0.051)	(0.046)	(34.254)
Industry, region, border fixed effects	YES	YES	YES
Observations	100,218	98,126	98,126
R-squared	0.030	0.030	0.033

Note: Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Sorting of firms

It is possible that municipalities in provinces with a more efficient local public administration and close to provincial borders host more productive firms than inside-the-border municipalities (i.e. municipalities in the middle of a province rather than along the border) due to the sorting of firms. For example, take an industrial district composed of several municipalities with a specialized business structure that span two provinces having different administration efficiency. Firms in this industrial district located in the province with a less efficient local public administration and near the provincial border could decide to marginally change their location and move to the neighbouring province so as to benefit from the more efficient local public administration on the other side of the border, while still enjoying the positive district spillovers. On the contrary, firms located in the same province but outside the district and further away from the border have less incentive to relocate, since the relocation distance is longer (raising relocation costs) and the business environment may be substantially different. As a result, municipalities along the provincial boundaries would be systematically different from inside-the-border municipalities, leading to overestimating the effect of public administration efficiency on labour productivity.

To test for sorting, two binary dummies (named, “High efficiency province” and “Low efficiency province”) are defined as taking the value of one for municipalities located on the provincial border (either in the high efficiency or low efficiency province) and zero otherwise (for inside-the-border municipalities). Using the full sample of municipalities (i.e. including bordering and inside-the-border municipalities), we run the baseline regression with firm-level labour productivity growth as dependent variable on the two dummies (the inside-the-border municipalities being the omitted group), the additional controls and a full set of regional, provincial and industry fixed effects.

The results are reported in Table 12 (column 1). The two 'Low efficiency’ and ‘High efficiency’ province dummies are small and not significantly different from zero, indicating no sorting of firms. A similar robustness test consists of running the baseline regression on the full sample and including an additional interaction term between the local public administration efficiency index and a dummy that is one for firms located in municipalities on the provincial border and zero otherwise. A positive and significant interaction term would indicate that the positive effect of the local public administration efficiency on labour productivity could be upward biased. This is because firms close to the provincial border would systematically have higher productivity growth than those far from it. The results in Table 12 (column 2) shows the coefficient of the interaction term is close to zero and not significant, indicating that firms close to the border are not systematically different from those far from it.

Table 12. Robustness: testing sorting

	Labour productivity growth	
	1	2
High efficiency province	-0.001	
	(0.004)	
Low efficiency province	-0.006	
	(0.004)	
Efficiency		0.001
		(0.002)
Efficiency * border		-0.001
		(0.000)
Small (revenues<p35)	-0.057***	-0.057***
	(0.002)	(0.002)
Medium (revenues>p35&<p70))	-0.010***	-0.010***
	(0.002)	(0.002)
Age (ln years)	-0.084***	-0.084***
	(0.003)	(0.003)
Provincial GDP per capita	0.010***	0.001
	(0.003)	(0.002)
Constant	0.214***	0.160***
	(0.017)	(0.021)
Provincial fixed effects	YES	
Industry fixed effects	YES	YES
Regional fixed effects		YES
Observations	317,581	317,581
R-squared	0.030	0.030

Note: High and low efficiency provinces are defined as relative to the neighbouring province. Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Conclusion

We estimate the causal effect of local public administration efficiency on firm-level labour productivity growth using detailed data form Italy. Italy provides an interesting benchmark to study this topic as the efficiency of the local public administration and living standards vary greatly across the country.

We employ a spatial discontinuity approach, exploiting jumps in the local public administration efficiency across provincial borders. Our results indicate that the efficiency of local public administrations has a positive and significant effect on labour productivity growth. It has a smaller but still significant effect on multifactor productivity growth. We perform different robustness checks to be sure to isolate the effect of public administration efficiency from other confounding factors, relating to local labour markets, judicial districts and sorting of firms. Our preferred specification suggests that raising the efficiency of the public administration efficiency from the 25th percentile of the provincial level distribution to the 75th percentile would increase firm-level labour productivity growth by 2.4 percentage points yearly.

Overall these results highlight the role of local public administration efficiency in explaining large and persistent regional disparities in living standards within countries (Acemoglu and Dell, 2010[1]; Breinlich, Ottaviano and Temple, 2014[3]). Our results point to the efficiency of local public administration as a channel of the widely reported positive impact of social capital on growth as the efficiency of the local public administration is closely intertwined with social capital (Putnam, 1993[12]; Keefer and Knack, 1997[8]; Algan

and Cahuc, 2010[11]; Andrews, 2012[16]). However, more research is needed to better understand how public administration reforms and the provision of local public goods could help to build social capital and trust in public institutions. Empirical evidence suggests that social capital is not necessarily a "slave of history" as the efficient provision of public goods might contribute to enhance social capital (Wallis and Dollery, 2002[17]; Coleman, 1990[51]; Hetherington, 1998[52]). For instance, effectively preventing crimes and strengthening personal safety could boost trust among strangers, facilitating economic transactions; shorter delays in settling commercial debts by the public administration would increase trust in the government and public agencies; a more efficient tax collection system and more transparency on how tax revenues are spent would result in higher tax compliance and willingness to pay taxes. MIchler and Rose (2001[53]) find that in post-communist societies trust in the democratic public institutions is affected positively by their quality and effectiveness. Schoon and Cheng (2011[54]) find similar results for the UK. Acemoglu et al. (2018[55]) show that providing information about reduced delays in state courts leads to an increase in people's trust in state courts and higher willingness to settle disputes through them.

For the specific case of Italy, our results point to the importance of public administration reforms to revive productivity growth, in addition to other important factors previous studies have highlighted, such as the failure to adopt information and communications technology (Pellegrino and Zingales, 2017[22]), lack of human capital and/or managerial knowhow (Bandiera, Prat and Valletti, 2009[25]; Brasili and Loredana, 2008[26]), and capital and labour misallocation (Hassan and Ottaviano, 2013[28]). Further research is needed to better identify what areas of the local public administration are especially beneficial for firm-level productivity. While public administration reforms often aim at containing cost increases, focussing solely on this runs the risk of diminishing the quality and the quantity of the local public goods and services that are most beneficial to growth. Identifying those local public services closely associated with firm-level productivity growth would help policymakers to design better-informed public administration reforms.

Annex A.

Table A.1. Results using 2011-2014 sample and local public administration efficiency index of 2013

	Labour productivity growth		Value added growth		MFP	
Local public administration efficiency	0.013**		0.015***		0.001**	
	(0.006)		(0.005)		(0.001)	
Local public administration efficiency (weighted by pop)		0.009*		0.010***		0.001***
		(0.004)		(0.004)		(0.001)
Small firm (revenues < p35)	-0.064***	-0.064***	-0.073***	-0.073***	-0.007***	-0.007***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.001)	(0.001)
Medium firm (revenues >p35 & < p70)	-0.017***	-0.017***	-0.019***	-0.019***	-0.001*	-0.001*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)
Log of age	-0.083***	-0.083***	-0.117***	-0.117***	-0.008***	-0.008***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.000)	(0.000)
Log of provincial GDP per capita	-0.002	0.003	-0.003	0.002	-0.000	0.000
	(0.005)	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)
Constant	0.167***	0.200***	0.325***	0.363***	0.043***	0.045***
	(0.031)	(0.025)	(0.029)	(0.024)	(0.004)	(0.003)
Observations	76,209	76,209	76,209	76,209	73,219	73,219
R-squared	0.031	0.031	0.056	0.056	0.021	0.021

Note: p35 refers to the 35th percentile ; p75 refers to the 75th percentile. Standard errors clustered at the provincial level. Statistical significance levels: *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table A.2. Results using 2013 indicator of efficiency weighted by population

	Labour productivity growth			Value added growth			MFP growth			Size (log employees)
Local public administration efficiency	0.007*	-0.016**	0.011**	0.006**	-0.025***	0.010**	0.001**	-0.002**	0.002**	0.029***
	(0.004)	(0.007)	(0.005)	(0.003)	(0.007)	(0.004)	(0.000)	(0.001)	(0.001)	(0.010)
Local public administration efficiency * ln(age)		0.012***			0.016***			0.001***		
		(0.003)			(0.003)			(0.000)		
Local public administration efficiency * ln(employees)			-0.003**			-0.003**			-0.000*	
			(0.001)			(0.001)			(0.000)	
Small (revenues<p35)	-0.052***	-0.051***		-0.084***	-0.083***		-0.005***	-0.005***		
	(0.004)	(0.004)		(0.004)	(0.004)		(0.001)	(0.001)		
Medium (revenues>p35&<p70))	-0.008**	-0.007*		-0.019***	-0.018***		-0.000	-0.000		
	(0.004)	(0.004)		(0.004)	(0.004)		(0.001)	(0.001)		
Log of age	-0.082***	-0.148***		-0.111***	-0.197***		-0.008***	-0.016***		0.224***
	(0.004)	(0.016)		(0.005)	(0.019)		(0.000)	(0.002)		(0.008)
Log of provincial GDP per capita	-0.002	-0.002	-0.001	-0.005	-0.006	-0.004	-0.000	-0.000	-0.000	-0.059***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.000)	(0.000)	(0.001)	(0.014)
Log of employees			0.035***			0.034***			0.004***	
			(0.007)			(0.007)			(0.001)	
Constant	0.343***	0.185***	-0.148***	0.590***	0.311***	-0.121***	0.011	0.014**	-0.022***	0.792***
	(0.054)	(0.049)	(0.046)	(0.042)	(0.047)	(0.038)	(.)	(0.006)	(0.006)	(0.048)
Observations	100,218	100,218	100,276	100,218	100,218	100,276	96,143	96,143	96,193	112,456
R-squared	0.030	0.031	0.007	0.053	0.055	0.010	0.018	0.019	0.008	0.189

Note: Regressions include (2-digit) industry and regional dummies. Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table A.3. Results using 2010 indicator

	Labour productivity growth					
Local public administration efficiency	0.009***	-0.019***	0.012***			
	(0.004)	(0.006)	(0.005)			
Local public administration efficiency * ln(age)		0.013***				
		(0.003)				
Local public administration efficiency * ln(L)			-0.002			
			(0.001)			
Local public administration efficiency (weighted by pop)				0.008**	-0.019***	0.011**
				(0.004)	(0.006)	(0.005)
Local public administration efficiency (weighted by pop)* ln(age)					0.013***	
					(0.002)	
Local public administration efficiency (weighted by pop) * ln(L)						-0.002
						(0.001)
Small firm (revenues<p35)	-0.052***	-0.051***		-0.052***	-0.051***	
	(0.004)	(0.004)		(0.004)	(0.004)	
Medium firm (revenues>p35&<p70))	-0.008**	-0.007*		-0.008**	-0.007*	
	(0.004)	(0.004)		(0.004)	(0.004)	
Log of age	-0.082***	-0.162***		-0.082***	-0.156***	
	(0.004)	(0.017)		(0.004)	(0.015)	
Log of provincial GDP per capita	-0.005	-0.004	-0.004	-0.005	-0.004	-0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Log of employees			0.030***			0.029***
			(0.008)			(0.007)
Constant	0.326***	0.203***	-0.171***	0.327***	0.196***	-0.165***
	(0.057)	(0.049)	(0.046)	(0.059)	(0.050)	(0.048)
Observations	100,218	100,218	100,276	100,218	100,218	100,276
R-squared	0.030	0.031	0.007	0.030	0.031	0.007

Note: Regressions include (2-digit) industry and regional dummies. Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

Table A.4. Results using 2011-2014 sample and local public administration efficiency index of 2013

	Labour productivity growth		Value added growth		MFP	
Local public administration efficiency	0.013**		0.015***		0.001**	
	(0.006)		(0.005)		(0.001)	
Local public administration efficiency (weighted by pop)		0.009*		0.010***		0.001***
		(0.004)		(0.004)		(0.001)
Small firm (revenues < p35)	-0.064***	-0.064***	-0.073***	-0.073***	-0.007***	-0.007***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.001)	(0.001)
Medium firm (revenues >p35 & < p70)	-0.017***	-0.017***	-0.019***	-0.019***	-0.001*	-0.001*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)
Log of age	-0.083***	-0.083***	-0.117***	-0.117***	-0.008***	-0.008***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.000)	(0.000)
Log of provincial GDP per capita	-0.002	0.003	-0.003	0.002	-0.000	0.000
	(0.005)	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)
Constant	0.167***	0.200***	0.325***	0.363***	0.043***	0.045***
	(0.031)	(0.025)	(0.029)	(0.024)	(0.004)	(0.003)
Observations	76,209	76,209	76,209	76,209	73,219	73,219
R-squared	0.031	0.031	0.056	0.056	0.021	0.021

Note: Regressions include (2-digit) industry and regional dummies. Standard errors clustered at the provincial level. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' computation based on OpenCivitas and ORBIS.

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