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Three big diseases of Public Administration in the last decade

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Introduction

Public choice theory [Buchanan and Tullock, 1962] has shown that there are different reasons why the State does not always maximize social welfare. One of them is bureaucracy, consisting of officials and employees responsible for carrying out the tasks of the State, who are more interested in their own preservation and growth than in performing the assigned tasks efficiently [Niskanen, 1971]. According to the theory of the Leviathan [Brennan and Buchanan, 1980] not only the bureaucracies, but also the representative government try to use the expenditures and the revenues in its favour, taking advantage of the lack of information of the electorate. The government corruption, namely the sale by government for personal gains, is a further obstacle to the efficient functioning of the Public Administration [Shleifer and Vishny, 1993].

Here I analyzed three “diseases” of the Public Administration, which have been spreading all over the world, in the last decade: complexity tax compliance due to bureaucracy, corruption of the public system and budget manipulation during the electoral cycle. *Corruption* is a social issue, although with different intensity, for several countries. According to the World Economic Forum the cost of corruption equals more than 5% of global GDP and according to the World Bank estimates 1 trillion dollars are paid in bribes each year. Furthermore, the perception of the phenomenon is extensive, in fact in a survey with European firms (Flash Eurobarometer survey, 2019) for the 71% of them, corruption is a widespread in their own country. *Bureaucracy* plays an important role in most of the world economies, for instance, in the last ten years, on average, 15% of the employees in a country belonged to the Public Sector (World Bank, Worldwide Bureaucracy Indicators). Harvard Business Review in 2017 estimated that, for the developed countries, the cost of excess bureaucracy is nearly 9 trillion dollars: in the world on average 8 different procedures are required to open a business and the average cost dealing with construction permits is the 7,5% of the house value. Finally, concerning the *appropriation of public resources* by politicians for electoral purposes, on a sample of 137 countries, in 88% of these countries companies have an insufficient valuation of the long-term vision of their government (Global competitiveness report, 2019).

This thesis proposes an analysis of the economic effects of these three phenomena in three different contexts. In particular, I study the effect of mafia’s corruption on local firm activities in Southern Italy municipalities, the role of tax systems’ complexity on foreign direct investment allocation in the OECD countries, and the budget’s manipulation by local politicians in roads and transportation investments in Italy.

I use economic theory to formulate reasonable hypotheses about the effects of these three “diseases and then I apply the econometric analysis to test these hypotheses. I collected and used innovative dataset. In particular, in the first chapter I used the number of days of dissolution of municipal councils from the decrees of the Ministry of the Interior to proxy the presence of corruption. In the second chapter, from Doing Business survey (World Bank), I computed the hours that a firm has to spend to compile and pay the corporate income taxes, the value added taxes, and the labor taxes to measure tax systems’ complexity. In the last chapter, I use the details of capital expenditures from municipal budgets to verify the effect on the electoral cycle.

Let us look more specifically at the topics of each chapter.

In the first chapter, I study the impact of organized crime on firm activity at local level using the introduction of a strong anti-corruption policy: the dissolution of a municipality for mafia infiltration by the central government. Following [Sah \(1991\)](#), a strong anti-corruption policy affects the activities of criminal organizations in the neighbouring areas where these policies are implemented. The construction sector is more vulnerable to criminal infiltration than others and it is heavily dependent on local procurement. Using a geo-localized dataset on Italian firms, I investigate, with a difference in difference model, whether there is a heterogeneous response by firms in relation to the construction sector if they are next to a municipality dissolved for mafia infiltration. I also control if the effect is sensitive to the intensity of treatment, identified by the number of days of dissolution for mafia infiltration. I control the validity of the previous results by performing a set of robustness tests. The two major ones are: checking the existence of any anticipatory behaviour by including leads of the treatment variable, and using a falsification test by replacing as treatment variable the neighbour council dismissal for different reasons.

The second chapter presents new cross-country evidence showing that, in recent years, in developed countries, international investments are driven more by the tax system complexity than by tax rates. Tax and non-tax factors might affect the decision to relocate investment abroad. The size of a market, the regulatory and legal environment, and distance between markets are the main non-tax factors. Regarding tax factors, previous studies show that investment decisions and other activities of multinational corporations are sensitive to the tax corporate rate [Devereux and Maffini, 2007](#). I use a database of Foreign Direct Investment (FDI) bilateral flows for all OECD countries over the 2013-2016 period and, also the dataset from the survey “Doing Business – Paying Taxes” which collects different measures of tax systems’ complexity and tax rates (effective tax rates and statutory tax rates). In particular, I use the variable time to comply with taxes to proxy the tax systems’ complexity. The

model of the empirical analysis used in this chapter is a gravity model, in order to take into account both the characteristics of the home and the destination countries and the distance between countries. The analysis shows that the FDI outflows in OECD countries are determined by the difference in tax complexity and not by the difference in tax rates. This result holds with fixed home country's effect and with a set of variables that controls for country-specific economic, trade, social and institutional differences. I also find heterogeneous effects due to the demographic size of the FDI outflows' country of origin: the impact of the tax complexity is due small countries.

In Chapter 3 I test the existence of the political budget cycle in the investments for roads and transportation in the Italian municipalities. This can be considered an interesting empirical case of due to its staggered elections. Road projects are highly visible and clearly identifiable with municipal governments: this is the reason why this type of capital expenditure could be used by politicians to strategically draw the vote of their electorate. The empirical analysis is based on a dataset of Italian municipalities resulting from a combination of different datasets containing detailed information on municipal budgets, elections, characteristics of mayors and accidents on municipal roads. I follow the empirical approach of Golden and Poterba (1980) to estimate the impact of the timing of elections on capital expenditures, using a set of dummy variables to control each year pre-electoral and post-electoral year separately. I also test, with this empirical model, the presence of heterogeneous effects relative to the case when the mayor can be re-elected or the mayor has an academic education. This chapter also investigates if investments in roads and transport have an impact on road accidents. To test this hypothesis I use a probit model that allows to verify the impact of the investments for roads and transport interacted with the electoral cycle variables on the probability of having an accident. It is interesting to note that I find that investment in road and transport have a negative and significant impact in the number of accident only in the post-electoral year, showing that investment done before election are not useful to have a positive outcome.

1 Mafia's infiltration and spillover effects in the construction sector

Abstract

Literature has mainly focused on understanding whether organized crime impacts on economic growth, broadly intended. Yet, at the local level, little is known as to how crime may affect economic activities. Using a unique geo-localized dataset on Italian firms, I exploit the strengthening of policy enforcement against corruption to show that in municipalities where the city council is dissolved because of organized-crime infiltration, there is a reduction in the added value of firms located in neighboring municipalities, this effect being more marked for firms operating in the construction sector. I also find that the effect is larger the longer the commissioner is present in the municipal council. Taken together my findings suggest that criminal organizations bring about spillover effects in the construction sector.

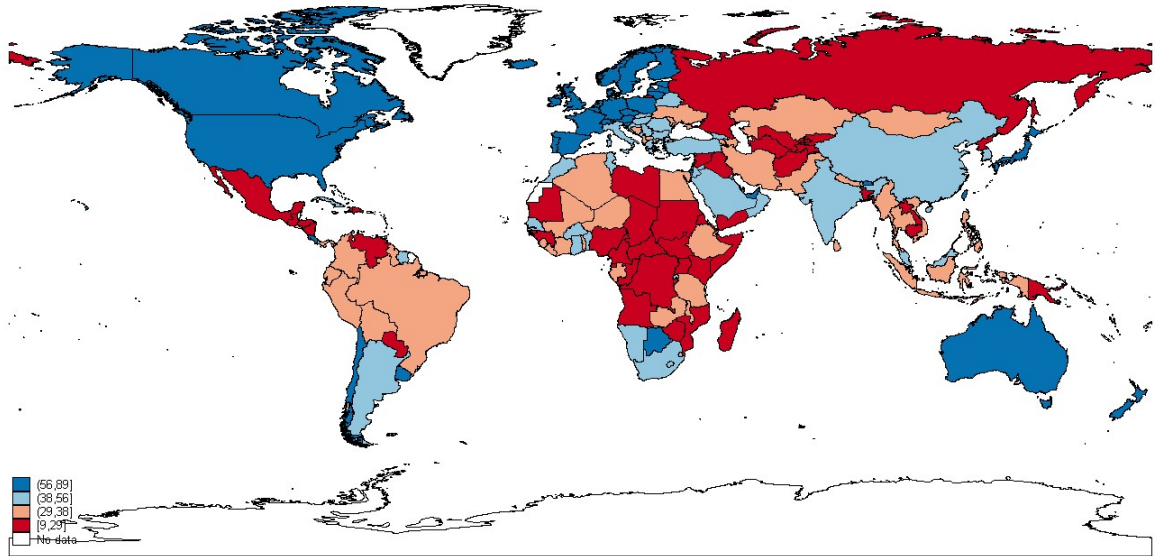
KEYWORDS: organized crime; anticorruption policy; firms' added value; spillover effects.

JEL: K42, D73, R10, H32.

1.1 Introduction

In the last decade there has been a growing interest in the public debate towards anti-corruption policies, as corruption weakens the institutions, the values of democracy/justice and compromises the development and the principle of legality [ONU, 2003]. And this is particularly salient in Italy, where – according to the Transparency International’s Corruption Index¹ (Figure 1) - the perception of corruption is one of the highest among developed countries.

Figure 1: *Corruption Perception Index in the world, year 2017.*



Source: World Economic Forum, *Global competitiveness reports*, 2018.

The criminal organizations in Italy have drained many public resources by interfering in several public contracts [Caneppele and Martocchia, 2014]. As a response, the central government promoted legislative actions², including the possibility to dissolve the municipal councils for mafia infiltration.

Together with this anecdotal evidence on the relevance of mafia infiltration, a large body of literature focuses on the role played by organized crime in shaping economic [Fenizia, 2018; Montoya, 2016; Rozo, 2014] and political outputs [Hess, 1973; Pezzino, 1985; Acemoglu et al., 2009; Pinotti, 2012; Buonanno et al., 2016; Daniele and Dipoppa, 2017; De Feo and De Luca, 2017; Daniele, 2019]. In particular, a large amount of literature has sought to identify the deterrent impact of sanctions [Drago et al., 2009] and [Kessler and Levitt, 1998] and the negative effect of police on crime [Corman and Mocan, 1999] and [Di Tella and Schargrodsky, 2004]. Other studies emphasize the effect of mafia

¹World Economic Forum, *Global competitiveness reports*, 2018.

²Legislation includes Law n. 575/1965, which first inserted special provisions against the mafia into Italian law; Law n. 646/1982, introducing criminal association as illegal act in the Italian penal code, and Law n. 356/1992, which introduced article 41 bis in the Italian prison system, known as the "hard prison for mafia".

organization on the general government (Gennaioli et al., 2011; Acconcia et al., 2014; Barone and Narciso, 2015; Daniele and Dipoppa, 2017; Di Cataldo and Mastrococco, 2017) and the channels of diffusion of organized crime (Buonanno and Pazzona, 2014).

While many contributions have focused on the direct effects of organized-crime, only very few works have analyzed the presence of mafia-related spatial spillover effects on public outcomes. (Avis et al., 2016) find that measures of auditing have no effects on the level of corruption in neighboring municipalities. By way of contrast, (Silva, 2010), using information from an anti-corruption policy in Brazil that randomly assigns cities to be controlled, shows that anti-corruption policy takes time to materialize its effects in the neighboring cities. Yet, (Galletta, 2017) finds evidence of a reduction of public investments in municipalities close to those that have been dissolved due to the presence of mafia infiltration in southern Italy.

The aim of this paper is to fill this gap in the literature, by studying the effect of an anti-corruption policy on the level of economic activities of neighboring areas. In particular, I rely on the Orbis - Bureau van Dijk database to collect financial information concerning the budget of over 500,000 firms. Then, I match each firm to a specific municipality via geo-localization. I concentrate on 1,350 municipalities belonging to three Italian southern regions, the ones most affected by mafia infiltration (Sicily, Calabria and Campania). In order to induce variation in the spillover variable I exploit the law enforcement against corruption in local governments, that is the municipal council dissolution that occurred for mafia infiltration over the period 2010-2016. Once controlling for firms and years fixed effects, the results suggest that the dissolution of the municipal council is associated with a 7% reduction in the value added generated by firms in the construction sector belonging to neighboring municipalities. To provide a causal interpretation of the results, it is crucial to show that the timing of the council dissolution in neighboring municipalities is random. To test for this hypothesis, I show that the unobservable – taken to be several combination of fixed effects – does not matter in the estimates. In addition – and to complement this analysis – I perform a series of placebo test that allows for anticipatory effects to be excluded. Yet, I provide evidence that council dissolution for mafia infiltration is likely to be the most plausible explanation for the observed reduction in the local economy, as other reasons for the council dissolution do not lead to any downsizing in the value added. Finally, I use alternative definitions of council dissolution, namely the average number of neighboring council dissolutions and the average number of days of council dissolution, which allow us to measure the intensity of the treatment. This analysis indicates that the decrease of the value added is larger the longer the presence of the organized crime is in the municipal council.

Taken together, my findings seem to suggest that the presence of anticorruption policies have a repercussion on the local economy, especially in the construction sector where the probability of mafia infiltration is very high (Sciarrone, 1998 and Varese, 2011).

There is a huge amount of anecdotal evidence confirming this attitude³. To begin with, Salvatore Lima, the mayor of Palermo between 1958 and 1963, was considered responsible for the so-called "Sacco di Palermo", a dramatic urbanization of the territory, by explicitly favoring construction firms linked to Cosa Nostra. Yet, Tano Badalamenti, head of the Sicilian mafia, was arrested because he was able to corrupt politicians so as to participate in the bribe for the construction of the local airport using his own construction company.

Furthermore, in 1982, the judge Giovanni Falcone wrote: "the mafia organizations completely control the building sector in Palermo, from the quarries for the production of aggregates, the excavation firms and the concrete factories, to the iron deposits for building, ... entrepreneurs are either in the mafia or have to undergo the impositions of mafia organizations".

Finally, based on Openregio⁴, a dataset built by the Ministry of the Interior, it turns out that among the 712 firms confiscated from the mafia by the Italian Government, over 35% refers to the construction sector. Mafia interest was also found in the post-earthquake reconstruction works in L'Aquila, as well as during the realization of the universal exposition hosted by Milan in 2015 (Expo 2015) and in the modernization of the most important highway in the southern Italy: the Salerno-Reggio Calabria (see the report of the Parliamentary Commission of inquiry on the Mafia phenomena)⁵

The rest of the work is organized as follows. Section 2 describes the anti-corruption policy and describes the institutional framework. Section 3 illustrates the dataset. The empirical analysis, the results and the robustness checks are in Section 4. Section 5 concludes.

1.2 Institutional setting

In 1991, in order to combat corruption in local public administrations, the Italian parliament approved a Law (D.L. n. 164/1991) which allows the Central Government to dissolve the municipal council if there are potential links with the mafia.

³A recent analysis conducted on the province of Crotone in the South Italy (Riccardi et al., 2016), has identified that the most infiltrated economic sectors include construction, transport and storage, services for enterprises, the supply of electricity (including renewable sources), as well as gambling. In addition, according to the Anti-mafia Investigative Direction (DIA) report, which analyzes firms sequestered by the Italian government for mafia activity over the period 1983-2012, it turns out that the majority of them were related to the trade and transport sectors, followed by construction and mining activities. These figures, have also been confirmed by a recent study conducted by the Bank of Italy, which registers firms operating in the construction sectors on top of activities managed by the mafia in 2016.

⁴Source: https://openregio.it/statistiche/visualizza/beni_destinati/aziende.

⁵The report is available here: <http://www.senato.it/service/PDF/PDFServer/BGT/1066861.pdf>.

The Municipal Councils are dissolved when: "concrete, univocal and significant elements emerge on direct or indirect links with organized crime, such as to determine an alteration of the process of formation of the willingness of the elective and administrative bodies and to expose the good performance or impartiality of the municipal administrations, as well as the regular functioning of the services entrusted to them, or that are such as to cause serious and lasting prejudice to the state of public safety" (D.L. n. 164/1991).

The consolidated legal orientation legitimizes the dissolution also with regard to events that don't necessarily assume criminal importance, being able to give weight also "to situations [...] such as to make reasonable in the concrete contingent reality and based on the data of experience, the hypothesis of a permeability or subjection of administrators to the influence of organized crime".

The dissolution is ordered by a decree of the President of the Republic, on the proposal of the Minister of the Interior. In order to ascertain the existence of the accusations, the Prefect appoints a commission of inquiry that within three months (renewable for another three) must make the necessary controls and submit his conclusions to the Prefect. Within 45 days the Prefect sends a report to the Minister of the Interior. Then the President of the Republic signs the decree of dissolution, on the proposal of the Minister of the Interior. In the proposed dissolution are indicated analytically: the anomalies found, the administrators held responsible and the conduct that gave rise to the dissolution, the necessary measures to promptly remove the most serious and detrimental effects for the public interest. The intervention preserves its effects for a period of twelve to eighteen months, in exceptional cases extending to a maximum of twenty-four months.

As a consequence of this legislative act, the major of the city is replaced by a group of commissioners, who is in charge of the overall governance and functioning of the municipality in which they intervene. The dissolution of municipal councils can take place for other reasons than organized crime infiltration⁶ and it usually follows a process which is slightly different from the one used for the mafia.

The commissioners are chosen from officials who already have experience in the management of municipalities and typically are from a different geographic area than ones of the municipality put under commissioner [Fenizia](#) [\[2018\]](#). Furthermore, the commissioners are empowered to revise the budgetary choices and the decisions of the municipal council. Such decisions often coincide with the resolution of public procurement contracts stipulated with firms associated with the criminal organization, regardless the state-of-the-play of the contract [\[Ministry of the interior, 2016\]](#).

⁶The dissolution may take place for the accomplishment of acts contrary to the constitution or for serious and persistent violations of the law, as well as for serious reasons relating to public order or for the impossibility of ensuring the normal functioning of the organs and services, e.g. the resignation of the mayor or more than half of municipal councilors (TUEL).

Finally, there are special obligations foreseen by the mafia code (D.Lgs. n. 159/2011), which impose municipalities that have been dissolved for organized crime infiltration to acquire anti-mafia information for any contracts during the five years following the dissolution - a sort of internal communication within bodies of the Public Administration that certifies whether a firm can be procured or not. Once the period finishes for the commissioner, there are local elections and the commissioners are then replaced by the elected mayor and the elected municipal council.

1.3 Dataset

The empirical analysis is based on a dataset on both municipalities and firms in the regions of Campania, Calabria and Sicily, for the period 2010-2016⁷. These information are collected from a combination of different archives, available from the Italian Ministry of the Interior, the Italian Statistical Office (ISTAT), the National Association of Italian municipalities (ANCI) and Orbis - Bureau van Dijk.

1.3.1 Municipal data

Municipal information on council dissolution, and its length, have been collected by complementing the data available at the Ministry of the Interior with the Ancitel database, from ANCI, which provides detailed information on the causes of municipal dissolution⁸. According to the sample, 730 councils were dissolved over the period 2010-2016, corresponding to approximately 16% of municipalities in the three considered regions. Among these, 186 municipalities were dissolved for mafia infiltration, with the yearly distribution being more pronounced in Calabria (Figure 2).

⁷I also collect data for the years 2008 and 2009 and then proceed with the robustness check.

⁸See the following link for detailed information concerning municipal dissolution http://www.interno.gov.it/sites/default/files/relazione_ministro_enti_sciolti_2015_2016t_0.pdf.

Figure 2: *Distribution of council dissolution for mafia infiltration and for another reason, by region and year.*

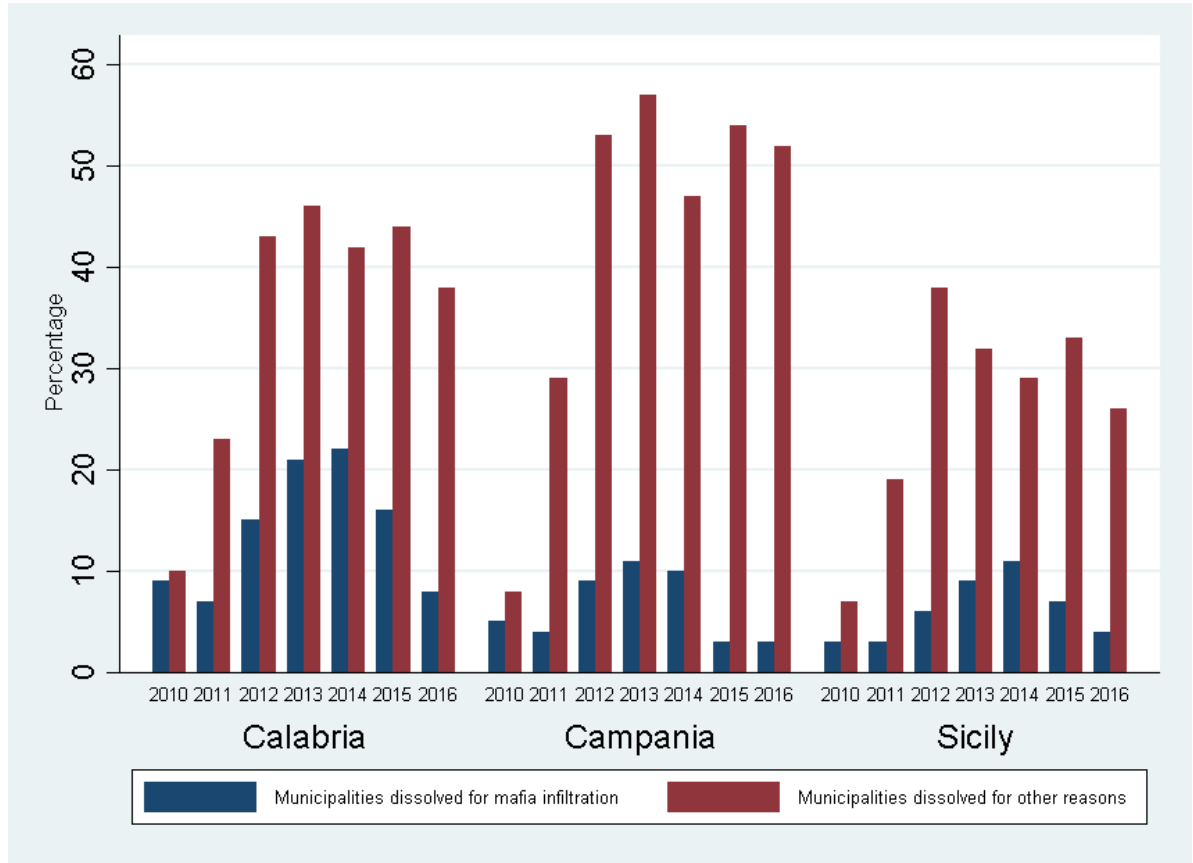


Table 1 shows the number of municipalities dissolved for mafia infiltration for different class of inhabitants. The dataset seems to cover all types of demographic groups except the one that includes the great municipalities. Municipalities dissolved for mafia infiltration with over 100,000 inhabitants are only two: Giugliano and Reggio Calabria.

Table 1: *Number of municipalities dissolved for mafia infiltration, for different class of inhabitants.*

	2010	2011	2012	2013	2014	2015	2016	Total
Inhabitants < 2.000	2	3	7	7	6	2	1	28
2.000 < inhabitants < 5.000	6	3	5	9	13	9	5	50
5.000 < inhabitants < 10.000	3	5	8	9	10	7	5	47
10.000 < inhabitants < 20.000	4	2	8	13	11	8	4	50
20.000 < inhabitants < 60.000	3	4	8	10	9	4	3	41
60.000 < inhabitants < 250.000	0	0	2	2	2	0	0	6
Inhabitants > 250.000	0	0	0	0	0	0	0	0
Total	18	17	38	50	51	30	18	222

Source: Ancitel and Ministry of the Interior.

In order to build the main variable of interest I use both the start and the end date of the commissioner. Thus, for each municipality, I build the variable *mafia council dissolution* that takes on the value of 1 if the municipality council has been put under the control of a commissioner for a mafia related issue, and zero otherwise. In the same way, the variable *council dissolution for another reason* accounts for any reason for a council dissolution other than mafia, and it is equal to 1 if the municipality has been put under the control of a commissioner for not mafia related issue, and zero otherwise.

These variables are then used to create neighboring values. In particular, I build the *neighboring council dissolution* variable, which equals to 1 when, in a given year, a commissioner for dissolution is appointed due to mafia infiltration in a nearby municipality and zero otherwise⁹. Figure 3 depicts the geographical distribution of both the mafia council dissolution and neighboring council dissolution variables, suggesting that it is quite uniform within each region, though less marked for Campania.

In a similar vein, I define the variable *neighboring council dissolution for another reason* as being equal to 1 when in a nearby municipality, in a given year, the commissioner is in charge as a consequence of council dissolution for reasons other than mafia.

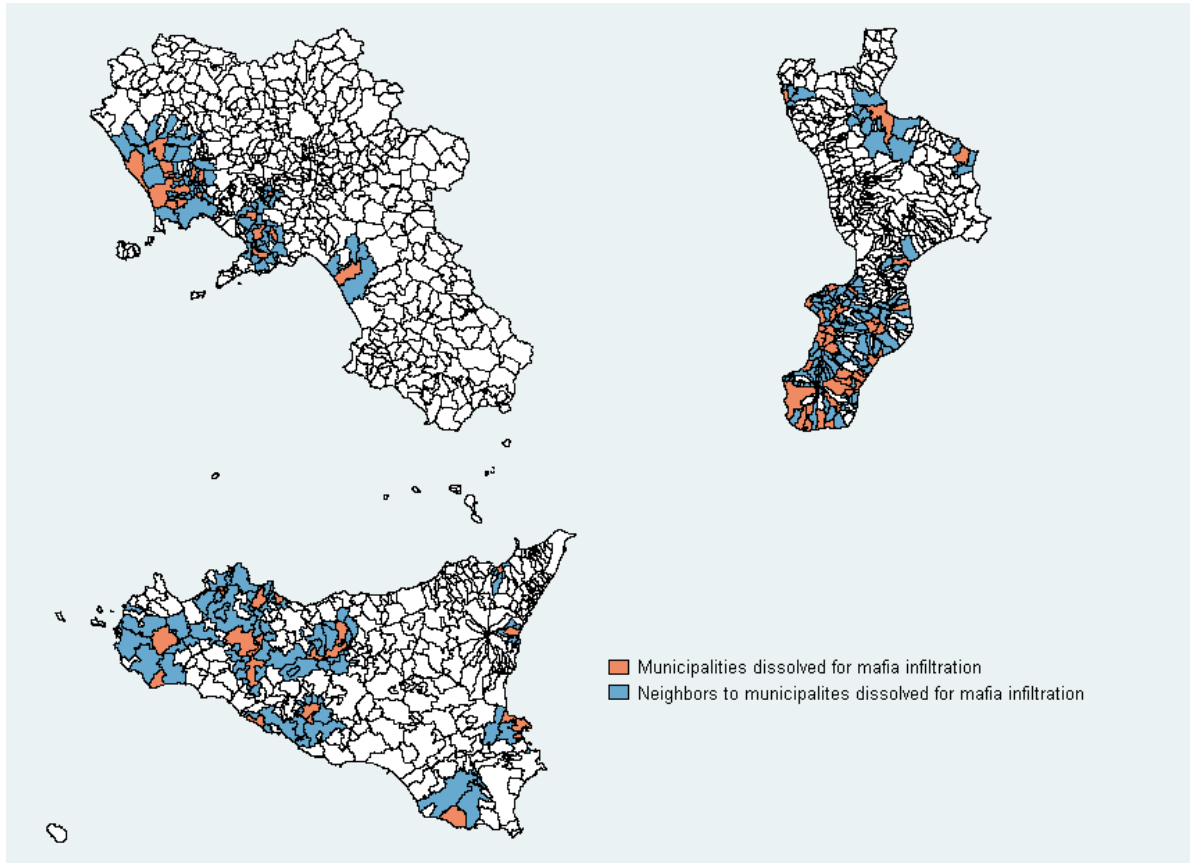
In order to analyze possible heterogeneous effects I have built two different variables. The *average number of days of council dissolution* variable is equal to the ratio between the number of days of council dissolution in neighboring municipalities due to mafia infiltration and the number of neighboring municipalities. To ease the interpretation of the result this variable has been normalized to one, such that 0 implies that neighboring municipalities have experienced zero days of a commissioner over a year and 1 implies that on average, neighboring municipalities have been put under the control of a commissioner for the entire year (365 days). It follows that a value of this variable equals 0.30 is associated with 110 days of a commissioner¹⁰.

The variable *average number of neighboring council dissolution* is equal to the ratio between the number of neighboring municipalities dissolved as a result of mafia infiltration and the number of neighboring municipalities. These two variables are equal to 0 when the municipality is not close to a municipality that has been dissolved as a result of mafia infiltration.

⁹The measure of proximity between municipalities was constructed using data from the ISTAT (<http://www.istat.it/it/archivio/157423>).

¹⁰ $365 \text{ days} \times 0.30 = 110 \text{ days}$.

Figure 3: *Municipalities dissolved for mafia infiltration and relative neighbors (2010-2016).*



1.3.2 Firms data

Information concerning firms was taken from the Bureau van Dijk database (Orbis). This database contains financial and commercial information on over 500,000 equity companies operating in Italy. As the main variable of interest I used the *value added*, calculated by subtracting the total costs from the total revenues¹¹. The definition of total costs include costs for gross purchases, costs for several services/changes in inventories of materials, goods purchased without transformation and other operating costs. On the revenue side, I included the value of gross sales, the change in inventories of finished products, semi-finished goods and work in progress, increases in fixed effects for internal work and the revenues of management accessories are items included for calculating revenues.

In addition, I collected information on the number of years since the founding of the firm (*firm aging*) and the class of revenue (*revenue class*): these variables serve to proxy the degree of maturity of the

¹¹While in principle it is possible to rely on a definition of the valued added per employees, in practice this solution turns out to be not feasible as the number of employees (full time equivalent) for 25% of the firms is equal to 0.

firm and the size of the company in financial terms, respectively¹²

The variable *firm aging* of the firm represents the maturity of the firm measured by the number of years that have passed since its foundation. The *revenue class* variable captures the size of the company in financial terms. Furthermore, I gather information on the activity of the firm by relying on its economic sector (ATECO¹³). Finally, I use the address and the zip code (CAP) to geo-localize each firm so as to assign them into a specific municipality. Summary statistics of all variables used in the analysis are reported in Table 2.

Table 2: *Summary statistics.*

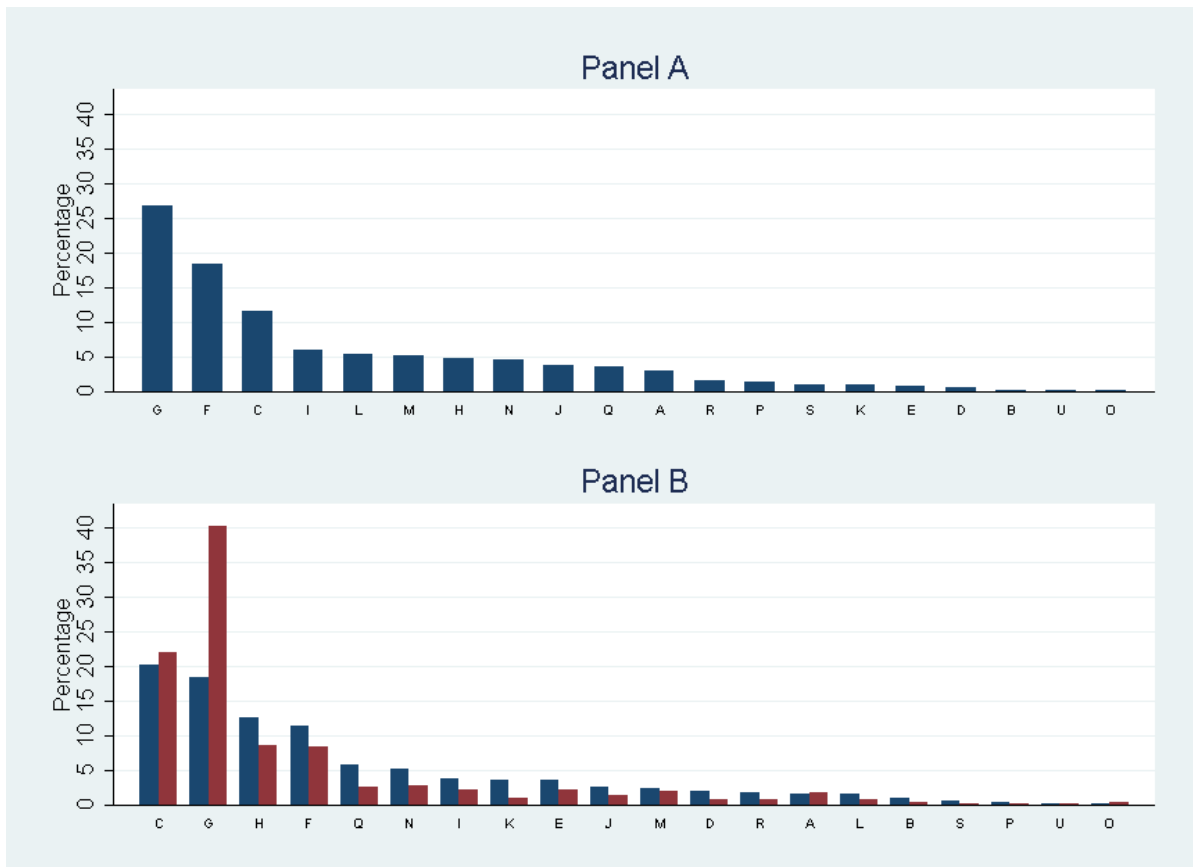
	N	Mean	S.d.	Min	Max
Value added	701,288	337.36	3,499	0.001	1,181,223
Neighboring council dissolution	701,288	0.225	0.418	0	1
Neighboring council dissolution for another reason	701,288	0.321	0.467	0	1
Average number of neighboring council dissolution	698,960	0.034	0.08	0	1
Average number of days of council dissolution	698,960	0.035	0.077	0	0.904
Mafia council dissolution	701,288	0.03	0.172	0	1
Council dissolution for another reason	701,288	0.123	0.329	0	1
Firm aging	701,288	11.25	10.364	1	155
Revenue class	680,822	0.697	1,.25	0	9

Figure 4 plots the distribution of firms, valued added and revenue for all economic sectors. Accordingly, in Panel A, it emerges that almost 60% of firms are distributed across three sectors: wholesale trade (26%), construction (18%) and manufacturing (12%). A similar picture is depicted in Panel B, where the sectorial distribution of value added and revenue is shown. Indeed, the lion's part of the value added and revenue generated by companies is concentrated among the manufacturing, wholesale, construction and transport sectors. What this simply suggests is that construction is among one of the more relevant sectors the local economy of the three regions (Figure 4).

¹²Following the definition provided by ISTAT, I grouped firms in 9 revenue classes (see Table AI).

¹³The ATECO codes used in the analysis are reported in the Appendix, Table AII.

Figure 4: *Distribution of firms, value added and revenue by economic sectors.*



Note: Panel A: percentage distribution of the firms (green) by ATECO code (see Table A2); Panel B: percentage distribution of valued added (blue) and revenue (red) by ATECO code.

1.4 Empirical analysis

1.4.1 Econometric specification

My analysis focuses on the effects of the commissioner for mafia infiltration on the value added of firms in bordering municipalities. In particular, I'm interested in analyzing the impact of spillover effects, due to the anti-corruption policy, on the local economy. To begin with, I use the following model:

$$Y_{ict} = \alpha + \beta \text{neighboring mafia council dissolution}_{ct} + \gamma \text{mafia council dissolution}_{ct} + \delta \text{council dissolution}_{ct} + \rho X_{it} + \mu_i + \tau_t + \vartheta_{pt} + \epsilon_{ict} \quad (1)$$

where i denotes the firm, c the municipality where the firm is located and t the year. Y_{ict} is the logarithm of the value added, opportunely deflated¹⁴. The *mafia council dissolution* variable is a

¹⁴Data deflated by the national consumer price index for the entire community, excluding energy (ISTAT).

dichotomous variable that is equal to 1 when the firm is located in a municipality bordering a municipality which is dissolved for mafia infiltration and 0 otherwise. I also include two indicators accounting for the presence of commissioners in the municipal administration: *mafia council dissolution* and *council dissolution*, with the former capturing the presence of mafia-related commissioners and the latter accounting for the presence of other commissioners for reasons other than mafia. X_{it} is a set of time-varying variables at the level of the firm, such as firm aging and revenue class. μ_i denotes the firm's fixed effects, τ_t is the year's fixed effects and ϑ_{pt} is a set of province-by-year fixed effects, the aim of which is that of capturing any pattern of unobserved economic shock within the same province. Finally, ϵ_{ict} is the idiosyncratic error term, clustered at the municipal level.

While the coefficients γ and δ account for the direct effect of the council dissolution (for mafia related reasons and reasons not related to mafia) on the value added of firms, β captures the spillover effect on the local economic activity due to the dissolution of the council in relation to the mafia of neighboring municipalities.

To investigate whether there is a heterogeneous response in relation to the construction sector, I interact the neighbors' mafia council dissolution with a dummy variable accounting for it. In particular, I have estimated a modified version of equation (1) where I allow the spillover effect in the construction sector to be separated:

$$Y_{ict} = \alpha + (\beta + \lambda \text{construction}_i) \times \text{neighboring mafia council dissolution}_{ct} + \gamma \text{mafia council diss.}_{ct} + \delta \text{council dissolution}_{ct} + \rho X_{it} + \mu_i + \tau_t + \vartheta_{pt} + \epsilon_{ict} \quad (2)$$

In a way that differs from equation (1), equation (2) includes an additional term: *neighboring mafia council dissolution*construction*. This identifies the specific impact of the neighbors' mafia council dissolution on the construction sector. In fact, *construction*, is a dummy variable that is equal to one when firm i belongs to the construction sector and zero otherwise. The impact of being a firm belonging to a neighbors' mafia council dissolution on its own value added can be calculated as $\beta + \lambda \times \text{construction}_i$, where λ provides the differential impact on value added of a construction firm.

1.4.2 Baseline results

In Table 3 I show the estimates. In particular, I first estimate equation (1), without including controls variable (col. 1) and then in column (2) I replicate the analysis including the firm's controls. Results indicate that the neighboring council dissolution for mafia triggered a reduction of the level of value

added; nevertheless, the estimated effects are not statistically different from zero in both specifications. While these results seem to suggest that, on average, there is no effect associated with the anti-corruption policy, it might be the case that some sectors, such as construction, have been strongly affected.

To explore whether construction firms are affected by the policy, I estimate model (2). Results of this analysis are shown in column 3 and indicate that the value added of firms in the construction sector reduces by approximately, $6.5\% = (0.5 - 7.1)$, as the coefficient of the interaction term, *neighboring mafia council dissolution*construction*, turns out to be negative and statistically significant at 1%. A very similar effect is obtained when I repeat the analysis with the inclusion of control variables (col. 4). It is also worth noting that the direct effect of the policy is associated with a reduction of the value added, i.e. the coefficient of *mafia council dissolution* is always negative, albeit this is not statistically significant at the conventional level.

Finally, in columns (5), (6), (7) and (8) I replicate the previous regressions by adopting a different definition of the council dissolution variable. In detail, I create a measure for the intensity of a commissioner, which is given by the number of days over a year in which neighboring municipalities are put under the control of a commissioner for mafia infiltration¹⁵. In this case too, I observe a negative and statistically significant effect of the neighbors council dissolution on the value added of firms in the construction sector, both in the case when control variables are excluded (Table 3, col 7), and in the case when, instead, controls are included (Table 3, col 8). To see the magnitude of the effect, take a low level of intensity, say the one corresponding to the 25th percentile of its distribution (0.09, corresponding to approximately 33 days). The effect of neighboring council experiencing a dissolution then implies a decrease in the value added of firms in the construction sectors of $-0.007 \times 0.09 - 0.248 \times 0.09 = -2.29\%$ (statistically significant at 1%). If one now takes a high level of commissioner intensity, say the one corresponding to the 75th percentile of its distribution (0.19, corresponding to approximately 69 days). In this case, neighboring council dissolution leads to a decrease in the value added of firms operating in the construction sectors of $-0.007 \times 0.19 - 0.248 \times 0.19 = -4.84\%$ (statistically significant at 1% level). Note that the difference of these two effects is statistically significant ($-4.84 + 2.29 = -2.55\%$; p-value = 0.006), implying that the effects are larger the longer the commissioner is present in the municipal council.

Finally, it can be noticed that neither the inclusion of control variables, nor the adoption of different

¹⁵To test for the robustness of the results I also use a third definition of neighboring council dissolution. In particular, I define neighboring council dissolution as the ratio between the number of neighboring municipalities put under the control of a commissioner and the total number of municipalities. Results do not change and are available in Appendix, Table AIII.

measures of council dissolution change the magnitude of the assets, implying that firms may not appear to significantly differ in terms of observables and that the effect is not driven by the definition of the neighboring council dissolution variable.

Taken together, these results suggest that the presence of an anti-corruption policy leads to a reduction of the value added of firms in the construction sector, suggesting that there are crime-related links between private firms and local officials (with such an effect being more pronounced the longer the commissioner is present).

Table 3: Value added and neighbors council dissolution for mafia infiltration.

Dependent variable: Value added	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dummy neighbors council dissolution			Average number of days of council dissolution				
Neighboring mafia council dissolution	-0.008 (0.005)	-0.005 (0.005)	0.005 (0.005)	0.006 (0.005)	-0.085*** (0.028)	-0.062** (0.027)	-0.017 (0.028)	-0.007 (0.029)
Neighboring mafia council dissolution \times construction			-0.071*** (0.018)	-0.060*** (0.016)			-0.316** (0.125)	-0.248** (0.102)
Mafia council dissolution	-0.025 (0.015)	-0.015 (0.013)	-0.023 (0.015)	-0.013 (0.013)	-0.021 (0.015)	-0.012 (0.013)	-0.019 (0.015)	-0.011 (0.013)
Council dissolution for another reason	-0.001 (0.006)	-0.003 (0.005)	-0.001 (0.006)	-0.003 (0.005)	-0.001 (0.005)	-0.002 (0.005)	-0.001 (0.006)	-0.002 (0.005)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province \times year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other firm controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	676,728	653,777	676,728	653,777	674,473	651,564	674,473	651,564
R-squared	0.833	0.849	0.833	0.849	0.833	0.850	0.833	0.850

Notes: Robust standard errors, clustered at the municipal level, are shown in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. Other firms' controls include the variable firm aging and revenue class.

1.4.3 Robustness test

In this section, I assess the validity of the previous results by performing a set of robustness tests. First of all, I run checks to detect anticipatory behaviour by including leads, up to two years, for *neighboring mafia council dissolution*, and *neighboring mafia council dissolution*construction*, variables with regard to the fully controlled regressions. Results of this analysis are reported in Table 4 and indicate that there is no evidence of anticipatory effects on the value added associated with the city council dissolution for mafia infiltrations.

Table 4: *Value added and neighbors council dissolution for mafia infiltration, falsifying the commissioner's entry to one year or two years before.*

Dependent variable: Value added	(1)	(2)	(3)	(4)
Neighboring mafia council dissolution _{t+1}	-0.006 (0.006)	-0.003 (0.005)		
Neighboring mafia council dissolution _{t+1} × construction	-0.025 (0.025)	-0.011 (0.018)		
Neighboring mafia council dissolution _{t+2}			-0.009 (0.007)	-0.008 (0.006)
Neighboring mafia council dissolution _{t+2} × construction			0.007 (0.020)	0.021 (0.016)
Mafia council dissolution	-0.022 (0.016)	-0.013 (0.012)	0.010 (0.018)	0.016 (0.014)
Council dissolution for another reason	-0.002 (0.005)	-0.000 (0.005)	-0.007 (0.006)	-0.003 (0.006)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Province × year fixed effects	Yes	Yes	Yes	Yes
Other firm controls	No	Yes	No	Yes
Observations	554,137	535,261	465,616	450,197
R-squared	0.852	0.868	0.859	0.875

*Notes: Robust standard errors, clustered at the municipal level, are shown in parentheses. *** significant at 1%; ** significant at 5%, * significant at 10%. Other firms' controls include the variable firma aging and the revenue class.*

Second, there might be some unobservable characteristics linked to council dissolution which bias the results. To tackle this issue, I compare point estimates, and confidence intervals relating to the main variable of interest, *neighboring mafia council dissolution*construction* using three different combinations of fixed effects: i) model with controls, firms and years of fixed effects; ii) model with controls, firms and years of fixed effects as well as province by years of specific time trend; iii) model with controls, firms and years of fixed effects and municipality by years of specific time trend. The results, shown in Table 5, suggest that point estimates are consistent among the three models and thus I find no plausible explanation that stand up as an argument against a causal interpretation of the identified relationship.

Table 5: *Value added and neighbors council dissolution for mafia infiltration, with different fixed effects.*

Dependent variable: Value added	(1)	(2)	(3)
Neighboring mafia council dissolution	0.013*** (0.005)	0.006 (0.005)	-195,057 (466,281)
Neighboring mafia council diss. × construction	-0.060*** (0.017)	-0.060*** (0.016)	-0.061*** (0.016)
Mafia council dissolution	-0.012 (0.012)	-0.013 (0.013)	-160,268 (411,873)
Council dissolution for another reason	-0.001 (0.005)	-0.003 (0.005)	-132,481 (159,284)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Province × year fixed effects	No	Yes	No
Municipal × year fixed effects	No	No	Yes
Other firm controls	Yes	Yes	Yes
95% Conf. Interval			
Neighboring council dissolution × construction	[-0.0928;-0.0263]	[-0.0921;-0.0285]	[-0.0933;-0.0288]
Observations	653,777	653,777	653,159
R-squared	0.849	0.849	0.852

*Notes: Robust standard errors, clustered at the municipal level, are shown in parentheses. *** significant at 1%; ** significant at 5%, * significant at 10%. Other firms' controls include the variable firma aging and the revenue class.*

Third, in order to better strengthen the evidence pointed out so far and in the spirit of a placebo exercise, I investigate whether using the council dissolution for reasons other than mafia leads to the same conclusion. Indeed, were it the case, it would imply that the effects detected for firms operating in the construction sector are not due to mafia, but – more generally – to the status of commissioner, thereby undermining the crime-related links between private firms and local officials. The results of this analysis are reported in Table 6 and suggest that being surrounded by municipalities dissolved for reasons that are not mafia related brings no effects on the added value of firms, as the interaction term *neighboring mafia council dissolution for another reason* × *construction* is not statistically significant in any specification.

1.5 Conclusion

In this paper I examined the impact of organized crime on economic activity at a local level. In particular I focused on the effects of a strong anti-corruption policy, namely the introduction of a municipal commissioner for mafia infiltration.

Following the theoretical reasoning of [Sah \(1991\)](#), a strong anti-corruption policy affects the activities of criminal organizations, even in neighboring municipalities and loosens control by the mafia on the

Table 6: *Value added and neighbors council dissolution for another reason.*

Dependent variable: Value added	(1)	(2)	(3)	(4)
Neighboring council dissolution for another reason	-0.000 (0.004)	-0.002 (0.004)	0.004 (0.004)	0.001 (0.004)
Neighboring council diss. for another reason × construction			-0.023 (0.023)	-0.017 (0.019)
Mafia council dissolution	-0.025 (0.015)	-0.015 (0.013)	-0.025* (0.015)	-0.015 (0.013)
Council dissolution for another reason	-0.001 (0.006)	-0.003 (0.005)	-0.001 (0.006)	-0.003 (0.005)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Province × year fixed effects	Yes	Yes	Yes	Yes
Other firm controls	No	Yes	No	Yes
Observations	676,728	653,777	676,728	653,777
R-squared	0.833	0.849	0.833	0.849

*Notes: Robust standard errors, clustered at the municipal level, are shown in parentheses. *** significant at 1%; ** significant at 5%, * significant at 10%. Other firms' controls include the variable firma aging and the revenue class.*

activities of the municipal administration. While all firms are potentially subject to a link to organized crime, some of them are in practice, more vulnerable to criminal infiltration than others, e.g. the ones operating in the construction sectors.

Indeed, I showed that in the construction sector the effect of having had a municipality dissolved for mafia infiltration close to the headquarters of the firm decreases the value added by 7%. The effect that is found is sensitive to the intensity of treatment, defined by the number of days the commissioner is present. Not surprisingly, the effect is driven by the construction sector as this sector is heavily dependent on local procurement as such, it is "more" likely to be involved in mafia-related crime [Gambetta and Reuter, 1995].

One main concern of the analysis is that it focuses on a single country, and as such, limits the external validity of the results. As a matter of fact, the Italian mafia can be considered as the "prototype" for other criminal organization around the world, such as drug cartels in South America and the Yakuza in Japan [Pinotti, 2015]. More broadly, it follows that the evidence pointed out in this work might eventually shed light on the effects of the presence of criminal organizations in public administration and local firms.

2 The role of tax systems' complexity on foreign direct investment allocation

Abstract

This work presents new cross-country empirical evidence that, in recent years, tax systems' complexity affects international investments. This evidence comes from a database of Foreign Direct Investment (FDI) bilateral flows for all OECD countries over the 2013-2016 period. I use the dataset from the survey "Doing Business – Paying Taxes" which collects different measures of tax systems' complexity and effective tax rates. I consider the impact of destination and parent country characteristics on firm investment decisions, by using a gravity model. I find that an increase in the difference between tax complexity in the home country and in the destination country is related with an increase in FDI outflows from home to destination country. I also find that this effect is driven by countries with a smaller demographic size.

KEYWORDS: FDI; tax complexity; gravity model.

JEL: H32, H29, H25.

2.1 Introduction

In recent years, removal of barriers to international trade pushed governments to attract Foreign Direct Investment (FDI) with the objective of achieving positive spillover effects in the local economy, offering access to international available technologies and managerial know-how¹⁶ [OECD, 2008]. At the same time, the pressure of public opinion pushed governments to guarantee that an appropriate share of tax revenues should be collected from multinationals. The discussions about company tax reform and tax harmonization arise also after the implementation of the OECD/G20 Base Erosion and Profit Shifting (BEPS) Package [OECD, 2018].

In [Esteller-More', Rizzo, and Secomandi 2019], using [Djankov et al. 2010] dataset, we show that taxes in the destination country matter a lot for non-OECD countries. While the raising of tax rate has no impact on FDI for OECD countries. Are there other FDI determinants for OECD countries?

In this work I concentrate the analysis on the tax systems' complexity as an important determinat of international firms' investment decision. Fulfilling tax requirements is time-consuming for the companies, so this implies an additional cost for the firms. Measuring the tax systems' complexity is not simple. I use the dataset "Doing Business – Paying Taxes" ; in particular, the variable *time required to comply taxes* measures how long a firm takes to prepare, compile and pay three main types of taxes and contributions in each country: the corporate income tax, value added or sales tax, and labor taxes, including payroll taxes and social contributions.

According to [de Mooij and Ederveen 2003], the decisions to undertake FDI may not only depend on location advantages, but also on ownership advantages. To consider the impact of origin and destination country characteristics on firm investment decisions, I adopt the technique of the so-called gravity models, originally developed by [Isard 1960].

I present a new cross-country evidence for developed countries. During the 2013-2016 period, FDI flows are driven by tax complexity rather than by tax rates. The evidence comes from the use of a database containing bilateral flows of Foreign Direct Investment (FDI), measures of tax complexity, tax rates and other control variables for all OECD countries over the 2013-2016 period. This result holds even when a range of country-specific controls is added, including the level of government expenditure and different measures of the distance between countries.

The existence of different home market implies that in larger countries foreign investment is more rigid to the variation of tax policies [Trandel, 1994]. Therefore, all other factors affecting the tax system will have a greater relevance in small countries. In fact, I find that FDI is more driven by tax system

¹⁶Among others, see [Alfaro et al. 2004], [Barro 1991], [Baumol et al. 2007], [Du et al. 2014], [Javorcik 2004].

differential with a smaller economic and demographic size.

The structure of rest of the paper is as follows. Section 2 reviews the literature, Section 3 describes the data, Section 4 introduces the empirical approach, Section 5 presents results of the gravity model and shows heterogeneity effects, and Section 6 concludes.

2.2 Literature

Tax and non-tax factors might affect the decision to relocate investments abroad. The size of a foreign market, the foreign regulatory and legal environment, and distance from the home country are the most important non-tax factors. Regarding tax factors, previous studies show that investment decisions and other activities of multinational corporations are sensitive to the tax corporate rate (for a review, see [Devereux and Maffini, 2007](#)).

A large body of literature shows the existence of significant and quantitatively important tax effects on the magnitude and location of FDI [Desai and Hines, 2001](#), [Devereux et al., 2002](#), [Gordon and Hines, 2002](#), [Slemrod, 1990](#). Starting with aggregate time series, the literature on the impact of taxation on FDI has gradually evolved in the direction of panel data analyses [Buettner and Wamser, 2013](#), [Devereux and Freeman, 1995](#), and cross-country analyses [Djankov et al., 2010](#). More recently there is a trend to use micro data of firm investments [Barrios et al., 2012](#), [Becker and Riedel, 2012](#), [Desai and Hines, 2001](#), [Stowhase, 2002](#). [de Mooij and Ederveen 2003](#) analyze 25 studies comprising 371 elasticities of FDI inwards with respect to corporate taxation and find a median tax-elasticity of FDI of -3.2. However, their sample of 371 elasticities has a high variation, exhibiting a standard deviation of 9.0 and just 300 of the 371 elasticities having a negative sign.

Recent studies explore the effects of international agreements aimed at restricting multinationals' tax planning. Using the US tax agreements with developing countries for the period 1970–2001, [Neumayer 2007](#) finds empirical evidence that double tax treaties increase FDI inwards around 34 per cent. [Blonigen et al. 2014](#) use US firm-level on their activity in 174 countries between 1987 and 2007, find a positive effect of double tax treaties on foreign direct investment. [Petkova et al. 2018](#), distinguishing between relevant, neutral and non-relevant double tax treaty, whether or not it is capable of changing the fiscal advantages of investors, for the period 2009-2019, quantify the increase of FDI due to a relevant double tax treaty at around 22%.

Studies of the effect of taxation on FDI location decisions generally examine destination country taxation and do not consider parent country taxation [Mooij and Ederveen, 2006](#), [Devereux and Maffini, 2007](#). The contribution of this paper is to jointly consider the impact of home and destination country

tax systems. In particular, as in Lawless [2013] and Mueller and Voget [2012], I look at the impact on FDI due to differences in tax complexities between the home and destination country.

As far as I know, very few studies (Djankov et al. [2010]; Lawless [2013] and Mueller and Voget [2012]) have examined the effect of the tax systems' complexity on international firms' investment decision. The tax systems' complexity for a firm is the difficulty in managing tax instructions and forms (Woodworth [1969]), and the level of complexity is mainly associated with the numbers of tax rates, tax bases, tax payments and the number of exceptions or special provisions included (Warskett, Winer, and Hettich [1998]). Slemrod [2005] use as a simple measure of tax complexity the number of lines in the tax forms and the number of pages in the instruction booklets. There is anecdotal evidence that tax complexity is an important issue. For instance, in 2017, the instructions for the corporate income tax return in Italy amounted to more than 250 pages. Tax complexity is costly since it creates a transaction cost for firms that comprises all actions to full the requirements which are necessary to remain in compliance (Edmiston et al. [2005]). High tax complexity might also lead to incomplete information in terms of a misperception of the effective level of taxation (or uncertainty about it), which might reduce investments.

(Djankov et al. [2010]) use the World Bank data on tax rates and the number of tax payments to explain a range of country-level outcomes, including FDI inflows. They find that both statutory and effective tax rates have negative effects on FDI inflows, investment and entrepreneurship, but they find no significant relationship between the number of tax payments and total FDI inflows. The work by (Edmiston, Mudd, and Valev [2005]) examine whether complexity and uncertainty in tax laws have deterred FDI. From their analysis, carried out only on countries of the former Soviet Union and Eastern and Central Europe, they conclude that complexity and uncertainty, defined by the number of different in tax rates on profit taxation, by the number of lines in the description of the tax base, and by the number of change in tax parameters have a significant negative effect on inward FDI. (Lawless [2013]) using a Heckman selection model finds a negative effect of tax complexity on FDI flows for the years 2002-2009 both for OECD and for non-OECD countries. (Mueller and Voget [2012]) examine the effect of tax complexity using German firm-level data and find that the effect on FDI of a reduction of tax complexity will be particularly powerful for countries with a low statutory corporate income tax rate. My paper differs from these previous commented works because I use a gravity model that allows for each origin country to consider the destination country where the investment is directed, the dataset refers to 2013-2016 and the analysis is limited to the OECD. The data set construction is explained next.

2.3 Data

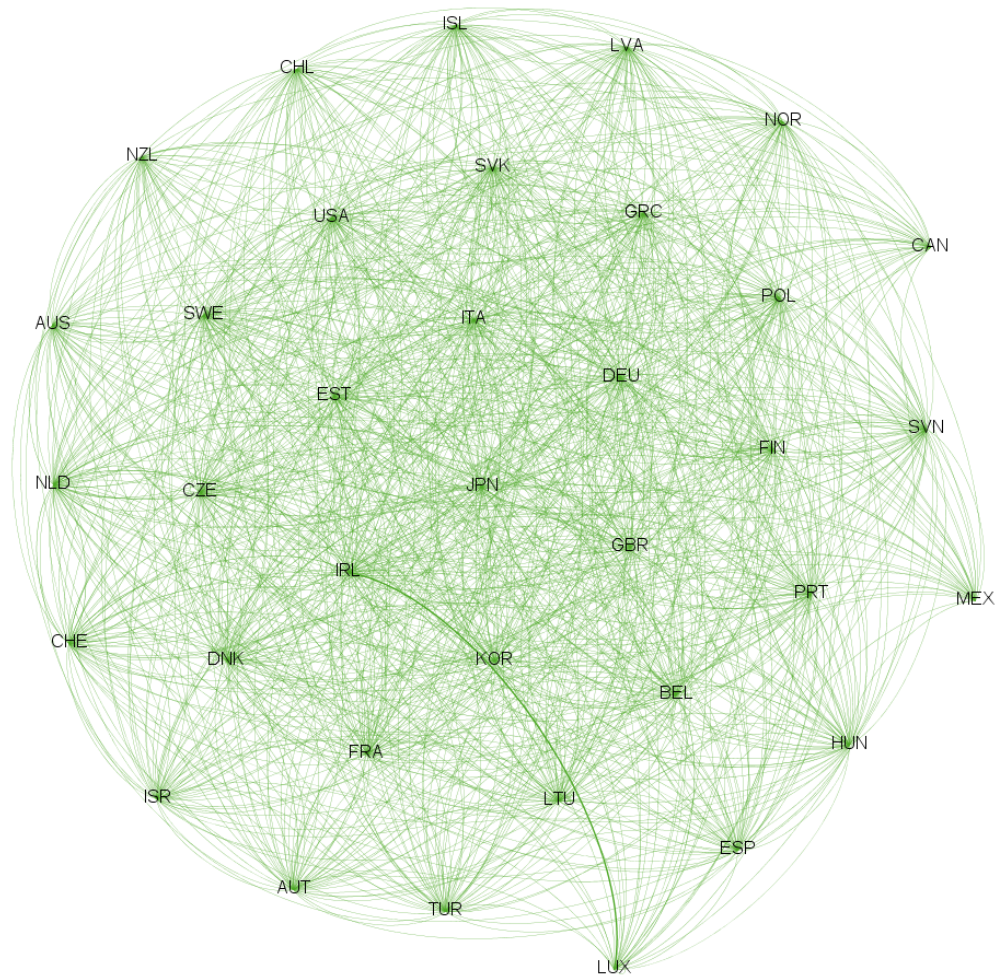
2.3.1 Data on FDI

The main variable of interest is the Foreign Direct Investment (FDI) bilateral flows¹⁷. Following the definition of the International Monetary Fund [IMF, 2019], direct investment is the category of international investment that reflects the objective of a resident entity in one economy obtaining a lasting interest in an enterprise resident in another economy. The lasting interest implies the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence by the investor on the management of the enterprise. The “lasting interest” is verified when the direct investor owns at least 10% of the voting power of the direct investment enterprise [OECD, 2008]. Direct investment comprises not only the initial transaction establishing the relationship between the investor and the enterprise but also all subsequent transactions between them and among affiliated enterprises, both incorporated and unincorporated. Thus, FDI could be financial flows consist of equity, transactions, reinvestment of earnings and intercompany debt transaction [UNCTAD, 2009]. As suggested by the *FDI Eurostat manual*, FDI measured in this way is the most appropriate way for studying the nature and motivations of FDI.

As in [Torslov, Wier, and Zucman 2018] and [Wei 2000], I use outward FDI instead of inward FDI because the statistical reporting of FDI outward allows to have a smaller number of missing values in the bilateral flows. Notice that the variable net FDI outward can contain negative values because there can also be reverse investments from the subsidiary in the destination country [UNCTAD, 2009]. Data on FDI bilateral flows come from the bilateral Eurostat Balance of Payment and from the OECD International Direct Investment report. The data from Eurostat follows in principle the OECD benchmark definition for FDI such that both datasets are fully comparable. All FDI flows are converted into current dollars.

¹⁷It is well known that there exist significant problems in the accounting procedure for FDI, and that even the statistics supplied by supranational bodies like Eurostat and the OECD suffer from differences in the national reporting procedures. However, as emphasized by [Hines 1997] in order to study the determinants of FDI it is sufficient to focus on the distribution of FDI flows among different countries.

Figure 5: *Bilateral flows of Foreign Direct Investment on GDP, network graph (2013-2016).*



Source: Eurostat and OECD.

The variable *Foreign Direct Investment outflows on GDP* in the dataset refers to all OECD countries, 36 source countries versus 36 destination countries. These countries represent a large part of the world economy (63% of the world's GDP) and of international trade (68% of the value of exports in the world). The full list of source and destination countries is contained in Table BI. As suggested in recent works (e.g. see [Petkova et al., 2018](#)), I use only data from 2013 to 2016, since substantial methodological changes in classifying bilateral FDI flows time series have occurred after 2013 (*FDI Eurostat manual*)¹⁸ and so data before and after 2013 are not comparable.

¹⁸The latest international standards for compiling FDI statistics lead to more meaningful measures of direct investment but also lead to significant changes in the FDI statistics. One of the largest changes was to the aggregate, or global, FDI statistics included in the Balance of Payment and International Investment Position accounts.

The average value of FDI outflows is equal to 0.02% of the total GDP, and varies from -1.97 to 8.43%. The heterogeneity reflects the relative attractiveness of investment in the country, the size and growth of the economy, the level of openness, competition and integration into international value chains. Figure 5 shows the FDI network using the Fruchterman-Reingold algorithm [Fruchterman and Reingold, 1991], where the nodes are represented by steel rings and more marked connections reflect more intense outflows FDI. The network reveals a very high degree of connectedness where most economies have FDI links vis-à-vis each other. Investment hubs can also be identified in the network. For instance, the strong link between Ireland and Luxembourg likely reflects that many foreign investors use these two countries as a third jurisdiction for investments other countries because of various tax agreements.

2.3.2 Data on tax complexity

I use the dataset “Doing Business – Paying Taxes” (World Bank, PricewaterhouseCoopers, and Harvard University) to measure the tax systems’ complexity¹⁹. To ensure comparability across countries, the data are based on a case study of a hypothetical representative firm examined across countries. A range of assumptions were made about the structure of the business, and hypothetical financial accounts were presented to the survey respondents to let them calculate the company’s tax liabilities and costs of compliance. This information is available for the 2006-2017 period for more than 130 countries.

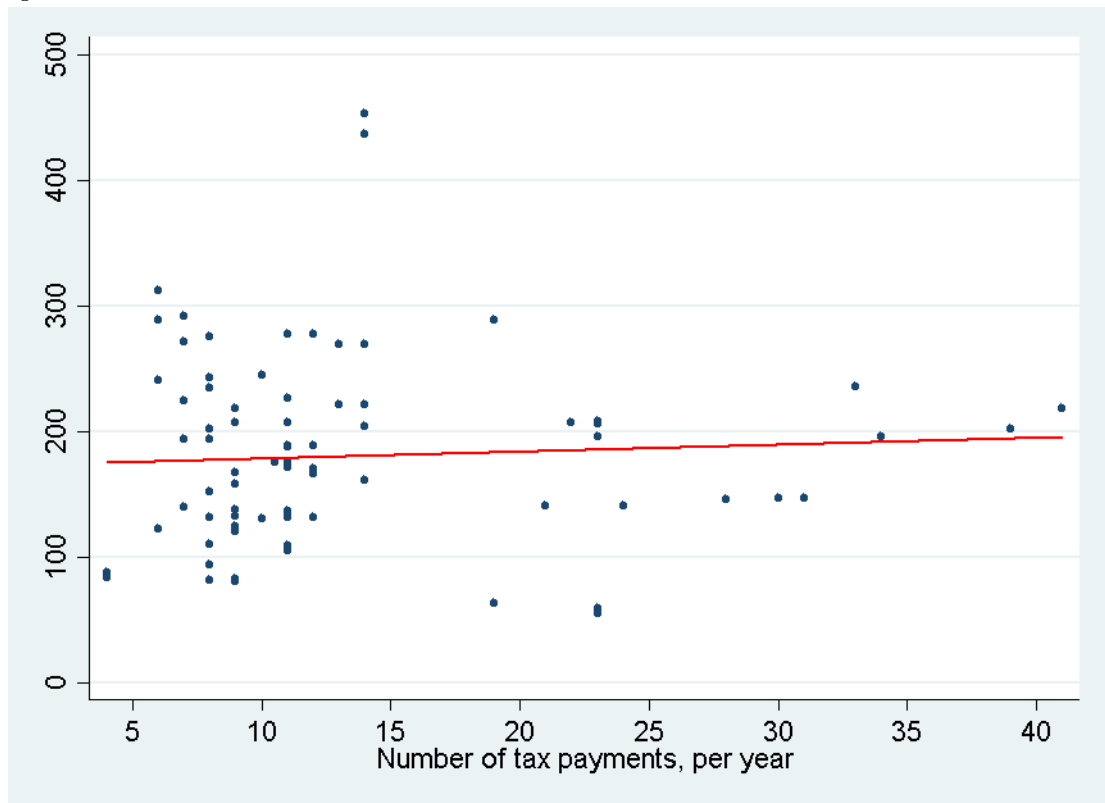
In particular, two variables are interesting for my purpose: the variables *time required to comply taxes* and *number of payments*. The variable time required to comply taxes measures how long a firm takes to prepare, compile and pay three main types of taxes and contributions: the corporate income tax, value added or sales tax, and labor taxes, including payroll taxes and social contributions. Time required to comply taxes is recorded in hours per year. Preparation time includes the time to collect all information necessary to compute the tax payable and to calculate the amount payable. If separate accounting books must be kept for tax purposes the time associated with these processes is included. This extra time is included only if the regular accounting work is not enough to fulfill the tax accounting requirements. Filing time includes the time to complete all necessary tax return forms and file the relevant returns at the tax authority. Payment time considers the hours needed to make the payment online or in person. Where taxes and contributions are paid in person, the time includes delays while waiting.

¹⁹Recently several authors have used this source of information for different purposes. For example van Stel et al. [2007] used it to study the effect of business regulations on nascent and young businesses; Belitski et al. [2016], to analyze the connection between taxes, corruption, and entry; and Jerbashian and Kochanova [2016], to explore the impact of doing business regulations investments in information and communication technologies.

The variable *number of payments*, which reports the total number of taxes and contributions paid during a year, including sales tax, Value Added Taxes (VAT) and employee-borne labor taxes. These taxes are traditionally collected by the company from the consumer or from the employee on behalf of the tax agencies. Although they do not affect the income statements of the company, they add to the administrative burden of complying with the tax system and so are included in the tax payments measure. The number of payments takes into account electronic filing. Where full electronic filing and payment is allowed, the tax is counted as paid once a year even if filings and payments are more frequent. For payments made through third parties, such as tax on interest paid by a financial institution or fuel tax paid by a fuel distributor, only one payment is included even if payments are more frequent.

From the analysis of the data on the tax complexity there would not seem to be a close relationship between the two variables. Along 2013-16, the correlation between both variables 0.052 (Figure 6), while the correlation between the difference in time required to comply taxes between home and destination country and the difference in number of payments between home and destination country is -0.009.

Figure 6: *Correlation between time required to comply taxes and number of payments, 2013-2016.*

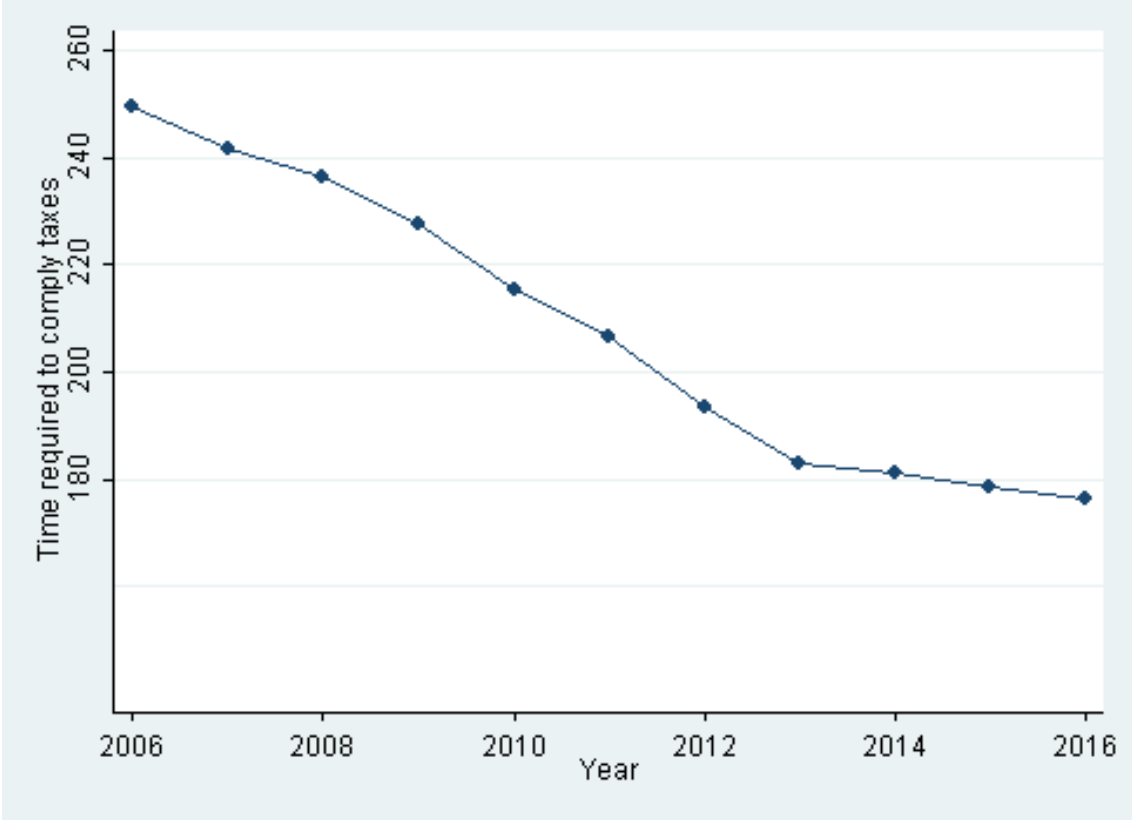


Source: *Doing Business, World Bank.*

In the main regression I use as a proxy of tax complexity the variable time required to comply taxes. Figure 7 and Figure 8 show the length of time required to comply taxes (in hours) required for a standardized firm to comply with the tax codes in the OECD and European countries. Countries differ significantly in the way in which they regulate tax administration. The average number of hours, in the period 2013-2016, is 180, about 23 working days. The variable time required to comply taxes goes from a minimum mean value of 56 hours in Luxembourg to a maximum average value of 440 in Bulgaria. For the 28 countries belonging to the European Union the average of time required to comply taxes is 181, for other 3 OECD – European countries the average is 96 and for other 10 OECD – Non-European countries the average is 201.

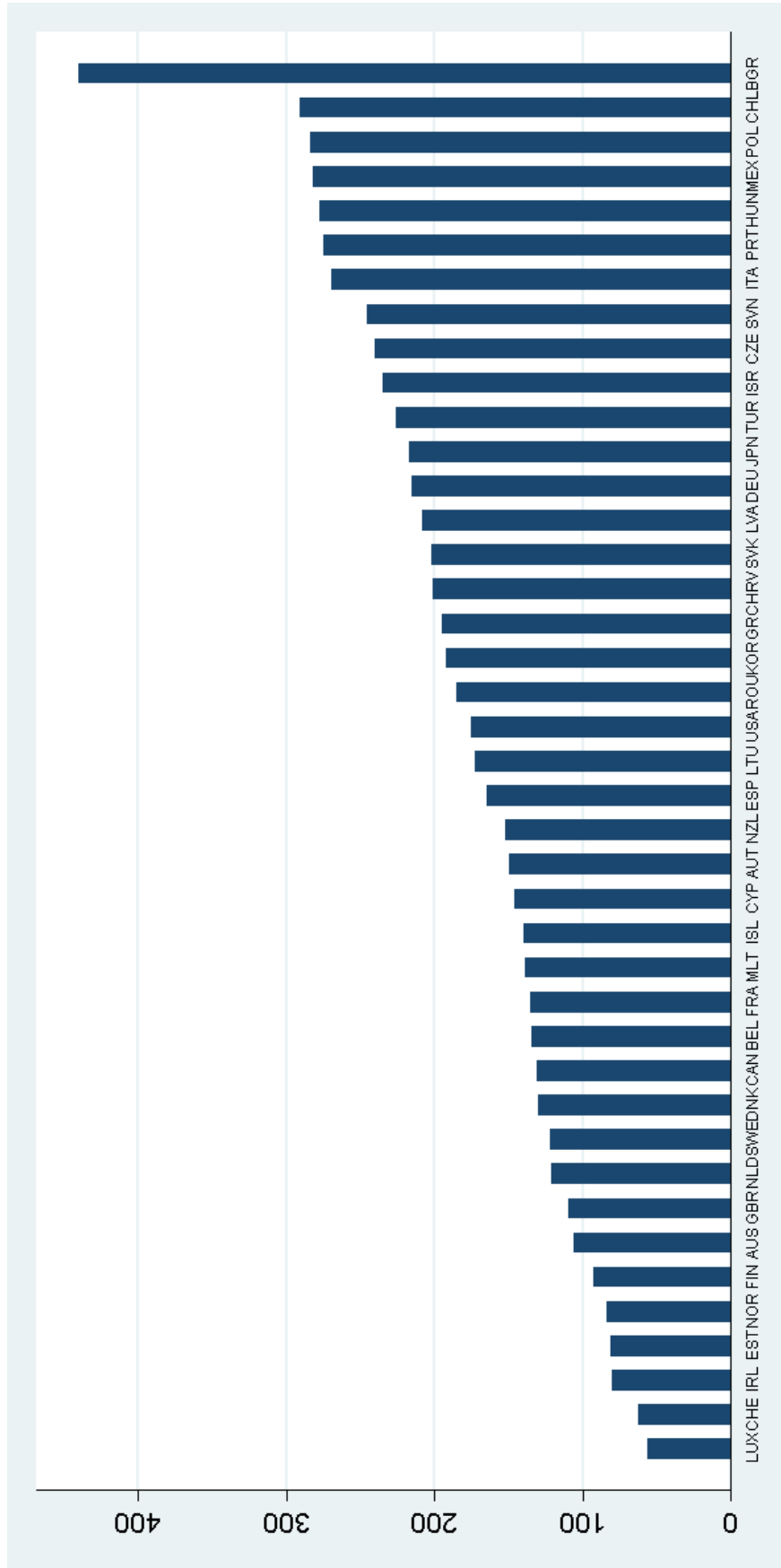
The gravitational model in this work is estimated using the average values for each variable in the period 2013-2016. As this paper uses a cross-section of data, it is important to note that there is very little variation in the tax complexity measures in the period 2013-2016 (Figure 7). Year-to-year correlations in the time required to complete taxes come in at 99%, while year-to-year correlation in number of payments come in at 93%.

Figure 7: *Time required to comply taxes, in hours, 2006-2016.*



Source: *Doing Business, World Bank.*

Figure 8: Time required to comply taxes, in hours, average values 2013-2016.



Source: *Doing Business*, World Bank.

2.3.3 Data on tax rates

The measurement of taxation is a non-trivial issue [Benassy-Quere et al., 2005]. Statutory rates are the most obvious and readily available measure, while ex ante measures, as effective tax rates, are difficult to measure but give more accurate measure of the effective tax burden as they account for any possible special tax treatment. [Devereux and Maffini 2007] and [Mooij and Ederveen 2006] find that both corporate income statutory tax rate and corporate income effective tax rate are important for locations of international investments. Therefore, I decide to use for each specification both measures of tax rate.

The *effective tax rate on profit* from Doing Business survey measures the amount of taxes and mandatory contributions borne by the business in the second year of operation, expressed as a share of commercial profit. The total amount of taxes and contributions borne is the sum of all the different taxes and contributions payable after accounting for allowable deductions and exemptions. The taxes withheld (such as personal income tax) or collected by the company and remitted to the tax authorities (such as VAT, sales tax or goods and service tax) but not borne by the company are excluded. If there are different corporate taxes (e.g. federal, state and local), the deductibility of one or more of those taxes is taken into account when computing the tax base for corporate income. It differs from the statutory tax rate, which merely provides the factor to be applied to the tax base.

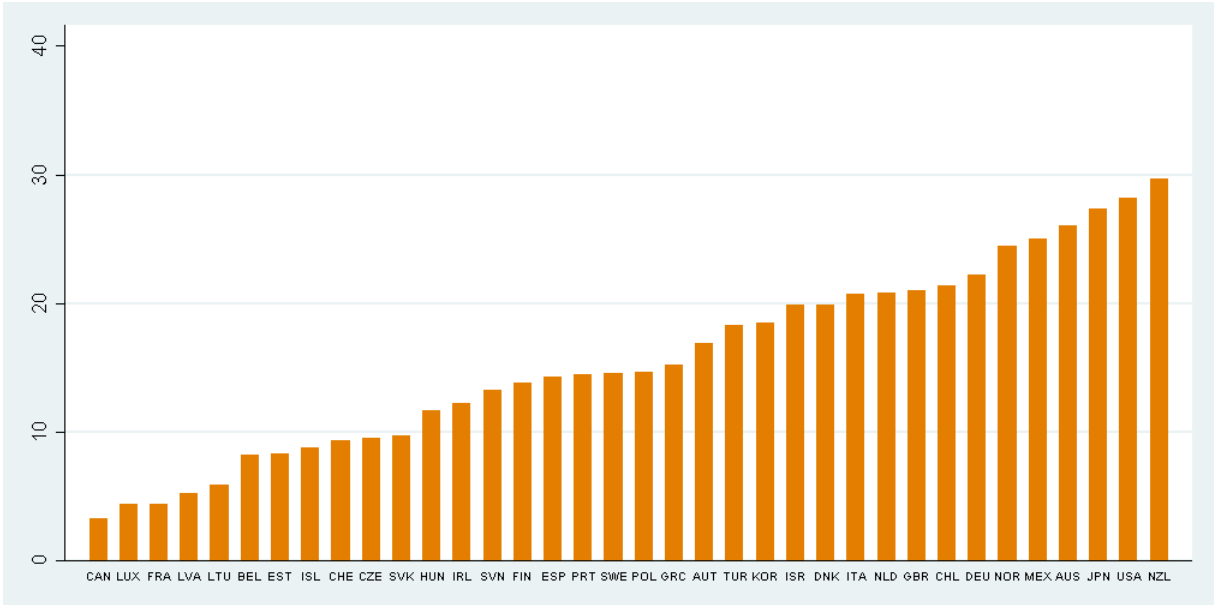
The *statutory tax rate* is the top statutory corporate income tax rate, from Eurostat and OECD dataset; in particular, it is the tax rate that a corporation has to pay on marginal income assuming that it is in the highest tax bracket, taking into account federal, state, and local rates.

In addition to these three corporate taxes, I use five other tax rates in the analysis as controls. The first two are derived from Doing Business dataset: *effective tax rate on labor* and *effective tax rate on other*. The effective tax rate on labor is the ratio between the sum of all labor-related taxes payable (including payroll taxes, mandatory social security contributions, mandatory health insurance, mandatory unemployment insurance) and the pre-tax earnings. The *effective tax rate on other* is the ratio between the sum of all taxes payable that enter the profit and loss statement where the statutory incidence is on the firm, other than corporate income and labor tax, and pre-tax earnings. This ratio includes all property taxes, business license taxes, financial transactions, and asset and capital taxes payable. In addition, indirect taxes and other direct taxes can have an impact on FDI, comparable in magnitude with the corporate income taxes [Desai and Hines, 2001], so I collect data for *VAT and sales ordinary tax rate* and *personal income top tax rate*, from Eurostat and KPMG report.

For the period 2013-2016, the average of the variable effective corporate tax rates goes from a minimum

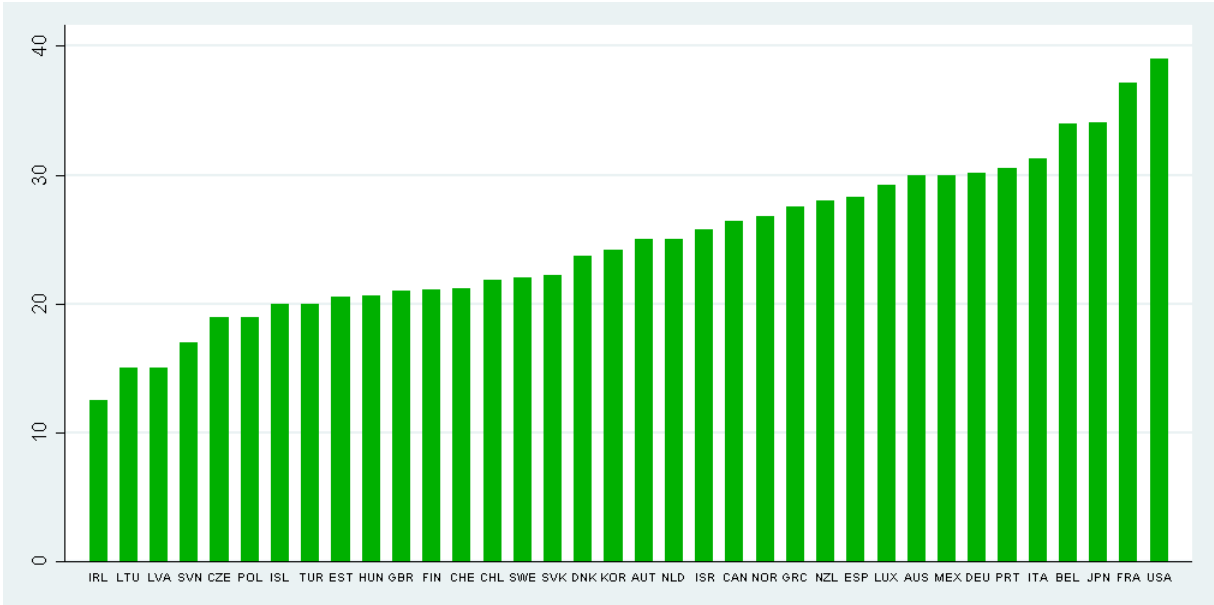
mean value of 3.75% in Canada to a maximum average value of 29.6% in New Zealand. For the 36 OECD countries the average of the effective corporate tax rates is 15.6% (Figure 9). For the statutory tax rate the country where the highest average value is registered is the United States (39%), the minimum value is registered in Ireland (12.5%) and the average value is 28.3% (Figure 10).

Figure 9: *Effective corporate tax rates, average values 2013-2016.*



Source: *Doing Business and OECD.*

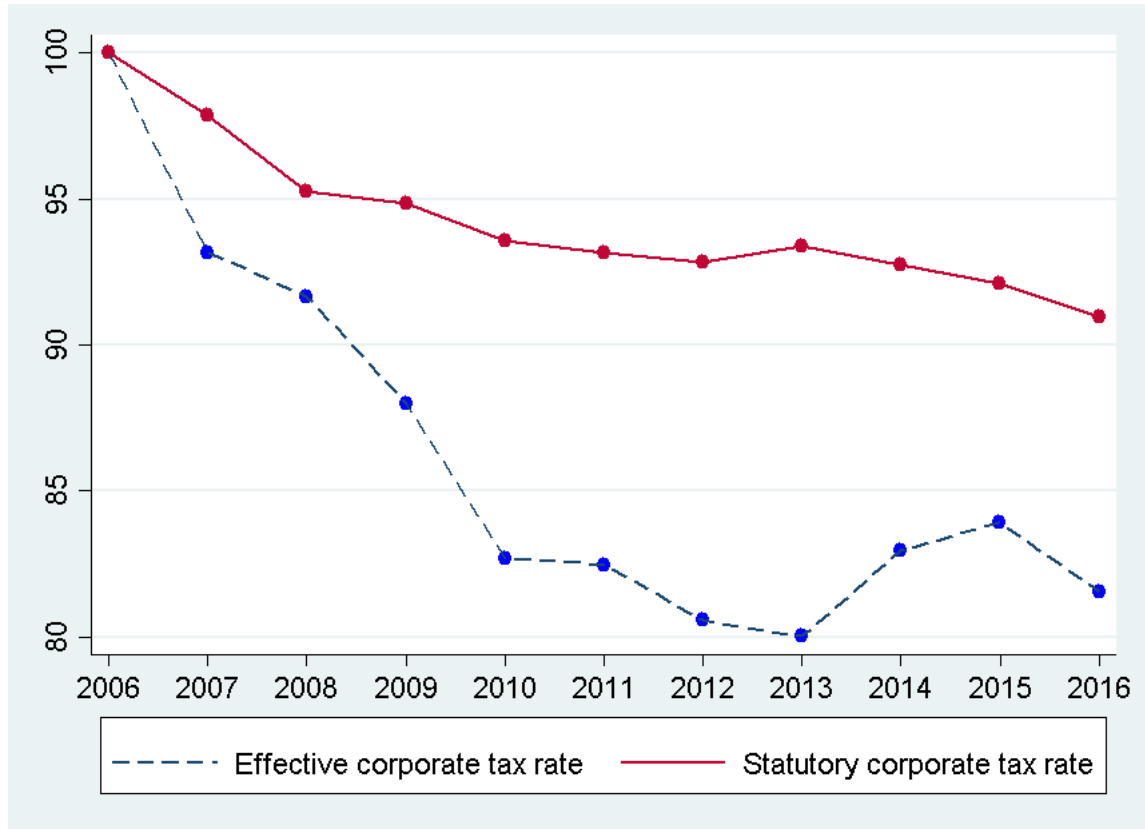
Figure 10: *Statutory corporate tax rates, average values 2013-2016.*



Source: *OECD.*

Most governments in recent years have significantly reduced their statutory tax rates on corporate income (Steinmuller et al., 2018). Looking at Figure 11, on average for all OECD countries, statutory and effective corporate taxation have been decreasing since 2006.

Figure 11: *Effective corporate tax rate and statutory tax rate, OECD countries, baseline year=2010.*



Source: *Doing Business and OECD.*

2.3.4 Data on other control variables

The gravitational model, in its original definition, directly incorporates the costs of trade with the distance between countries. In empirical applications, the distance is measured in different ways (Krugman, 1997). As suggest in Buettner (2017), I use in the main specification the ratio between bilateral exports and GDP to capture market size and trading costs between the source and destination countries. The data on all exports and on GDP (in euro) come from World Bank national accounts data and OECD National Accounts data files. Consistent with a number of studies using gravity equations, I collect also data for the geographical distance. As in Mayer and Zignago (2011), I built the two variables *distance between most populated cities* and *distance between capitals*. I also collect information for common colonial experience (*colonial*). This dummy is used to pick up cultural and

institutional factors that significantly contribute to international trade and financial linkages between countries, for instance, through network externalities.

In addition to the tax rates, I control for a range of country economic, trade and institutional specific characteristics, as it is common in this literature. I collect these variables in three different set of control variables: other institutional frameworks; economic and trade differences and the supply of public services.

Other institutional framework might be an important factor affecting international investments and not considering them could overestimate the effect of tax systems' complexity. I proxy tax enforcement using an estimate of the magnitude of *shadow economy*, as a percentage of GDP, from [Medina and Schneider \[2018\]](#), for all OECD countries. From Doing Business survey, I integrated the dataset with the variable *start-up procedures*. This variable counts all procedures that are officially required for an entrepreneur to start up and formally operate an industrial or commercial business in a country.

A country's ability to attract FDI depends on several other factors. Economic, openness to trade and regulatory differences between countries that can affect investment and entrepreneurship. To control for the income of the country I use the gross domestic product at Purchasing Power Parities divided by the population (*GDP per capita, PPP*), from OECD. *IEF property right index* is an estimate of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state, from Heritage Foundation. *Employment rigidity index*, is the flexibility of wage determination, measured with a survey, from the World Economic Forum. *EFW freedom to trade internationally index* which measures taxes on international trade, regulatory trade barriers, size of the trade sector relative to expected, black-market exchange rates, and international capital market controls, from Heritage Foundation. Theory predicts that inflation might influence investment, partly through its impact on the cost of capital [Auerbach and Jorgenson, 1980](#), and partly because the government might use seignorage as a substitute for taxes [Djankov et al. \[2010\]](#). That is why, I control for inflation and seignorage. *Inflation* is measured starting from World Bank national accounts data and OECD national accounts data as the annual growth rate of the GDP implicit deflator²⁰. *Seignorage* is measure with the currency in circulation on GDP, from US federal bank and BCE.

The empirical study on FDI takes account of various measures of the supply of public services. As general indicator, I use the levels of public consumption and public investments as obtained from the statistics of the OECD on GDP (*gov. expenditure on GDP*).

The descriptive statistics of the main variables are shown in Table 7.

²⁰The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.

Table 7: *Summary statistics.*

	N	Mean	S.d.	Min	Max
Bilateral export	1,082	2.308	4.725	0.002	55.46
Diff. in effective tax rate on profit	1,082	-0.068	9.983	-25.25	26.38
Diff. in other taxes	1,082	0.038	3.164	-10.90	10.90
Diff. in effective tax rate on labor	1,082	1.075	18.49	-49.60	49.60
Diff. in standard VAT rates	1,082	0.897	7.772	-20	22
Diff. in statutory tax rate	1,082	-0.659	9.009	-26.51	26.51
Diff. in personal income top tax rate	1,082	-0.164	17.85	-41.92	41.92
Diff. in inflation	1,082	-0.001	2.147	-8.945	8.945
Diff. in shadow economy	1,082	0.180	9.339	-24.07	24.07
Diff. in IEF property right index	1,082	-0.594	8.545	-27	26.45
Diff. in IEF trade freedom index	1,082	0.025	4.267	-16.90	16.90
Diff. in seignorage	1,082	0.092	5.400	-21.68	21.68
Diff. in start-up procedures	1,082	0.088	2.728	-8	8
Diff. in employment rigidity index	1,082	-0.040	1.444	-3.775	3.775
FDI /GDP	1,082	0.206	2.908	-19.74	84.30
Diff. in GDP per capita - PPP	1,082	-0.022	0.485	-1.656	1.402
Diff. in number of tax payments	1,082	0.014	0.561	-1.749	1.705
Diff. in time required to comply taxes	1,082	0.032	0.616	-1.530	1.648
Colony	1,082	0.035	0.184	0	1
Distance between most populated cities	1,082	4,677	5,010	59.62	19,335
Distance between capitals	1,082	4,695	5,002	59.62	19,335
Diff. in gov. expenditure on GDP	1,082	0.358	5.27	-14.182	14.182

2.4 Model specification

The reference model that I adopt follows the technique of the so-called gravity models, originally developed by [Isard \(1960\)](#) and applied to FDI flows in different papers [Eaton and Tamura, 1996](#), [Wei, 2000](#), [Blonigen and Davies, 2002](#), [Benassy-Quere et al., 2005](#), [Buettner, 2017](#). As suggested by the name, gravity equations model bilateral flows depending on the size and distance effect, similar to the Newton's gravity formula.

Denoting the bilateral flows of Foreign Direct Investment on GDP, measured at constant price, from i to j with $f di_{ij}$, the cross-section specification used in the main regression is the following:

$$f di_{ij} = \beta_0 + \beta_1(c_i - c_j) + \beta_2(t_i - t_j) + \beta_3(x_i - x_j) + \beta_4 d_{ij} + a_i^H + \epsilon_{ij} \quad (3)$$

where $c_i - c_j$ is the difference in the tax complexity between country i to country j at year t , measured by the log of the variable *time required to comply taxes* and the log of the variable *number of payments*; $t_i - t_j$ is the difference in the tax rate (*effective tax rate* and *statutory tax rate*) between country i to country j . Hence, the key parameters of interest are β_1 and β_2 , capturing the impact of tax complexity

and tax rate differential, respectively.

To partially address the risk that my results could be distorted by omitted variables, I control for many other factors in the regressions (x_i and x_j). In the main regression I use the same control variables used in a previous work from [Djankov et al. \[2010\]](#). I combined these variables in three different set of control variables: other tax controls (other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate); other institutional frameworks (shadow economy on GDP, start-up procedures); economic and trade differences (GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index, inflation, level of seignorage). As robustness check, I also control for public presence in the economy measured by the percentage of public expenditure on GDP. All variables not expressed in percentage terms are transformed with a logarithmic scale.

I consider spatial effects, not in the sense of spatial proximity but more in the sense of proximity to the markets²¹, control for the ratio between bilateral exports and GDP [Jost, 1997](#). In fact, I use as control variable d_{ij} which is equal to the ratio between the value of *export* (all products) from country i to country j and the sum of GDP of country i and country j . This variable is built using data from Eurostat and World Bank:

$$d_{ij} = \frac{export_{ij}}{GDP_i + GDP_j}$$

The additional inclusion of country specific origin dummies (a_i^H) controls for unobserved characteristics in each origin countries [Devereux and Freeman, 1995](#)²². Since I work with a cross section analysis, I do not include destination country dummies as doing so would saturate the model. Robust standard errors are used in all specifications. The error is clustered at destination country level (i).

2.5 Results

2.5.1 Main results

The results in Table 8 and Table 9 are obtained using the gravity model with the tax rates and [Djankov et al. \[2010\]](#) controls as explanatory variables. I use the difference in effective corporate tax rates as independent variable in Table 8, and the difference in statutory corporate tax rates in Table 9.

The potential number of observations for bilateral FDI is 1,260 (36 investors \times 36 destination countries – 36 same country pair). However, there are 172 missing values and also six missing values among

²¹In the robustness check I control also for geographical and cultural proximity instead of bilateral exports [Porta et al. \[2008\]](#).

²²As [Wei \[2000\]](#) I don't include destination country dummies as doing so would eliminate the possibility of estimating all the interesting coefficients including the effects of tax complexity and tax rate.

explanatory variables, so the final number of observations is 1,082.

As in [Djankov et al. \[2010\]](#), for each table in column (1) I use no controls, in column (2) I add other tax controls, in column (3) I add as control variables other institutional frameworks, in column (4) I add economic and trade differences, finally in column (5) I use all control variables.

As we can check from both tables, the difference in taxes does not have a statistically significant impact on FDI.

Table 8: *Impact of corporate effective tax rate on FDI outflows.*

	(1)	(2)	(3)	(4)	(5)
Diff. in effective tax rate on profit	0.008 (0.014)	0.014 (0.018)	0.004 (0.010)	0.003 (0.010)	0.005 (0.008)
Diff. in other taxes		0.047 (0.042)			0.076** (0.033)
Diff. in standard VAT rates		0.014 (0.016)			-0.001 (0.011)
Diff. in personal income top tax rate		-0.004 (0.004)			0.004 (0.006)
Diff. in number of tax payments			-0.237 (0.258)		-0.047 (0.144)
Diff. in GDP per capita - PPP				-0.787* (0.439)	-1.147** (0.454)
Diff. in IEF property right index				0.010 (0.010)	0.030** (0.014)
Diff. in start-up procedures			0.021 (0.023)		-0.011 (0.027)
Diff. in employment rigidity index				-0.106 (0.068)	-0.186** (0.078)
Diff. in IEF trade freedom index				0.004 (0.018)	0.031 (0.027)
Diff. in seignorage					0.022** (0.010)
Diff. in inflation					-0.110** (0.050)
Diff. in shadow economy			0.016* (0.009)		0.015 (0.012)
Bilateral export	0.024 (0.018)	0.026 (0.019)	0.024 (0.018)	0.025 (0.019)	0.027 (0.020)
Constant	-0.053 (0.135)	0.119 (0.092)	0.146* (0.075)	-0.058 (0.147)	-0.212 (0.194)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.04	0.04	0.04	0.04	0.05
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

Table 9: *Impact of corporate statutory tax rate on FDI outflows.*

	(1)	(2)	(3)	(4)	(5)
Diff. in statutory tax rate	0.000 (0.012)	0.003 (0.019)	0.001 (0.011)	0.012 (0.010)	-0.004 (0.013)
Diff. in other taxes		0.033 (0.041)			0.074** (0.034)
Diff. in standard VAT rates		0.010 (0.008)			-0.004 (0.011)
Diff. in personal income top tax rate		-0.003 (0.006)			0.005 (0.007)
Diff. in number of tax payments			-0.256 (0.298)		-0.079 (0.163)
Diff. in GDP per capita - PPP				-0.887* (0.509)	-1.159** (0.481)
Diff. in IEF property right index				0.015 (0.013)	0.030** (0.014)
Diff. in start-up procedures			0.024 (0.027)		-0.004 (0.028)
Diff. in employment rigidity index				-0.111 (0.075)	-0.197** (0.083)
Diff. in IEF trade freedom index				0.009 (0.019)	0.028 (0.024)
Diff. in seignorage					0.023** (0.011)
Diff. in inflation					-0.110** (0.050)
Diff. in shadow economy			0.016* (0.008)		0.015 (0.012)
Bilateral export	0.025 (0.018)	0.027 (0.019)	0.025 (0.018)	0.026 (0.018)	0.027 (0.020)
Constant	0.017 (0.066)	0.175 (0.174)	0.192 (0.131)	-0.109 (0.153)	-0.176 (0.180)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.04	0.04	0.04	0.05	0.05
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

In Table 10 and in Table 11 I add as explanatory variables the difference in tax complexity, measured by the variable *time required to comply taxes*. I include other tax controls in column (2), other institutional frameworks in column (3), economic and trade differences in column (4) and all control variable in column (5).

Table 10 shows the results of the gravity model using the difference in tax complexity and effective tax rate. The effect of tax complexity differential on FDI outflows is statistically significant and large in

each specification, while the difference in the effective tax rates remains insignificant. The estimates indicate that an increase in the difference in tax complexity by one percentage point increases the FDI/GDP outflows by 0.04-0.06 percentage points.

For comparison, Table 11 reports results obtained by using the statutory tax rate. The effects of tax complexity differential on FDI outflows are statistically significant and with the same magnitude as the estimates shown in Table 11.

As shown in Table 10 and in Table 11, *number of tax payments*, the other variable that captures the tax systems' complexity, is not relevant for FDI flows. This result may be due to the fact that this count variable measures an imprecise way the complexity, respect to the hours required to compile the taxes in the variable *time required to comply taxes*. Not surprisingly, as shown in Figure 6, the two variables are not closely related.

Table 10: *Impact of tax complexity and corporate effective tax rate on FDI outflows.*

	(1)	(2)	(3)	(4)	(5)
Diff. in effective tax rate on profit	0.009 (0.013)	0.009 (0.014)	0.008 (0.010)	0.006 (0.012)	0.003 (0.009)
Diff. in time required to comply taxes	0.452** (0.219)	0.455** (0.210)	0.599* (0.301)	0.417** (0.201)	0.500** (0.227)
Diff. in effective tax rate on labor	0.010 (0.006)	0.010* (0.006)	0.011* (0.006)	0.012* (0.006)	0.007 (0.005)
Diff. in other taxes		0.025 (0.031)			0.065** (0.027)
Diff. in standard VAT rates		0.000 (0.013)			0.002 (0.012)
Diff. in personal income top tax rate		0.001 (0.004)			0.006 (0.006)
Diff. in number of tax payments			0.001 (0.004)		-0.086 (0.146)
Diff. in GDP per capita - PPP				-0.406 (0.319)	-0.633 (0.388)
Diff. in IEF property right index				0.027* (0.015)	0.045** (0.017)
Diff. in start-up procedures			-0.052 (0.035)		-0.030 (0.030)
Diff. in employment rigidity index				-0.077 (0.053)	-0.133** (0.057)
Diff. in IEF trade freedom index				-0.052 (0.035)	0.033 (0.023)
Diff. in seignorage					0.019* (0.010)
Diff. in inflation					-0.092* (0.053)
Diff. in shadow economy			-0.007 (0.009)		0.022* (0.011)
Bilateral export	0.030 (0.019)	0.030 (0.019)	0.030 (0.019)	0.031 (0.019)	0.029 (0.019)
Constant	0.155 (0.103)	0.197 (0.148)	0.095 (0.102)	-0.076 (0.170)	-0.135 (0.196)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05	0.05
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

Table 11: *Impact of tax complexity and corporate statutory tax rate on FDI outflows.*

	(1)	(2)	(3)	(4)	(5)
Diff. in statutory tax rate	-0.004 (0.009)	-0.019 (0.022)	-0.003 (0.009)	0.002 (0.009)	-0.016 (0.015)
Diff. in time required to comply taxes	0.498* (0.276)	0.556* (0.294)	0.633* (0.336)	0.440* (0.238)	0.604** (0.240)
Diff. in effective tax rate on labor	0.008** (0.004)	0.010* (0.006)	0.009** (0.004)	0.010** (0.005)	0.008 (0.005)
Diff. in other taxes		0.029 (0.032)			0.074** (0.028)
Diff. in standard VAT rates		-0.010 (0.013)			-0.006 (0.014)
Diff. in personal income top tax rate		0.007 (0.008)			0.009 (0.008)
Diff. in number of tax payments			-0.201 (0.206)		-0.139 (0.171)
Diff. in GDP per capita - PPP				-0.436 (0.369)	-0.509 (0.353)
Diff. in IEF property right index				0.028 (0.017)	0.045*** (0.017)
Diff. in start-up procedures			-0.044 (0.030)		-0.023 (0.030)
Diff. in employment rigidity index				-0.091 (0.065)	-0.150** (0.065)
Diff. in IEF trade freedom index				0.000 (0.015)	0.033 (0.020)
Diff. in seignorage					0.020* (0.010)
Diff. in inflation					-0.095* (0.051)
Diff. in shadow economy			-0.008 (0.010)		-0.058 (0.167)
Bilateral export	0.030 (0.018)	0.029 (0.019)	0.030 (0.019)	0.031 (0.019)	0.030 (0.020)
Constant	0.274* (0.157)	0.307 (0.210)	0.213* (0.118)	-0.050 (0.133)	-0.058 (0.167)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05	0.05
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

2.5.2 Heterogeneity

It is common to find examples where smaller countries set higher tax rates: Canada imposes lower income taxes than the US, Denmark has a lower VAT than Germany, as well as Ireland with the Great Britain. When countries compete to attract FDI, smaller countries always have to develop stronger attractive tax policies than the larger countries. By offering a larger market, the bigger countries are a more attractive location for investment than the smaller countries, inducing the former to make more effort to attract FDI than the latter [Hauffer and Wooton, 2010]. This result, also called the “bigger-country-higher-tax-rate” rule [Wang, 1999], can be further generalized to the institutional framework. At the same tax rate, the complexity of the fiscal system will have the greatest impact in countries with small domestic markets. Therefore, I expect that the impact of complexity on FDI outflow must be stronger for smaller countries.

To distinguish possible different effects between small and large countries on FDI outflows, I build a variable dummy (*big*) equal to one if the country of origin has a population greater than the average of population, that for the period 2013-2016 which is equal to 35,561,224.

In Table 12 and Table 13, I add the dummy variable *big* to the gravity model and the interactions between *big* and all explanatory variables. Table 12 shows the results of the gravity model with the difference in tax complexity and the difference in corporate effective tax rate as explanatory variables. Other taxes for each home and destination country is controlled in column (2), other institutional frameworks in column (3), economic and trade differences in column (4), and all set of controls in column (5).

The coefficient of *big* has the expected positive sign and is significant at the 1 per cent level, while the variable difference in time required to comply taxes keeps the positive sign. The interaction term in all specifications difference in *time required to comply taxes*big* is negative and significant at the 5 per cent level. In all specifications, the impact of tax complexity on FDI for bigger countries is not statistically different from zero²³. I get the same results by replacing the variable *diff. in effective tax rate* with *diff. in statutory tax rate* (Table 13). This is consistent with my expectation that the impact tax complexity on FDI flows tends to be stronger in smaller economies.

²³For example in the case where I use all controls (col. 5, Table 12), the linear combination of the coefficients of *diff. in time required to comply taxes* + *diff. in time required to comply taxes*big* leads to an estimation equals to $0.693 - 0.596 = 0.097$, which is not statistically different from zero (p-value = 0.325).

Table 12: *Impact of tax complexity and corporate effective tax rate on FDI outflows, for big and small countries.*

	(1)	(2)	(3)	(4)	(5)
Diff. in effective tax rate	0.014 (0.017)	0.015 (0.019)	0.013 (0.013)	0.011 (0.016)	0.009 (0.012)
Diff. in effective tax rate*big	-0.019 (0.015)	-0.020 (0.016)	-0.017 (0.012)	-0.018 (0.014)	-0.017 (0.011)
Diff. in time required	0.639** (0.309)	0.639** (0.296)	0.840* (0.422)	0.568** (0.268)	0.693** (0.309)
Diff. in time required*big	-0.585** (0.285)	-0.573** (0.268)	-0.750* (0.382)	-0.463* (0.231)	-0.596** (0.271)
Bilateral export	0.029 (0.018)	0.029 (0.019)	0.030 (0.019)	0.031 (0.019)	0.029 (0.020)
Big	1.371*** (0.325)	1.319*** (0.417)	1.410*** (0.339)	1.618*** (0.346)	1.610*** (0.376)
Constant	0.193 (0.138)	0.244 (0.212)	0.116 (0.140)	-0.144 (0.232)	-0.218 (0.266)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05	0.06
Other controls	No	Other taxes	Other inst. frameworks	Economic and trade difference	All
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. Big is a dummy variable equal to 1 if the home country has a population below the average. Other controls: other tax controls (other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate); other institutional frameworks (shadow economy on GDP, start-up procedures); economic and trade differences (GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index); all controls (other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate, shadow economy on GDP, start-up procedures, GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index, inflation, level of seignorage). All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

Table 13: *Impact of tax complexity and corporate statutory tax rate on FDI outflows, for big and small countries.*

	(1)	(2)	(3)	(4)	(5)
Diff. in effective tax rate	-0.006 (0.013)	-0.025 (0.030)	-0.005 (0.013)	0.004 (0.013)	-0.020 (0.021)
Diff. in effective tax rate*big	0.005 (0.013)	0.020 (0.028)	0.004 (0.013)	-0.006 (0.013)	0.012 (0.020)
Diff. in time required	0.717* (0.392)	0.794* (0.420)	0.898* (0.475)	0.617* (0.328)	0.845** (0.336)
Diff. in time required*big	-0.683* (0.362)	-0.742* (0.392)	-0.821* (0.433)	-0.544* (0.291)	-0.747** (0.316)
Bilateral export	0.030 (0.019)	0.029 (0.019)	0.031 (0.020)	0.031 (0.019)	0.030 (0.020)
Big	1.257*** (0.421)	1.184** (0.524)	1.283*** (0.411)	1.711*** (0.331)	1.590*** (0.404)
Constant	0.385* (0.223)	0.419 (0.302)	0.309* (0.167)	-0.090 (0.180)	-0.090 (0.225)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05	0.06
Other controls	No	Other taxes	Other inst. frameworks	Economic and trade difference	All
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. Big is a dummy variable equal to 1 if the home country has a population below the average. Other controls: other tax controls (other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate); other institutional frameworks (shadow economy on GDP, start-up procedures); economic and trade differences (GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index); all controls (other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate, shadow economy on GDP, start-up procedures, GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index, inflation, level of seignorage). All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

2.5.3 Robustness check

A range of robustness checks for the results are carried out in tables 14, 15, 16 and 17.

The most important contribution of the gravity equation is that it allows to control for the relevance of trade costs. The measurement of these costs, even if they are often approximate, used in the literature, are referred to actual distance between countries and different dummies to indicate borders, language similarities, cultural differences, colonial ties (van Bergeijk and Brakman, 2010). In order to check this evidence, my results are robust to a different definition of the costs of trade. I replace in the gravitational model the bilateral exports with other three measures: distance between most populated cities in kilometers, distance between capitals in kilometers and the dummy *colony* that is equal to one if the home and destination country had a common colonial experience.

Table 14 shows the results of the gravity model with all control variables, difference in tax complexity and effective tax rate and different distance measures: in column (1) the distance measure is the bilateral export, in column (2) the distance between most populated cities, in column (3) the distance between capitals and in column (4) the dummy colony. With the same specification of previous tables, Table 15 shows the results of the gravity model with all control variables, difference in tax complexity and difference in statutory tax rate. Looking at these two tables, the signs and sizes of the estimated coefficients of the main variables are comparable with the previous results. In particular difference in complexity remains positive and significant.

Table 14: *Impact of tax complexity and effective tax rate on FDI outflows, with different distance measures.*

	(1)	(2)	(3)	(4)
Diff. in effective tax rate on profit	0.003 (0.009)	0.002 (0.010)	0.002 (0.010)	0.003 (0.008)
Diff. in time required to comply taxes	0.500** (0.227)	0.469** (0.223)	0.469** (0.223)	0.488** (0.232)
Bilateral export	0.029 (0.019)			
Distance between most populated cities		-0.000 (0.000)		
Distance between capitals			-0.000 (0.000)	
Colony				-0.615 (0.650)
Constant	-0.135 (0.196)	0.016 (0.330)	0.031 (0.325)	-0.080 (0.168)
Observations	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05
Other controls	All	All	All	All
Destination country FE	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. Other controls: other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate, shadow economy on GDP, start-up procedures, GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index, inflation, level of seignorage. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

Table 15: *Impact of tax complexity and statutory tax rate on FDI outflows, with different distance measures.*

	(1)	(2)	(3)	(4)
Diff. in statutory tax rate	-0.016 (0.015)	-0.021 (0.016)	-0.022 (0.016)	-0.015 (0.014)
Diff. in time required to comply taxes	0.604** (0.240)	0.566** (0.234)	0.567** (0.234)	0.581** (0.241)
Diff. in effective tax rate on labor	0.008 (0.005)	0.008 (0.006)	0.008 (0.006)	0.006 (0.006)
Bilateral export	0.030 (0.020)			
Distance between most populated cities		-0.000* (0.000)		
Distance between capitals			-0.000* (0.000)	
Colony				-0.616 (0.652)
Constant	-0.058 (0.167)	0.359 (0.245)	0.379 (0.247)	-0.013 (0.153)
Observations	1,082	1,088	1,088	1,088
R-squared	0.05	0.05	0.05	0.05
Other controls	All	All	All	All
Destination country FE	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. Other controls: other taxes effective tax rate, VAT and sales ordinary tax rate, personal income top tax rate, shadow economy on GDP, start-up procedures, GDP per capita in PPP, IEF property right index, EFW freedom to trade internationally index, employment rigidity index, inflation, level of seignorage. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

Bartik (1991) suggests that when the analysis omits public expenditures the role of tax incentives would tend to be underestimated. Public service provision, especially for material and non-physical infrastructures, tends to improve locations' attractiveness for investment, so corporate taxation may be compensated with public spending.

In Table 16 and Table 17 I add in the gravity model the variable *government expenditure on GDP* to capture differences in the supply of public services. The explained variation of FDI due to the difference in tax complexity is in the same order of magnitude ranging from around 0.04 to around 0.06 percentage. With regard to the difference in government expenditure, I do not find any significant effect on FDI outflows.

Table 16: *Impact of tax complexity, government expenditure and effective tax rate on FDI outflows.*

	(1)	(2)	(3)	(4)	(5)
Diff. in effective tax rate on profit	0.008 (0.011)	0.009 (0.012)	0.007 (0.009)	0.008 (0.011)	0.004 (0.009)
Diff. in time required to comply taxes	0.506** (0.248)	0.515** (0.223)	0.586* (0.297)	0.393** (0.184)	0.448** (0.217)
Diff. in gov. expenditure on GDP	0.030 (0.022)	0.045* (0.023)	0.023 (0.021)	0.043 (0.026)	0.034 (0.021)
Diff. in effective tax rate on labor	0.007 (0.005)	0.007* (0.004)	0.008 (0.005)	0.010** (0.005)	0.007 (0.005)
Diff. in other taxes		0.012 (0.025)			0.045 (0.027)
Diff. in standard VAT rates		-0.015* (0.008)			-0.010 (0.011)
Diff. in personal income top tax rate		-0.005 (0.004)			0.004 (0.006)
Diff. in number of tax payments			-0.166 (0.166)		-0.105 (0.139)
Diff. in GDP per capita - PPP				-0.489 (0.291)	-0.626* (0.370)
Diff. in IEF property right index				0.027** (0.013)	0.041** (0.017)
Diff. in start-up procedures			-0.034 (0.027)		-0.003 (0.023)
Diff. in employment rigidity index				-0.009 (0.040)	-0.079 (0.058)
Diff. in IEF trade freedom index				-0.004 (0.019)	0.029 (0.023)
Diff. in seignorage					0.006 (0.009)
Diff. in inflation					-0.073 (0.053)
Diff. in shadow economy			-0.004 (0.008)		0.022** (0.011)
Bilateral export	0.031 (0.019)	0.032 (0.019)	0.031 (0.019)	0.032 (0.020)	0.031 (0.020)
Constant	0.221* (0.109)	0.163 (0.148)	0.186 (0.119)	0.014 (0.137)	-0.095 (0.196)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05	0.05
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

Table 17: *Impact of tax complexity, government expenditure and statutory tax rate on FDI outflows.*

	(1)	(2)	(3)	(4)	(5)
Diff. in statutory tax rate	-0.006 (0.009)	-0.023 (0.019)	-0.005 (0.008)	0.002 (0.007)	-0.020 (0.015)
Diff. in time required to comply taxes	0.552* (0.299)	0.630** (0.295)	0.614* (0.324)	0.438* (0.216)	0.567** (0.225)
Diff. in gov. expenditure on GDP	0.032 (0.023)	0.050** (0.024)	0.025 (0.022)	0.041 (0.025)	0.041* (0.023)
Diff. in effective tax rate on labor	0.005 (0.003)	0.009* (0.005)	0.006* (0.004)	0.008* (0.004)	0.008 (0.005)
Diff. in other taxes		0.016 (0.025)			0.052* (0.027)
Diff. in standard VAT rates		-0.028* (0.015)			-0.023 (0.019)
Diff. in personal income top tax rate		0.002 (0.007)			0.007 (0.007)
Diff. in number of tax payments			-0.198 (0.191)		-0.177 (0.165)
Diff. in GDP per capita - PPP				-0.504 (0.311)	-0.469 (0.307)
Diff. in IEF property right index				0.030* (0.015)	0.041** (0.016)
Diff. in start-up procedures			-0.026 (0.022)		0.012 (0.029)
Diff. in employment rigidity index				-0.032 (0.038)	-0.089 (0.054)
Diff. in IEF trade freedom index				-0.006 (0.018)	0.027 (0.021)
Diff. in seignorage					0.004 (0.010)
Diff. in inflation					-0.073 (0.047)
Diff. in shadow economy			-0.004 (0.009)		0.026** (0.011)
Bilateral export	0.032 (0.019)	0.031 (0.019)	0.031 (0.020)	0.032 (0.020)	0.031 (0.020)
Constant	0.343* (0.187)	0.271 (0.200)	0.302* (0.160)	0.058 (0.120)	0.009 (0.157)
Observations	1,082	1,082	1,082	1,082	1,082
R-squared	0.05	0.05	0.05	0.05	0.05
Destination country FE	Yes	Yes	Yes	Yes	Yes

*Note: Period 2013–2016. Dependent variable: FDI outflows on GDP. All estimates include destination country fixed effects. The dependent variables has been rescaled by dividing by 1,000. Robust standard errors, clustered at destination country level, are reported in brackets. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ****

2.6 Conclusion

I find evidence in the period 2013-2016, FDI in OECD countries is strongly determined by the level of tax complexity, measured by the length of time required to comply with the tax codes, than by tax rates, either effective tax rates or statutory tax rate. I use a gravity model developed by [Isard 1960](#) to capture the effect of tax complexity and taxation on FDI outflows. Gravity model allows to control that the magnitude of FDI flows between countries is conditional on several characteristics of these countries, their economic size and level of economic development, and the factors stimulating or discouraging the movement of investment between countries [Brainard, 1997](#). This result holds even when a range of country-specific controls is added, including the government expenditures. I also find that this effect is driven by countries with a smaller economic and demographic size.

I can therefore state that an increase in the difference in tax complexity between the home country and the destination country is related with an increase in FDI outflows from home to destination country. This finding is consistent with the observation that a number of OECD economies with large domestic output markets and strong FDI inflows (e.g. US, Japan and France) have relatively high corporate tax rates.

A complex tax system generates uncertainty [Edmiston et al., 2005](#), directly imposes transaction costs on a firm, reducing the return to any given investment [Warskett et al., 1998](#) and in general create an hostile environment [Friedman et al., 2000](#). Investors seems to look for certainty and timeliness in the application of tax rules, and these concerns seem to be more important than the effective tax rate paid [OECD, 2008](#).

There are also other reasons why it is not always clear that a tax rate reduction is able to attract FDI. First of all, all OECD countries agreed on a OECD Model Tax Convention [OECD, 2019](#). This is the basis for negotiation and application of bilateral tax treaties between countries, designed to assist business while helping to prevent tax evasion and avoidance. The OECD Model also provides a means for settling on a uniform basis the most common problems that arise in the field of international double taxation. In 2016, double bilateral tax treaties in OECD countries are widespread: each OECD country has on average a tax treaty with the 90% of the other OECD countries and also there are some countries that have tax treaties with all other OECD countries (Table BII). Additionally, multinationals often channel foreign investment through financial corporations in offshore financial centers and through special purpose entities [Damgaard and Elkjaer, 2018](#). In these cases, the immediate investing country differs from the home country of the firms and therefore a reduction in home country taxation has no direct effect on FDI [Beer and Loeprick, 2018](#), [Petkova et al., 2018](#). Finally, in OECD countries, in

recent years there was a convergence of corporate tax rates to the lowest level (Figure 11).

Hence, the results suggest that increase in tax complexity increases FDI outflow. These results have several policy implications. First, if tax differentials do not matter so much for FDI flows, countries could increase the revenues, decreasing the tax systems' complexity. Second, the impact of tax complexity on FDI is holding basically for smaller country, indicating that these countries should care a lot about their tax complexity if they like to attract investments.

A strand of the literature shows the quality of institutions matters for attracting FDI [McCloud and Kumbhakar, 2012](#), [Dort et al., 2014](#). The interaction between tax systems' complexity and institutional context could play a key role at explaining FDI flows in a better way. I leave this interesting issue for further research.

3 Local political budget cycle: the case of roads and transportation investments in Italy

Abstract

Road projects are highly visible and clearly identifiable with municipal governments. This is the reason why this type of capital expenditure could be used by politicians to strategically drive the vote of their electorate. I test the existence of the political budget cycle in roads and transportation capital expenditures in the Italian municipalities. The Italian case can be considered a good application due to the staggered municipal elections and the presence of information asymmetry between policymakers and voters. I find that municipal investments for roads and transportation in the year before local elections is almost 30% higher than in electoral years. Furthermore, I point out that there is a shift in favor of this type of expenditure in the pre-electoral years, compared to other capital expenditures. Little is known about efficiency gains of the expenditure used for electoral purposes. The present paper shows that investments for roads and transportation do not reduce the probability of accidents during the pre-electoral period but only one year after the election.

KEYWORDS: Political Budget Cycle, road accidents, municipalities, local elections.

JEL: H70, H75, D72.

3.1 Introduction

In the last three decades, the literature on Political Budget Cycle (PBC) suggests that expenditure level and composition are affected by electoral incentives, especially in the pre-election years. The increasing expenditure is expected on special subjects which are easier to manipulate and more visible to the voters [Drazen and Eslava, 2010]. The difference between high visible and less visible expenditure is in general difficult to identify [Drazen and Eslava, 2010]. The first evidence is that the rigidity of current expenditure (e.g., public employment and wages, debt service, etc.) constrains the scope for political expenditure cycles, thus capital expenditure should be more subject to the electoral cycle [Drazen and Eslava, 2010]. The second evidence is that the infrastructure expenditures seem to be highly visible and easily targeted towards specific group of voters [Tanzi and Davoodi, 1997]. Finally, capital expenditure projects can be easily started and stopped around the electoral year while current expenditure requires time to be revised, because it is almost entirely composed by rigid expenditure [Schuknecht, 2000].

In Italy, opportunistic high visible capital expenditures are often associated with infrastructure projects, in particular with construction of roads. There is anecdotal evidence that at the end of their term mayors usually open new streets, road roundabouts or sidewalks with a high resonance in local newspapers²⁴. The Italian case²⁵ is a very interesting empirical framework because of the presence of information asymmetry between policymakers and voters [Repetto, 2018] and also because the Italian municipalities have staggered elections times, so being in an electoral year is randomly assigned, thus preventing the econometric problem of endogeneity [Alesina and Paradisi, 2017, Ferraresi et al., 2019]. Using budget data of more than 5,000 Italian municipalities, I make out different categories of capital expenditures. These unique dataset can identify which type of spending can be more easily modified by the incumbent. In my analysis, unlike many works [Veiga and Veiga, 2007, Foucault et al., 2008], I do not use only one dummy to identify the political budget effect but a vector of dummies for all individual non-election years that allows me to set out the evolution of investments over the whole legislature [Repetto, 2018].

I show that only the share of investments for roads and transportation are influenced by the political budget cycle, while there is no effect on other capital expenditures. I find the determinants of the magnitude of the political budget cycle: the effect on roads and transportation investments occurs only in the presence of mayors that can be re-elected and it is more pronounced in presence of more

²⁴La Gazzetta del Mezzogiorno [2019], La Repubblica di Parma [2017] and Varese news [2006]

²⁵Recent contributions have highlighted the relevance of political cycles in the case of Italian municipalities [Alesina and Paradisi, 2017, Ferraresi et al., 2019, Repetto, 2018].

educated politicians and citizens. The results obtained are robust to several tests.

Finally, I collect annual information on road traffic accidents at municipal level to test the impact of capital expenditures during the PBC on road traffic accidents. This is different from [Bertoli and Grembi \[2018\]](#) work which directly measured the effect of PBC on different outputs related to road accidents. I find that municipal investments for roads and transportation reduce the probability of accidents only one year after the election, so the expenditure increase due to the political budget cycle is not associated with an improvement of the output related to it.

The rest of the work is organized as follows. Section 1 reviews theoretical and empirical literature on expenditure and local political budget cycle. Section 2 describes the institutional background. Section 3 illustrates the dataset. The empirical analysis are in Section 4, the results, the robustness tests and heterogeneity effects are in Section 5. The work concludes in Section 6.

3.2 Literature review

The literature on political budget cycle is actually well developed²⁶. [Nordhaus \[1975\]](#) formalized the idea that macroeconomic variables are influenced by political strategies. [Buchanan and Wagner \[1977\]](#) introduced the idea of the so called “fiscal illusion”: voters can be eluded into forgetting the cost in terms of future deficits of increasing spending. [Rogoff \[1987\]](#) and [Rogoff and Sibert \[1988\]](#) show that when voters are rational but imperfectly informed about the complexities of the government budget, the incumbent leader has an incentive to bias the pre-election fiscal policy. [Drazen and Eslava \[2010\]](#) proved that incumbents choose to increase expenditure that voters as a whole prefer or are very visible and decrease those categories of spending which voters like less or that are less visible. Recent literature also shows that exogenous signal about an incumbent’s competence [Gonzalez, \[2002\]](#) and awareness of voters [Shi and Svensson \[2006\]](#) reduce the magnitude of the PBC.

Starting from these theoretical works, several papers documented and explained whether the electoral budget cycles exist for revenues and debts, while results for the expenditure size are not clear cut. Most studies are based on cross-country samples of central government budgets²⁷. Other works focus on local governments. Working at sub-national level has some important advantages. Sub-national samples

²⁶For a complete review see [Dubois \[2016\]](#).

²⁷Among others, [Alesina et al. \[1997\]](#), using a sample of 13 OECD countries for the period 1960–1993, find the presence of a political budget cycle only for the overall budget; instead, when the budget is split into different components, they do not find any significant result. [Persson and Tabellini \[2002\]](#) investigate whether the budget cycles are driven by the system of government, finding the cycle only in presidential systems and only for revenues. Other works show that budget cycles occur only in certain countries or under specific circumstances, depending on the political environment. In particular, [Shi and Svensson \[2006\]](#), using a panel of 123 countries over the period 1975–1995, find that budget cycles are present only in developing countries. [Bove et al. \[2017\]](#), relying on a panel of 22 OECD countries for the period 1981–2009, find evidence of a switch from military to social spending when elections are getting closer, with an effect that is less pronounced for countries involved in conflicts and in countries supported by a right-wing majority.

solve the problem of institutional differences among countries, thus eliminating the impact on PBCs of the differences in cultural, historic and institutional frameworks [Alesina and Paradisi \[2017\]](#). Also, by using sub-national data, I get an higher number of observations than by using cross country analysis [Rogoff \[1987\]](#). However, there are some disadvantages when working with local level data: sub-national jurisdictions may have constitutional restrictions on fiscal policy [Kneebone and McKenzie \[2001\]](#), local data are usually available for shorter time periods than national data, and, in most countries, local elections generally occur at the same time, so that it is difficult to identify the election year effect for a specific government level [Sjahrir et al. \[2013\]](#).

According to the literatures, I focus on capital expenditure because it has been identified as the most visible expenditure to the electorate in previous sub-national PBC literature [Ferris and Dash \[2019\]](#), [Foucault et al. \[2008\]](#), [Kneebone and McKenzie \[2001\]](#), [Rosenberg \[1992\]](#), [Veiga and Veiga \[2007\]](#). Also the composition of the expenditure is relevant in the PBC process; in fact, by shifting spending towards more visible goods and services closer to voter preferences, mayors increase the probability of re-election.

Evidence of the effect of local political budget cycles on the composition of the expenditure is found in different works²⁸ [Kneebone and McKenzie \[2001\]](#), using data on 10 Canadian provinces over the period 1966–1997, find that more visible expenditure functions (education, transportation and communication, recreation and culture) expand in election years versus non-election years. In Portugal, [Veiga and Veiga \[2007\]](#) show evidence in pre-electoral years of increased highly visible expenditures at the municipal level, such as spending to build overpasses, streets, complementary works and rural roads. [Khemani \[2004\]](#) shows that the state legislative assembly elections in 14 major states of India, over the period 1960–1992, affect the composition of local budgets in favor of road construction. Still for India, using state level data, [Chaudhuri and Dasgupta \[2006\]](#) find that state governments raise developmental capital expenditures, particularly education expenditure, in scheduled election years compared to other years. [Akhmedov and Zhuravskaya \[2003\]](#), using a monthly panel dataset of Russian provinces, over the period 1998–2003, find that expenditure in education, culture, and health care exhibit significantly increases during the two months prior to elections and it significantly decreases during the two months after the elections. Other studies focus on the effect of electoral cycles on very specific categories of municipal expenditures: expenditure in development projects [Brender \[2003\]](#), waste collection expenditure [Benito et al. \[2017\]](#) and highway spending [Bostashvili and Ujhelyi \[2019\]](#).

²⁸Evidence on the composition of expenditure has also been found at national level. For Portugal in the period 1990–2011, [Castro and Martins \[2016\]](#) show in election periods increase more visible government expenditure, such as general public services, social protection and health care. For Mexico, [Gonzalez \[2002\]](#) finds Mexican government infrastructural spending, between 1957 and 1997, expands prior to elections, while some other categories of spending, such as current transfers, contract.

My work is also related to a few studies that analyze the incumbent's strategic behaviors on the local level of public goods and services. [Bertoli and Grembi \[2018\]](#) explain trends in traffic accidents as a function of the political cycle using municipal data from two Italian regions (Lombardy and Veneto) finding that during municipal election years, the accident rate increases by 2.2%, with a 2.5 % increase in the injury rate. [Englmaier and Stowasser \[2017\]](#) find that German savings banks strategically respond to the local elections at the county level in Germany. [Baskaran et al. \[2015\]](#) find that Indian government elections, from 1992 to 2009, manipulate the electricity service provision before elections. In 2010 Italy had 8,109 municipalities, in 2016 they were 8,046 due to the fact that some of them merged. Municipalities are grouped into 110 provinces and 20 regions, five of which are special autonomous regions (Valle d'Aosta, Trentino-Alto Adige, Friuli-Venezia Giulia, Sardegna and Sicilia) as opposed to ordinary regions. In this analysis I do not consider the municipalities of the special autonomous regions because in force of their special autonomy they are allowed to set their own fiscal rules and they can delegate many policies to their municipal governments.

Italian municipalities in ordinary regions are in charge of a wide range of local public policies: welfare services, territorial development, tourism, infant schools, sports and cultural facilities, local police services, as well as infrastructural spending.

In terms of the share of general government budget, during the time span covered by my empirical analysis (2010–2016), municipalities account on average for about 10% of total public expenditure.

Although municipalities have considerable discretion over how to spend their own sources, it is necessary to distinguish between current expenditure decisions and capital expenditure decisions. Unlike current expenditure, mayors have substantial control over capital expenditure. Most current expenditures are mostly composed by rigid expenditure. In particular wages are regulated by rigid labor contracts, both in terms of duration and wage rates [Veiga and Veiga \[2007\]](#). Moreover, public jobs are highly protected by national law and wages are set by the central government [Baleiras and da Silva Costa \[2004\]](#).

Nevertheless, local administrations have an important role in determining the overall level of public investment: in the period 2010-2016, the 23% of the general government capital expenditure is carried by municipalities.

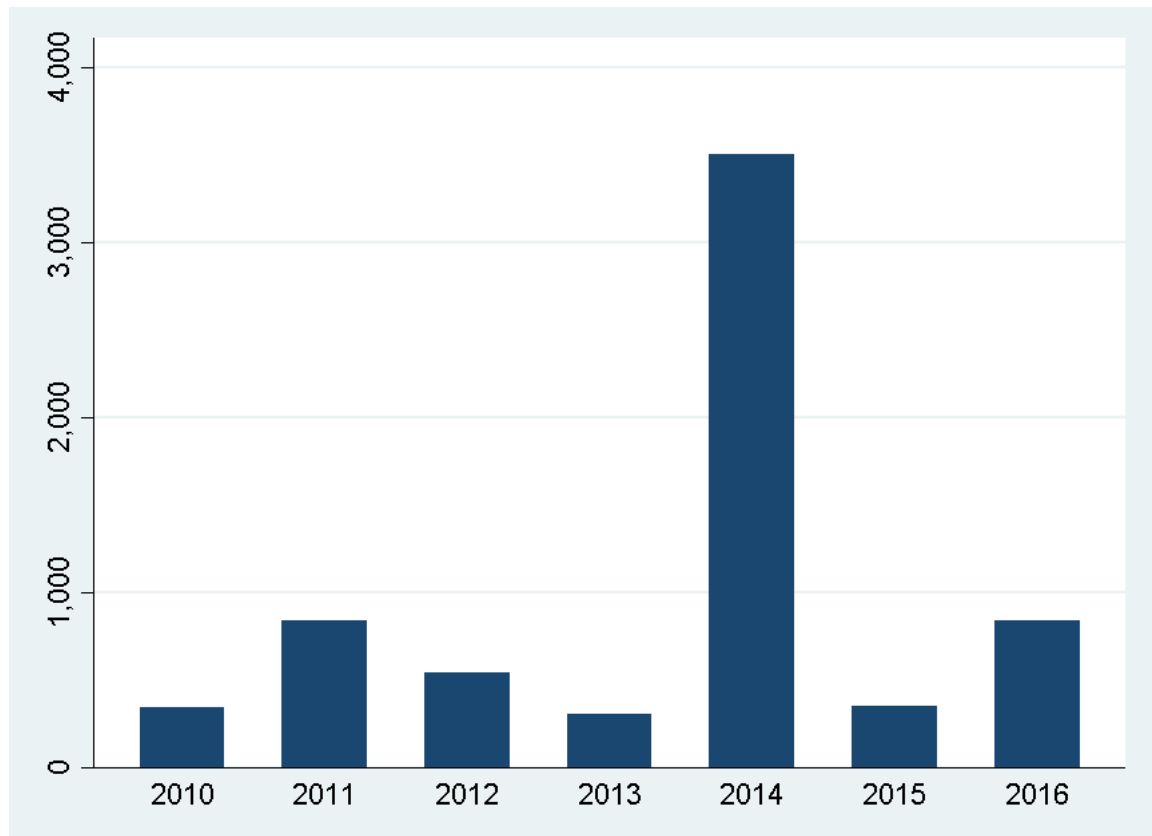
The Italian local level of government is regulated by the legislative decree n. 167/2000. Mayors are elected with two different systems according to a threshold based on population size in the latest census (15.000 inhabitants). For municipalities with a population lower than 15,000 inhabitants, elections are held with a single ballot and the so-called plurality rule: the winning candidate is awarded a majority

premium of at least two-thirds of the seats in the council. For municipalities with a population above 15,000, elections are held using a dual ballot system²⁹ Bordignon et al., 2017, Ferraresi et al., 2015.

Even if national political parties usually operate at municipal level, most of the lists supporting the mayor do not refer to a national political party, and they are the so called “liste civiche”. In my sample only the 25% of the lists supporting a mayor were directly related to a national political party.

In Italy, municipal elections are normally held every 5 years (they were four until 2000), but the timing is not the same for all municipalities. Staggering of electoral dates is the result, over the years, of local governments having to resign before the end of the term because of the impossibility to form a majority in the municipal council supporting the local government, or because of political scandals or judicial impeachment. Figure 12 shows that municipalities follow different election schedules.

Figure 12: *Municipalities holding elections in each year.*



Source: Ministry of the Interior.

Half of the municipalities in the sample (3,505) held elections in 2014, while 343 voted in 2010, 839 in 2011, 535 in 2012, 300 in 2013, 345 in 2015 and 833 in 2016. In the sample about 79% of municipalities

²⁹For municipalities with more than 15.000 inhabitants, the second ballot is held only if none of the candidates obtains an absolute majority of votes in the first ballot.

had an election in the period 2010-2016, more than 21% had elections in the seven years analyzed and only one municipality (Casalbordino, in province of Chieti) had three elections in this period.

Since 1993, mayors have been subjected to a two-term limit, while members of the executive committee and of the Municipal Council can be re-elected indefinitely. The system has then remained unchanged until April 2014 when a new law approved by the Italian Parliament (Law n. 56/2014) has allowed mayors in municipalities with a number of inhabitants lower than 3,000 to re-run for a third term (they are subject to a three-term limit). The change introduced by this legislative intervention has been motivated by the difficulty faced in finding administrators available to run for a mayor position in small municipalities [De Benedetto and De Paola, 2019](#).

3.3 Data

The empirical analysis is based on a dataset of Italian municipalities resulting from a combination of different archives publicly available from the Italian Ministry of the Interior, the Italian Ministry of the Economy and the Italian Statistical Office (ISTAT). It contains a full range of information for each Italian municipality organized into three sections: (1) financial data from municipal balance sheets; (2) electoral data, including the results of the elections in which the mayors in office during the period covered by the dataset were elected; (3) demographic and socioeconomic data.

I do not include municipalities under the administration of a government commissioner and municipalities whose mayor and municipal council resigned before the end of the term, thus leading to possible manipulation for anticipated elections. I exclude municipalities of the autonomous regions because they have different accounting, municipal electoral rules and larger degree of financial autonomy.

With these restrictions, and after excluding municipalities with missing values for some data, I obtain a sample of 5,520 municipalities including 38,640 observations from 2010 to 2016. The sample of municipalities have on average a population of about 6,500 inhabitants and an average taxable income of about 11,000 euros per capita.

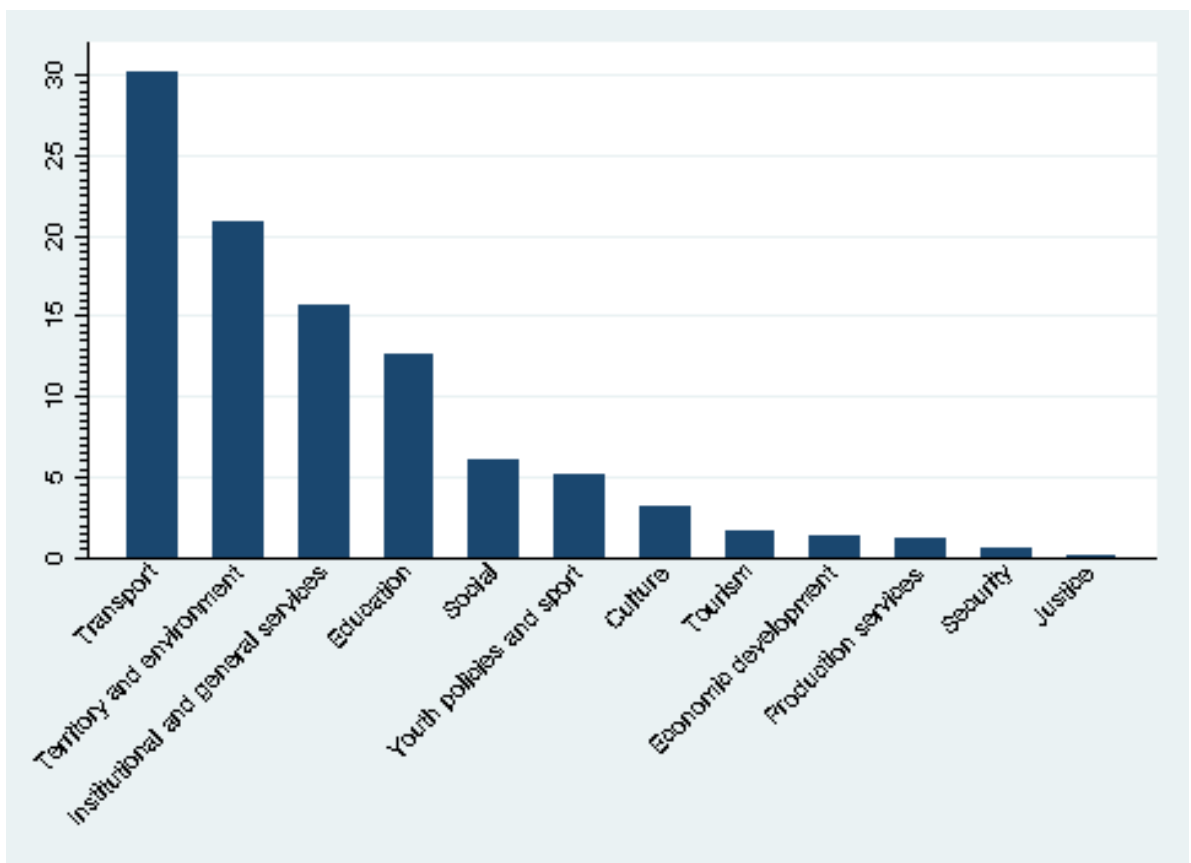
As main dependent variable I use the capital expenditure per capita for roads and transportation, in accrual terms³⁰. This category of expenditure contains gross fixed investments and land purchase for the construction and preservation of infrastructures and subsidiary works for roads, pedestrian and cycle paths, for other type of transport and also subsidies and capital transfers to enhance local public transport. For the period 2010-2015 I can distinguish three categories for this type of expenditure: *investment expenditure for roads*, *investment expenditure for public illumination* and *investment expen-*

³⁰Data deflated by the national consumer price index, excluding energy (ISTAT).

diture for public transport. On average the investment on roads³¹ is the 64% of the total of investment expenditure for roads and transportation, the public illumination is the 7% and the local public transport is the 27%. The remaining 2% is represented by expenses usually faced by large municipalities, for example capital expenditure for railway transport, waterways and other type of expenditure.

I take into account also the composition of the total capital expenditures. Investment expenditures are divided in 12 categories³² institutional and general services, justice, security, education, culture, youth policies and sport, tourism, road and transportation, territory and environment, social, economic development and production services. Figure 13 shows the average composition of capital expenditure.

Figure 13: *Composition of municipalities capital expenditure (average values period 2010-2016).*



Source: Ministry of the Interior.

Roads and transportation is the largest category in terms of total capital spending in municipalities and it also is the most visible to voters. As Figure 13 shows, capital expenditure for roads and transportation is 30% of the total municipal capital expenditure. Territory and environment is 21%

³¹This type of expenditure is related not only on roads but also bridges, tunnels, parking facilities, bus terminal and other infrastructures related to roads.

³²This classification is the result of the authors' elaboration, since the classification of expenditure in macro categories in Italian municipalities has changed since the introduction of harmonization in 2016 with the Law n.118/2011. The reconciliation of the balance sheet before and after the harmonization is shown in the Table CII.

of the total investment, general services the 16%, education the 13%, social 6%, youth policies and sport 5% and under culture 3%. Residual capital expenditures that together represent 6% of total investment expenditure are justice, security, tourism, economic development and production services. Political data are collected for each municipality of the sample by the Ministry of the Interior - Registry of Local and Regional Administrators. I collect information on the characteristics of the municipalities' administrators such as the age of the mayor in the reference year (*Mayor's age*), the educational qualifications held by the mayor on the date of his election (*Mayor's education*³³) and the profession declared by the mayor on the date of his election (*Mayor's occupation*³⁴).

In the baseline equations, I do not include the political party of the mayor because it is very difficult to unambiguously attach a political color, given the high number of civic coalitions. However, I build a dummy which is equal to one if the mayor belongs to a national political party and zero if it belongs to a civic coalition (*local party*). Overall, I do not expect partisanship to play a significant role in PBC at the municipal level [van Houten \[2009\]](#).

The dataset also includes some time-varying control variables that account for differences among municipalities in their population structure and economic conditions. The demographic controls include total population (*population*) and population density (*density*), expressed by population per square kilometer of municipal territory. These two variables can capture the presence of scale economies in the provision of public goods [Fredland et al. \[1967\]](#). I also include the share of population aged between 0 and 5 (*child*) and the share of population over 65 (*aged*), to account for some specific age related public needs such as nursery schools, nursing homes, and so on. As a socioeconomic control I add the municipal income (*taxable income*), using the per capita base of the personal income tax, taken from the database on income tax returns of the Revenue Agency.

In accordance with [Veiga and Veiga \[2007\]](#) the transfers should have a positive impact on spending, so I control with the variable per capita transfers from the upper levels of government (*transfers*). The financial condition and the ability to spend of the municipality could influence the dynamics of the investments in a different way [Reuter and Nerlich, \[2015\]](#), so I also control for two indicators: the *incidence of total investment expenditure* and the *incidence of loan repayment expenditure*. I measure the incidence of total investment expenditure as a ratio between total investment expenditure and total current expenditure, while I measure the incidence of loan repayment expenditure as a ratio between

³³The variable *Mayor's education* is a categorical variable equal to 0 if the mayor doesn't hold any educational qualifications, 1 if he/she has at most a primary school diploma, 2 if he/she has at most a lower secondary school diploma or professional diplomas or equivalent qualifications, 3 if he has at most a secondary school or equivalent qualification certificate, 4 if he has a university degree or higher university qualifications.

³⁴The variable *Mayor's occupation* is a categorical variable which follows the classification of works from ISTAT, that follows the *Isc08* international standard classification.

of loan repayment expenditure and total expenditure.

I complete the dataset, adding municipal data on road accidents at municipal level for the period 2010-2016, from ISTAT publication “Location of road accidents”. ISTAT collects all relevant incidents on the national territory communicated directly by police authorities. Based on these data, I create the outcome variable: *road accident probability*. This variable is a dummy variable, equal to one if a serious accident, namely that has caused at least one injured or at least one dead, occurred on a municipal road. I collect data of the number of registered vehicles (*vehicles*) for each municipality from Automobile Club d’Italia.

Summary statistics for the sample used in the analysis are reported in Table 18.

Table 18: *Summary statistics.*

	N	Mean	S.d.	Min	Max
Financial data					
Investment expenditure for roads and transportation in euros per-capita	38,640	98.84	331.2	0	15,784
Investment expenditure for roads in euros per-capita	33,120	91.83	316.08	0	15,784
Investment expenditure for public illumination in euros p.c.	33,120	9.97	77.91	0	6,057
Investment expenditure for public transport in euros p.c.	33,120	1.22	54.13	0	6,603
Share investment expendit. - Institutional and gen. services	38,640	0.157	0.224	0	1
Share investment expenditure - Justice	38,640	0.001	0.014	0	0.983
Share investment expenditure - Security	38,640	0.006	0.0349	0	1
Share investment expenditure - Education	38,640	0.127	0.218	0	1
Share investment expenditure - Culture	38,640	0.0310	0.110	0	1
Share investment expenditure - Youth policies and sport	38,640	0.051	0.133	0	1
Share investment expenditure - Tourism	38,640	0.017	0.087	0	1
Share investment expenditure – Roads and Transportation	38,640	0.301	0.291	0	1
Share investment expenditure - Territory and environment	38,640	0.208	0.266	0	1
Share investment expenditure - Social	38,640	0.060	0.137	0	1
Share investment expenditure - Economic development	38,640	0.013	0.069	0	1
Share investment expenditure - Production services	38,640	0.012	0.0772	0	1
Incidence of total investment expenditure	38,640	0.505	9.207	0	1,802
Incidence of loan repayment expenditure	38,640	0.080	0.096	0	0.660
Transfers in euros per-capita	38,640	140.1	227.5	0	15,559
Electoral data					
Electoral year	38,640	0.179	0.383	0	1
Pre electoral year	38,640	0.166	0.372	0	1
Two years before election	38,640	0.241	0.428	0	1
Three years before election	38,640	0.241	0.428	0	1
Post electoral year	38,640	0.241	0.428	0	1
Mayor's age	38,640	49.99	10.36	18	85
Mayor's education	38,640	3.322	0.688	1	4
Mayor's occupation	38,640	13.82	7.185	1	22
Term limit	38,640	0.344	0.475	0	1
Local party	38,640	0.736	0.441	0	1
Demographic and socioeconomic data					
Population (in thousands)	38,640	6.505	29.760	30	1,351
Child	38,640	0.042	0.011	0	0.105
Aged	38,640	0.236	0.06	0.04	0.72
Density	38,640	291.9	554.2	0.728	8,310
Taxable income in euros per capita	38,640	10,704	2,913	1,554	35,400
Population (Census 2011) (in thousands)	38,640	6.420	28.913	30	1,242
Share of inhabitants with university degree (Census 2011)	38,640	0.075	0.027	0	0.291
Road accidents					
Road accident probability	38,640	0.483	0.499	0	1
Vehicles (in thousands)	36,722	3.576	16.011	0	724

3.4 Empirical analysis

I follow the empirical approach of [Golden and Poterba \[1980\]](#) and [Alesina \[1988\]](#) to estimate the impact of timing of elections on fiscal variables. This method involves the use of dummy variables to control each year of the electoral schedule separately, rather than only including a dummy variable for the election year.

I argue capital expenditures for roads and transportation as dependent variable. In a second regression, I use the share of each category on total investment expenditures.

The equation 3 is the baseline model:

$$y = \alpha + \beta \mathbf{d}_{it} + \gamma \mathbf{X}_{it} + \tau_i + \mu_t + \theta_{it} + \epsilon_{it} \quad (4)$$

Where i denotes a municipality and t the year, \mathbf{d}_{it} is a set of four dummies for each municipality and for each years in the term defined as follows:

$$\mathbf{d}_{it} = \begin{cases} d_{it}^{\tau-3} = 1 & \text{three years before election} \\ d_{it}^{\tau-2} = 1 & \text{two years before election} \\ d_{it}^{\tau-1} = 1 & \text{one year before election} \\ d_{it}^{\tau+1} = 1 & \text{one year after election} \end{cases}$$

and zero otherwise, where the indicator for an election year, d_{it}^{τ} , is excluded from estimation to avoid multicollinearity. Hence, all coefficients should be interpreted as deviations from the election year.

The vector \mathbf{X}_{it} includes municipality, mayor-level and political controls. As municipality controls I include in this regression: total population, density, share of population aged between 0 and 5, share of population over 65 and municipal per capita taxable income. Mayor-specific traits are controlled by age, education, professional condition of the mayor and if the mayor was supported by a civic list. Furthermore, as robustness check, I control for some features of municipal budgets that could affect the effect of PBC on the level of capital expenditure.

Unobserved determinants of the dependent variable that are fixed at the municipality level are controlled with municipality fixed effect (τ_i). Common shocks in the analysis period are controlled with year fixed effects (μ_t). Municipal time trend (φ_{it}) control for possible different local trends in capital spending. The idiosyncratic error (ϵ_{ict}) is clustered at municipal level. As robustness check I also control for province time trend and cluster the errors at province level.

The second model adopted is a probit model and it is described by equation 4. It that allows to verify the impact of the investments for roads and transport interacted with the electoral cycle variables on the probability of having an accident (p_{it}):

$$p_{it} = \alpha + \beta inv_{it} + \gamma \mathbf{d}_{it} \times inv_{it} + \delta \mathbf{X}_{it} + \mu_t + \epsilon_{it} \quad (5)$$

Where i denotes a municipality and t the year, inv_{it} is the capital expenditure for roads and transportation per capita, \mathbf{d}_{it} is a set of dummy variables that indicate the electoral cycle as defined above, the vector \mathbf{X}_{it} includes characteristics of municipalities that vary over time and that can directly influence the probability of accident: total population, child, aged, density, taxable income per-capita and vehicles. I control also for year fixed effects (μ_t).

3.5 Results

3.5.1 Baseline results

In Table 19 I show the baseline estimates using as dependent variable the investment expenditure for roads and transportation per capita. The first column shows estimates from the specification with year and municipality fixed-effects but without any controls at municipal level. Additional control variables is useful to check for the robustness of the main findings. Therefore in the second column, I add mayor-specific controls: mayor's age, mayor's education, mayor's occupation and the dummy variable local party (coefficients for controls are omitted in this table and are reported in Table CI in Appendix). In the third column, I add other municipal controls: population, child, aged, density and taxable income. In the last column, I add municipal time trends in order to control possible macroeconomic effect at local level.

Looking at column (4) of Table 19 estimates, that includes all controls and municipal time trends, I observe that investments for roads and transportation three years before the election are €23 per capita higher than the baseline year (the electoral year). Compared to the sample mean of the investment for roads and transportation (€99), this amounts to a 23% increase. Two years before the elections it is 27€ per capita higher than the electoral year, 27% higher with respect to the sample mean. The greater increase reported is in the pre-electoral year when the per capita increase in capital expenditure for transport is 31€ higher than in election years (31% of the sample mean). All of the coefficients of the pre-electoral cycle are statistically significant at 1 per cent. In the year after election I do not find any significant increase respect to the electoral year. Considering that some investments may take

several months to be concluded, incumbents start increasing investment expenditures not in the year of election, which are usually held in April or March, but in the year before elections. If I disaggregate the investment expenditures for roads and transportation in sub-category³⁵ I observe differences in the effect of the political budget cycle (Table CVI). Not surprisingly, the major visible capital expenditure, spending for roads, follows the political budget cycle. I find a very mild effect on public illumination spending and no evidence on local public transport expenditure.

Table 19: *Political budget cycle effect on capital expenditure for roads and transportation.*

	(1)	(2)	(3)	(4)
One year before election	34.099*** (7.027)	34.133*** (7.031)	33.964*** (7.034)	30.726*** (7.816)
Two years before election	29.627*** (6.818)	29.592*** (6.812)	29.569*** (6.828)	27.159*** (7.234)
Three years before election	23.888*** (5.799)	23.883*** (5.799)	23.844*** (5.800)	22.684*** (6.327)
One year after election	8.279 (5.786)	8.318 (5.772)	8.314 (5.781)	4.574 (6.226)
Observations	38,640	38,640	38,640	38,640
R-squared	0.362	0.362	0.362	0.529
Municipality and year FE	Yes	Yes	Yes	Yes
Mayor specific controls	No	Yes	Yes	Yes
Other municipal controls	No	No	Yes	Yes
Municipal time trend	No	No	No	Yes

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Standard errors are robust to heteroscedasticity and clustered at the municipality level. *p < 0.1, **p < 0.05, ***p < 0.01.*

Capital expenditures can be divided in 12 different categories. Accordingly, I ran separate regressions for each categories, in which the dependent variable is the share of the total capital expenditure. This estimates are reported in the Table 20, and take in account not only municipality and year fixed-effects but also municipal time trend and also the complete set of the control variables. For roads and transportation the coefficient of the pre-electoral years dummies are positive and significant at 1 per cent (column 1). The share of capital expenditure for investments for roads and transportation three and two years before the elections are 1.3% higher than the electoral year, while is 2.8% higher in the pre-electoral year. The fact that the largest fluctuations are found in the most visible category is in line with results in [Kneebone and McKenzie \[2001\]](#) and [Veiga and Veiga \[2007\]](#). Interestingly, the pre-electoral share of capital spending decreases in some categories considered less visible for the voters or less related to the citizens, such as institutional and general services, tourism and territory and environment.

³⁵This is possible only for the period 2010-2015.

Table 20: Political budget cycle effect on composition of capital expenditure.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Roads and transportation	Institut. and gen. services	Justice	Security	Education	Culture	Youth policies and sport	Tourism	Territory and envir.	Social	Economic develop.	Prod. services
One year before election	0.028*** (0.005)	-0.014*** (0.004)	-0.000 (0.000)	-0.001 (0.001)	0.001 (0.004)	0.001 (0.002)	0.003 (0.003)	-0.003* (0.002)	-0.014*** (0.005)	-0.002 (0.003)	0.001 (0.001)	0.000 (0.001)
Two years before elect.	0.013** (0.005)	-0.011*** (0.004)	0.000 (0.000)	-0.000 (0.001)	0.005 (0.004)	0.002 (0.002)	0.002 (0.003)	0.001 (0.002)	-0.011** (0.005)	0.005 (0.003)	-0.001 (0.001)	0.001 (0.002)
Three years before elect.	0.013** (0.005)	-0.013*** (0.004)	-0.000 (0.000)	-0.000 (0.001)	-0.005 (0.004)	-0.001 (0.002)	0.002 (0.002)	-0.002 (0.002)	0.007 (0.005)	-0.000 (0.003)	0.002 (0.001)	-0.001 (0.001)
One year after election	-0.001 (0.005)	-0.003 (0.004)	-0.000 (0.000)	-0.000 (0.001)	0.008** (0.004)	0.002 (0.002)	0.003 (0.002)	-0.002 (0.002)	-0.011** (0.005)	0.005* (0.003)	0.001 (0.001)	-0.001 (0.002)
Observations	38,640	38,640	38,640	38,640	38,640	38,640	38,640	38,640	38,640	38,640	38,640	38,640
R-squared	0.753	0.665	0.406	0.346	0.630	0.501	0.513	0.538	0.694	0.465	0.430	0.445
Munic. and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mayor specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other munic. controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is the share of investment expenditures for 12 different categories. Standard errors are robust to heteroscedasticity and clustered at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3.5.2 Robustness test

In this section, I assess the validity of the previous results by performing a set of robustness tests. I start by controlling if some unobservable characteristics, linked to the political budget cycle, bias the results using a different set of fixed effects and cluster errors. I control also if the presence of capital province or particular financial condition of the municipalities can significantly drive the results. Finally, I test whether the main findings are sensitive to a single region.

In Table 21, I replace the municipal time trend with provincial time trend (column 1) and cluster error at province level instead of municipal level (column 2). In Italy the provincial capitals are usually bigger than the other municipalities and also coincide with the urban center that ensure a series of services and public goods that exceed its administrative boundaries, especially in the management of local public transport. In the sample there are 60 municipal province capitals³⁶ of 14 different Regions that on average have 158,131 inhabitants, while the average population of the other municipalities is 4,753. So in column (3) I exclude from the sample all the provincial capitals. In the last column of Table 21, I control if the financial condition of a municipality can reduce the effect of the political budget cycle, for this reason I add as explanatory variables three variables: the total transfers from the central and regional governments per capita (*transfers*), the ratio between total investment expenditure and total current expenditure (*incidence of total investment expenditure*) and the ratio between of loan repayment expenditure and total expenditure (*incidence of loan repayment expenditure*).

All these four different specifications go in the same direction as the baseline results.

³⁶The complete list of provincial capitals can be found in the Table CIII.

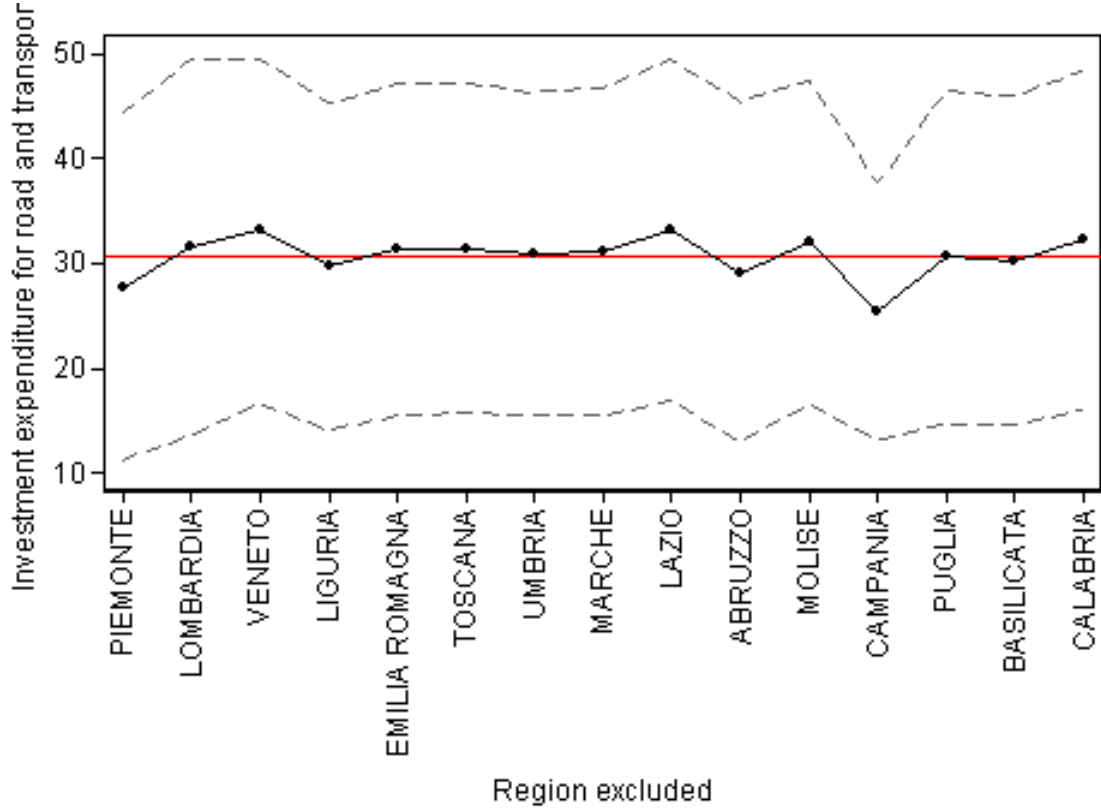
Table 21: *Political budget cycle effect on capital expenditure for roads and transportation, different specifications.*

	(1)	(2)	(3)	(4)
One year before election	29.930*** (6.990)	30.726*** (9.887)	31.190*** (7.962)	28.850*** (7.750)
Two years before election	22.818*** (7.279)	27.159*** (9.284)	27.655*** (7.373)	26.317*** (7.177)
Three years before election	18.357*** (5.704)	22.684*** (7.890)	23.190*** (6.435)	23.049*** (6.306)
One year after election	8.504 (6.091)	4.574 (7.940)	4.692 (6.338)	3.947 (6.192)
Transfers				0.024* (0.014)
Incidence of total investment expenditure				0.691 (0.789)
Incidence of loan repayment expenditure				-271.4*** (28.501)
Observations	38,640	38,640	38,220	38,640
R-squared	0.378	0.529	0.529	0.531
Municipality and year FE	Yes	Yes	Yes	Yes
Mayor specific controls	Yes	Yes	Yes	Yes
Municipal balance controls	No	No	No	Yes
Municipal controls	Yes	Yes	Yes	Yes
Province time trend	Yes	No	No	No
Municipal time trend	No	Yes	Yes	Yes
Error clustered at (level)	Municipal	Province	Municipal	Municipal

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Province time trend in specification (1), standard errors clustered at the provincial level in (2), province capitals are excluded in (3), control also for financial municipal condition in (4). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.*

Since each region in Italy differs for different levels of economic development and transport infrastructure concentration [Banca d'Italia \[2017\]](#), it is important to test whether the main findings are sensitive to the exclusion of a single region. For this reason, I have estimated the main equation, with municipal and year fixed effects, municipal time trend and political and municipal time varying control, by dropping one region at a time. The result of the estimated coefficient of the pre-electoral year and its 95% confidence interval, are in Figure 14. The results of the entire political budget cycle are shown in the Table Ax in the Appendix. These results shown are very similar to that obtained in the baseline specification. Hence, it can be concluded that the main results are not driven by a particular region.

Figure 14: *Pre-electoral year coefficient estimates, by dropping one region at a time.*



Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Complete estimates are available in Table CIV and in Table CV.

3.5.3 Heterogeneity of the Political Budget Cycle

Term limits

As reported in Section 2, in Italy there are different rules that do not allow mayors to recandidato to subsequent elections after two mandates before April 2014 and after three mandates after April 2014 only for municipalities with a number of inhabitants lower than 3,000. The system has then remained unchanged until April 2014 when a new law approved by the Italian Parliament (Law n. 56/2014) has allowed mayors in municipalities with a number of inhabitants lower than 3,000 to re-run for a third term (they are subject to a three-term limit).

Thirty-four percent of the mayors in the sample are term-limited and are therefore not eligible for re-election. In municipalities where the incumbent is term-limited I expect that the political budget cycle should be absent, or at least much reduced (De Benedetto and De Paola, 2019, Hajnal and Lewis,

2003, Nalder, 2007.

In Table 22 I re-estimate the baseline model by first restricting the sample to municipalities with a mayor who is eligible for re-election (columns 1), and then to those with a term-limited mayor in office (columns 2), respectively. Table 22 shows in term-limited municipalities the effect of the political budget cycle on investment expenditure for roads and transportation is null, while the effect remain for the municipalities in which the mayor can be re-elected in subsequent elections.

Table 22: *Political budget cycle effect on capital expenditure for roads and transportation, term-limit specification.*

	(1)	(2)
	No term-limit	Term-limit
One year before election	29.015*** (10.387)	-25.330 (49.548)
Two years before election	24.201** (9.849)	2.453 (43.427)
Three years before election	16.120* (8.813)	0.801 (30.378)
One year after election	4.093 (8.813)	-5.849 (19.284)
Observations	25,315	12,240
R-squared	0.614	0.620
Municipality and year FE	Yes	Yes
Mayor specific controls	Yes	Yes
Other municipal controls	Yes	Yes

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Not Term-limited municipalities in (1), Term-limited municipalities in (2). Standard errors are robust to heteroscedasticity and clustered at the municipality level. *p < 0.1, **p < 0.05, ***p < 0.01.*

Human capital

The lower level of human capital increases the share of "uninformed" voters which in turn strengthens the government's incentives to behave opportunistically. So in local area with lower human capital the magnitude of the political budget cycle should be greater than the area with less human capital. In Italy it has been shown that human capital varies substantially both over time and across regions (Guiso et al., 2000). To verify this assumption I split the sample with reference to two municipal-level variables used to capture human capital.

Using the median number of people with a university degree³⁷ (as recorded in the 2001 Census). I

³⁷The national median of people with a university degree for the census 2011, in the sample is 0.071.

split the sample in two groups: the first group includes a number of high educated population above the national median and the second group includes a number of high educated population below the median. I run regressions with these two groups (Table 23 col. 1 and 2). In the sample mayors with a university degree are 44% of the total number of mayors. In Table 23, col. 3 and 4, I split the sample in mayors with university degree and mayors without a university degree. The results in Table 23 show that the effect of the political budget cycle on capital expenditure for roads and transportation is still present but much smaller in municipalities with relatively more educated citizens and mayors.

Table 23: *Political budget cycle effect on capital expenditure for roads and transportation, human capital specification.*

	(1)	(2)	(3)	(4)
	Low educated population	High educated population	Low educated mayor	High educated mayor
One year before election	43.886*** (13.547)	25.466*** (5.840)	42.227*** (12.775)	27.319*** (7.594)
Two years before election	36.481*** (10.608)	23.871*** (5.190)	30.227*** (11.371)	29.492*** (8.401)
Three years before elect.	31.398*** (10.608)	17.548*** (5.505)	21.465** (9.147)	26.356*** (7.550)
One year after election	2.562 (10.978)	13.507*** (4.964)	4.003 (9.014)	12.123 (7.451)
Observations	19,320	19,320	21,421	16,903
R-squared	0.361	0.355	0.389	0.382
Municipality and year FE	Yes	Yes	Yes	Yes
Mayor specific controls	Yes	Yes	Yes	Yes
Other municipal controls	Yes	Yes	Yes	Yes

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Municipalities with a number of high educated population lower than the median in (1), municipalities with a number of high educated population higher than the median in (2), municipalities with low educated mayor in (3), municipalities with high educated mayor in (4). Standard errors are robust to heteroscedasticity and clustered at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.*

3.5.4 Investment expenditure and road accidents

The car is one of the most frequent transport (69%) of the approximately 30 million city commuters who reach their places for work or study every day (ISTAT, 2018). At the same time in all regions, at least 20% of families expresses a negative judgment on the roads of the territory in which they live (ISTAT, 2019). The administrative bodies responsible for the management and construction of roads at local level in Italy are Regions, Provinces and Municipalities. Regions play an important role in planning and coordinating the network of roads and highways of regional interest. Provinces

and municipalities, on the other hand, are responsible for managing provincial and municipal roads, respectively, in line with regional planning.

In this section I analyze the effect on the welfare of citizens due to municipal spending increases for road and transportation during the pre-election years. I use the road accidents as a proxy to measure the increase of welfare. In a normal situation, an increase in investments improves the roads or bridges maintenance. New investments also lead to building new infrastructures and this could relieve congested city streets. For these reasons, an increase in investments should decrease the probability of road accidents.

I collect data of accidents in road managed by municipality, for each municipality in the sample, available for the period 2010-2016. Using this dataset I run a probit regression, where the dependent variable is the probability of road accidents. The explanatory variable of interest is the investment for roads and transportations per capita and the interaction with the set of dummies that indicate the political cycle. I include other control variables: the population, the percentage of population younger than 5 years old, the percentage of population aged 65 and over, the density, the taxable income per capita and the numbers of vehicles.

In Table 24 I report the estimates of the probit model. The effect of the investment for roads and transportation on road accidents is negative and statistically significant only in the post-electoral year. I can therefore conclude that the increase in investments for roads and transportation does not affect the welfare of the citizens during the pre-electoral years. This result could be explained by anecdotal evidence³⁸. The increase in investments before the elections are mostly spending on maintenance on roads or subsidiary works that do not need any maintenance, spending for new roads not strategic for municipal traffic or which, once inaugurated, remain unused (so-called white elephants), or secondary expenditure, as the sidewalk repair. All these expenditures are very visible and close to the voters but with little or no effects on the efficiency of the public service.

³⁸Il Fatto Quotidiano (2015) and Ministero delle Infrastrutture e dei Trasporti (2019)

Table 24: *Capital expenditure for roads and transportation effect on road probability accident, probit model.*

	(1) Road accident probability
Investments expenditure for roads and transportation	0.000 (0.000)
One year after election x investments for roads and trans.	-0.000*** (0.000)
One year before election x investments for roads and trans.	-0.000 (0.000)
Two years before election x investments for roads and trans.	-0.000 (0.000)
Three years before election x investments for roads and trans.	-0.000 (0.000)
Population	0.000*** (0.000)
Child	3.574*** (1.315)
Aged	-1.781*** (0.280)
Density	0.000*** (0.000)
Taxable income per capita	0.000*** (0.000)
Vehicles	0.000*** (0.000)
Constant	-1.410*** (0.120)
Year FE	Yes
Observations	36,722

*Note: The dependent variable is the road accident probability equals to 1 if in the year is record an accident in the municipality. Standard errors are robust to heteroscedasticity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.*

3.6 Conclusion

According to the main literature of political budget cycle (Drazen and Eslava, 2010, Rogoff and Sibert, 1988), benefits and costs of “visible” programs are easily observed and verified by voters, while “less visible” programs generate benefits that are less easy to verify. The distinction between “visible” and “less visible” programs is somewhat arbitrary in practice, since it depends on the level of government, the social-economic context and also on the details of the available budget data.

By using data with a greater level of expenditure detail than previous studies on local political business cycles, I am able to show that the budget cycle in Italian municipalities is relevant for a type of spending that is one of the most visible: the investment for roads and transportation. I find that the investment for roads and transportation in the year before elections is almost 30% higher on average than in

election years, while no opportunistic cycles seem to exist in the others capital expenditures. The effect on roads and transportation investments occurs only in the presence of mayors that can be re-elected and it is more pronounced in presence of greater human capital.

In general, it could be assumed that the increase in investments spending linked to the political budget cycle, especially in a period of budget constraints for the local governments, have some positive spill-over. I instead show how the investments depending on political budget cycles do not have any indirect positive impact on citizens, in fact the municipal investments for roads and transportation reduce the probability of accidents only in the case that is done one year after the election.

Concluding remarks

In the dissertation I discussed three specific issues: the effect of mafia's infiltration on local economic activities, the role of tax systems' complexity on international investments and the existence of the local political budget cycle in capital expenditures. This section summarizes the main findings of the three studies and discusses the contribution of each of them.

In Chapter 1, I find that a firm in the construction sector, which is potentially related to mafia infiltration and also heavily dependent on local procurement (Varese, 2011), decreases the value added by 7% if its headquarter is close to a municipality dissolved for mafia infiltration. The results also show that the firm's added value is sensitive to the intensity of the effect, defined by the average number of days in which the municipal council was dissolved in neighboring municipalities. The results also suggest that being surrounded by municipalities dissolved for reasons that are not mafia related brings no effects on the added value of firms. The main contribution of this paper is bringing new evidence that, in a sector highly controlled by criminal activity and related to public local procurement, the restoration of legality leads to a reduction in "extra-profits" due to previous corruption activities. The conclusions reached may also be extended to other phenomena of corruption linked to criminal organizations, such as drug cartels in South America and the Yakuza in Japan, since the Italian mafia is not an isolated example but a "prototype" at international level (Pinotti, 2015).

In Chapter 2, I find evidence that in the period 2013-2016, using a gravity model, FDI outflows in OECD countries are strongly determined for small countries by the level of tax systems' complexity, measured by the length of time required to comply with the tax codes, moreover tax rates differentials on FDI distribution are not significant. This may be due to several reasons, such as the widespread presence of double tax treaties between developed countries or the possibility for firms to channel the investments through third countries. The results of this chapter bring two different policy implications. First, if tax differentials do not matter for FDI flows, but tax complexity matters, countries could increase their revenues, decreasing the tax systems' complexity. Second, the impact of tax complexity on FDI is holding for small country, indicating that these countries should care about their tax complexity if they are willing to attract investments.

In Chapter 3, I study the strategic behavior of local politicians in Italian municipalities for the period 2010-2016, related one of the most visible and more manageable expenditure such as the investments for roads and transportation. I find that capital expenditure for roads and transportation in the year before elections is almost 30% higher on average than in the election year. This result does not hold

for other capital expenditures. The second part of the chapter shows that municipal investments for roads and transportation reduce the probability of accidents only if the investment is done one year after the election. The chapter provides a first attempt to quantify the distortive effects of Political Budget Cycle on capital expenditures in Italian municipalities, in a particular type of investments, which has a big impact on local economic growth. Moreover I find that there is no improvement for the welfare of citizens (measured in the number of accidents) associated to the capital expenditures affected during the budget cycle, given that accidents decrease only when expenditure are done one year after the election.

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A Appendix to Chapter 1

Table I: *Revenue classes, euros.*

Revenue class	Revenue
0	0-0.499 million
1	0.5-0.999 million
2	1-1.999 million
3	2-4.999 million
4	5-9.999 million
5	10-24.999 million
6	25-49.999 million
7	50-99.999 million
8	100-249.999 million
9	\geq 250 million

Table II: *Description of ATECO macro-sector.*

ATECO code	ATECO sector
A	Agriculture
B	Cave
C	Manufacturing
D	Electricity and gas
E	Water supply
F	Construction
G	Wholesale trade
H	Transport
I	Accommodation, catering
J	Communication
K	Finance and insurance
L	Real Estate
M	Professionals
N	Rentals and trips
O	Public Administration
P	Instruction
Q	Health
R	Art, sport and entertainment
S	Other services
U	International organizations

Table III: *Value added and neighbors council dissolution for mafia infiltration, average number of neighboring council dismissal.*

Dependent variable: Value added	(1)	(2)	(3)	(4)
Neighboring mafia council dissolution	-0.059** (0.029)	-0.047 (0.029)	-0.001 (0.028)	-0.000 (0.028)
Neighboring mafia council dissolution × construction			-0.257*** (0.073)	-0.201*** (0.065)
Mafia council dissolution	-0.022 (0.015)	-0.013 (0.013)	-0.020 (0.015)	-0.011 (0.013)
Council dissolution for another reason	-0.001 (0.006)	-0.002 (0.005)	-0.001 (0.006)	-0.002 (0.005)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Province × year fixed effects	Yes	Yes	Yes	Yes
Other firm controls	No	Yes	No	Yes
Observations	674,473	651,564	674,473	651,564
R-squared	0.833	0.850	0.833	0.850

*Notes: Robust standard errors, clustered at the municipal level, are shown in parentheses. *** significant at 1%; ** significant at 5%, * significant at 10%. Other firms' controls include the variable firma aging and the revenue class.*

B Appendix to Chapter 2

Table I: *List of home and countries.*

Country	Code
Austria	AUT
Belgium	BEL
Czech Republic	CZE
Germany	DEU
Denmark	DNK
Spain	ESP
Estonia	EST
Finland	FIN
France	FRA
United Kingdom	GBR
Greece	GRC
Hungary	HUN
Ireland	IRL
Italy	ITA
Lithuania	LTU
Luxembourg	LUX
Latvia	LVA
Netherlands	NLD
Poland	POL
Portugal	PRT
Slovak Republic	SVK
Slovenia	SVN
Sweden	SWE
Switzerland	CHE
Iceland	ISL
Norway	NOR
Australia	AUS
Canada	CAN
Chile	CHL
Israel	ISR
Japan	JPN
Korea, Rep.	KOR
New Zealand	NZL
United States	USA
Mexico	MEX
Turkey	TUR

Table II: *Double tax treaties for each OECD countries, 2016.*

Code	Country	N. of double tax treaties	% of OECD partner countries with tax treaties
BEL	Belgium	35	100%
CAN	Canada	35	100%
CHE	Switzerland	35	100%
CZE	Czech Republic	35	100%
GBR	United Kingdom	35	100%
IRL	Ireland	35	100%
ITA	Italy	35	100%
KOR	South Korea	35	100%
POL	Poland	35	100%
USA	United States of America	35	100%
AUT	Austria	34	97.14%
DEU	Germany	34	97.14%
ESP	Spain	34	97.14%
FRA	France	34	97.14%
MEX	Mexico	34	97.14%
NLD	Netherlands	34	97.14%
HUN	Hungary	33	94.29%
PRT	Portugal	33	94.29%
SVK	Slovakia	33	94.29%
TUR	Turkey	33	94.29%
LUX	Luxembourg	32	91.43%
NOR	Norway	32	91.43%
EST	Estonia	31	88.57%
GRC	Greece	31	88.57%
ISR	Israel	31	88.57%
LTU	Lithuania	31	88.57%
LVA	Latvia	31	88.57%
SWE	Sweden	31	88.57%
FIN	Finland	30	85.71%
SVN	Slovenia	30	85.71%
DNK	Denmark	29	82.86%
JPN	Japan	28	80%
AUS	Australia	26	74.29%
ISL	Iceland	25	71.43%
NZL	New Zealand	24	68.57%
CHL	Chile	20	57.14%

C Appendix to Chapter 3

Table I: *The Political Budget Cycle effect on capital expenditure for transport, with explication of the coefficients of all control variables.*

	(1)	(2)	(3)	(4)
One year before election	34.099*** (7.027)	34.133*** (7.031)	33.964*** (7.034)	30.726*** (7.816)
Two years before election	29.627*** (6.818)	29.592*** (6.812)	29.569*** (6.828)	27.159*** (7.234)
Three years before election	23.888*** (5.799)	23.883*** (5.799)	23.844*** (5.800)	22.684*** (6.327)
One year after election	8.279 (5.786)	8.318 (5.772)	8.314 (5.781)	4.574 (6.226)
Mayor's age		-0.863* (0.490)	-0.872* (0.487)	-1.294* (0.741)
Mayor's education		-2.040 (6.154)	-2.054 (6.177)	-2.696 (9.926)
Mayor's occupation		0.152 (0.420)	0.159 (0.423)	-0.056 (0.783)
Local party		-1.316 (5.726)	-1.218 (5.786)	-2.359 (9.661)
Population			-0.001*** (0.000)	0.000 (0.001)
Child			692.38 (806.4)	310.45 (909.2)
Aged			-50.855 (470.4)	149.80 (706.9)
Density			0.066 (0.073)	-0.008 (0.102)
Taxable income per capita			0.008 (0.007)	0.015* (0.008)
Observations	38,640	38,640	38,640	38,640
R-squared	0.362	0.362	0.362	0.529
Municipality and year FE	Yes	Yes	Yes	Yes
Mayor specific controls	No	Yes	Yes	Yes
Other municipal controls	No	No	Yes	Yes
Municipal time trend	No	No	No	Yes

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Standard errors are robust to heteroscedasticity and clustered at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.*

Table II: *Reconciliation table of pre and post harmonization balance sheet.*

Budget functions (legislative decree 267/2000))	Missions (legislative decree 118/2011	Author's classification
General functions of administration, management and control	Institutional and general services, management and control	Institutional and general services
	Relations with other territorial and local autonomies	
	International relations	
Justice	Justice	Justice
Local police	Public order and security	Security
Education	Education	Education
Protection and enhancement of cultural assets and cultural activities	Protection and enhancement of cultural assets and cultural activities	Culture
Sports and recreational sector	Youth policies, sports and leisure	Youth policies and sport
Tourism	Tourism	Tourism
Viability and transportation	Transportation and the right to mobility	Roads and transportation
	Territory planning and housing construction	
Land and environmental management	Sustainable development and protection of the territory and the environment	Territory and environment
	Civil rescue	
Social sector	Social rights, social policies and family	Social
	Health	
	Employment policies	
Economic development	Economic development and competitiveness	Economic development
Production services	Agriculture, agri-food policies and fisheries	Production services
	Energy and diversification of energy sources	

Table III: *Province capitals, by region.*

Municipality	(Region)		
Chieti	(Abruzzo)	Ascoli Piceno	(Marche)
L'Aquila	(Abruzzo)	Macerata	(Marche)
Pescara	(Abruzzo)	Pesaro	(Marche)
Teramo	(Abruzzo)	Campobasso	(Molise)
Matera	(Basilicata)	Alessandria	(Piemonte)
Vibo Valentia	(Calabria)	Asti	(Piemonte)
Napoli	(Campania)	Biella	(Piemonte)
Salerno	(Campania)	Cuneo	(Piemonte)
Bologna	(Emilia-Romagna)	Novara	(Piemonte)
Ferrara	(Emilia-Romagna)	Torino	(Piemonte)
Forlì	(Emilia-Romagna)	Vercelli	(Piemonte)
Modena	(Emilia-Romagna)	Andria	(Puglia)
Piacenza	(Emilia-Romagna)	Bari	(Puglia)
Ravenna	(Emilia-Romagna)	Foggia	(Puglia)
Rimini	(Emilia-Romagna)	Lecce	(Puglia)
Frosinone	(Lazio)	Taranto	(Puglia)
Rieti	(Lazio)	Grosseto	(Toscana)
Viterbo	(Lazio)	Livorno	(Toscana)
Genova	(Liguria)	Lucca	(Toscana)
La Spezia	(Liguria)	Massa	(Toscana)
Savona	(Liguria)	Pisa	(Toscana)
Bergamo	(Lombardia)	Pistoia	(Toscana)
Brescia	(Lombardia)	Prato	(Toscana)
Como	(Lombardia)	Perugia	(Umbria)
Cremona	(Lombardia)	Terni	(Umbria)
Lecco	(Lombardia)	Treviso	(Veneto)
Mantova	(Lombardia)	Verona	(Veneto)
Milano	(Lombardia)	Vicenza	(Veneto)
Monza	(Lombardia)		
Pavia	(Lombardia)		
Sondrio	(Lombardia)		
Varese	(Lombardia)		

Table IV: *The Political Budget Cycle effect on capital expenditure for transport, excluding regions (panel A).*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Piemonte	Lombardia	Veneto	Liguria	Emilia Romagna	Toscana	Umbria	Marche
One year before election	27.800*** (8.449)	31.559*** (9.154)	33.101*** (8.408)	29.700*** (7.964)	31.333*** (8.091)	31.487*** (8.049)	30.941*** (7.881)	31.125*** (8.000)
Two years before election	21.745*** (7.220)	30.622*** (8.807)	30.925*** (7.707)	27.873*** (7.433)	27.556*** (7.495)	28.566*** (7.473)	27.206*** (7.303)	27.697*** (7.411)
Three years before election	17.377*** (6.483)	25.736*** (7.517)	24.721*** (6.476)	22.629*** (6.413)	23.108*** (6.572)	23.875*** (6.520)	23.223*** (6.386)	23.232*** (6.477)
One year after election	5.260 (6.441)	6.149 (7.571)	7.469 (6.544)	4.895 (6.363)	4.641 (6.445)	4.826 (6.414)	5.007 (6.273)	4.867 (6.379)
Observations	30,989	29,281	35,105	37,233	36,610	36,988	38,087	37,268
R-squared	0.515	0.530	0.532	0.526	0.528	0.528	0.529	0.529
Municipality and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mayor specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other municipal controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Each column excludes from the analysis a region reported in the column header. Standard errors are robust to heteroscedasticity and clustered at the municipality level. *p < 0.1, **p < 0.05, ***p < 0.01.*

Table V: *The Political Budget Cycle effect on capital expenditure for transport, excluding regions (panel B).*

	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria
One year before election	33.186*** (8.288)	29.173*** (8.312)	31.961*** (7.883)	25.443*** (6.264)	30.588*** (8.124)	30.301*** (8.016)	32.264*** (8.274)
Two years before election	29.455*** (7.637)	26.231*** (7.665)	28.042*** (7.326)	18.925*** (6.099)	26.746*** (7.594)	26.332*** (7.402)	28.267*** (7.651)
Three years before election	24.255*** (6.715)	23.542*** (6.689)	23.159*** (6.415)	15.531*** (5.650)	23.711*** (6.670)	22.056*** (6.476)	22.771*** (6.694)
One year after election	4.373 (6.493)	2.065 (6.624)	5.326 (6.306)	-1.137 (5.143)	4.362 (6.573)	4.420 (6.376)	6.544 (6.608)
Observations	36,666	36,841	37,933	35,952	37,387	37,877	36,743
R-squared	0.526	0.531	0.529	0.541	0.531	0.528	0.529
Municipality and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mayor specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other municipal controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Note: The dependent variable is investment expenditures for transport per capita in 2010 euros. Each column excludes from the analysis a region reported in the column header. Standard errors are robust to heteroscedasticity and clustered at the municipality level. *p < 0.1, **p < 0.05, ***p < 0.01.*

Table VI: *The Political Budget Cycle effect on capital expenditure for roads, public illumination and public transport..*

	(1)	(2)	(3)
	Roads	Public Illimination	Public transport
One year before election	27.497*** (7.190)	5.034** (2.240)	1.397 (1.515)
Two years before election	20.969*** (6.377)	4.189* (2.189)	1.735 (1.261)
Three years before election	10.545* (6.071)	1.308 (1.711)	3.092 (2.031)
One year after election	-1.673 (5.435)	5.855* (3.186)	-0.115 (0.382)
Observations	33,120	33,120	33,120
R-squared	0.574	0.432	0.602
Municipality and year FE	Yes	Yes	Yes
Mayor specific controls	Yes	Yes	Yes
Other municipal controls	Yes	Yes	Yes
Municipal time trend	Yes	Yes	Yes

*Note: The dependent variable are capital expenditures for roads per capita (col.1), capital expenditures for public illumination per capita (col.2) and capital expenditures for public transport per capita. Period 2010-2015. Standard errors are robust to heteroscedasticity and clustered at the municipality level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.*