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Electoral incentives to target investment in roads: Evidence from Italian municipalities

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ABSTRACT

Using a comprehensive dataset on Italian municipalities, we test whether investments in road services are affected by political manipulations motivated by the need of targeting a specific group of voters (construction firms). We show that road services investment in the year before election is 26% higher in municipalities with low density of construction firms and 40% higher in municipalities with high density of construction firms than in the electoral year. This result is confirmed by the fact that in the pre-electoral year the probability that public procurement on road services is assigned to a local firm increases by 52 percentage points with respect to the electoral year, for municipalities with high density of construction firms. Finally, we do not detect any relationship between investments in road services and the local road safety. These findings suggest that politicians manipulate investments in road services for re-electoral purposes.

1. Introduction

Over the period 2010–2015, in Italy municipalities spent on average, approximately 4 billion euros for investment in road and transport services during pre-electoral years, with the same amount being, on average, equal to 2.8 billion euros in other years of the term. In practice, spending in road and transport services increases of about 45% in the year preceding the election as compared to the average spending of no pre-electoral years.

Developing from this preliminary evidence, we ask three questions: is spending devoted to road and transport services plagued by political manipulations close to the elections? And, if so, is such an increase targeting local voters? Finally, does the increase in local public expenditure affect the safety level of the municipal roads? Our contribution to the literature is particularly related to the answers of the last two questions. In fact, first we test if the political budget cycle (PBC) is acting through a targeting strategy, by using a specific spending item like road and transport services. Specifically, we define the intensity of the construction sector and test whether the PBC on road services is stronger where the construction sector is more present. The higher the number of firms in the construction sector, which can be targeted, the bigger the incentive to manipulate the expenditure benefitting voters affected by the construction sector. Moreover, we check whether local procurement on roads increase before elections for the targeted group. Finally, we control whether, even if the PBC holds, the increase in expenditure produces any positive effect on the welfare of citizens. We look at the number of accidents in municipal roads and test whether they have been affected by the investment on road services.

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We use a comprehensive dataset at the local level in Italy, which allows detailed information on balance sheet of Italian municipalities. More in depth, we have access to information on all spending functions, as well as on every single service within each of these functions. In turn, this granularity allows us to focus on some specific components of the budget over which the mayor can truly enjoy discretion. To establish the presence of PBC, we exploit the exogenous variation in spending decisions due to the political cycle. Italian municipalities are characterized by staggered election times, so that it is possible to overcome identification issues, that is, since in each year only a fraction of municipalities holds elections, it is possible to control for any other shock common to all municipalities, i.e., we control for change in macroeconomic conditions by including time-specific dummies.

We find that politicians deliberately increase investment on road services prior to the election year, moreover this behaviour is stronger in municipalities where the density of construction firms is higher. Specifically, our estimates suggest that two years before election investment in this municipal service increases by about 20% with respect to the election year and it continues to grow one year before election (27%). Moreover, being in a place with a high density of construction firms increases investments in road services the year before the election by 40% more with respect to the election year , while the increase is lower (26%) in municipalities with a low density of construction firms. This result regarding the pre-electoral year is reflected by the increase in the probability in the year before the election to win a public tender of 52 percentage points with respect to the electoral year in a municipality with high density of construction firms. Our main results survive several robustness checks. At the same time, we detect no relationship between investments in road services and the local road safety, even if when we instrument spending in road services with PBC, as the probability of having an accident in local roads remains substantially unchanged, not only in the year when the spending occurs but also one and two years later.

Taken together, these results support the hypothesis that, indeed, politicians manipulate road service investments for re-electoral purposes by targeting local construction firms.

These findings are coherent with numerous examples around the world documenting mayors while inaugurating new roads, bridges, or sidewalks, as well as paving city streets just before elections.[1] As it regards Italy, attention has recently called in the Italian media to the point that, for example, the title page of *la Gazzetta del Mezzogiorno*, an important newspaper in Southern Italy, in its edition of June 18, 2018 read "2019 Election, new streets and sidewalks: get started with the festival of hypocrisies".

The remainder of the work is structured as follows. Section 2 presents a review of the literature, Section 3 illustrates the institutional context, Section 4 describes the data, while the econometric strategy is presented in Section 5. Preliminary findings and the mechanism behind our findings are discussed in Section 6. The last section offers some concluding remarks.

2. Related literature

The first well known theoretical model explaining the PBC is due to Rogoff (1990), in which voters decide who to vote by guessing about incumbents' competence. An alternative theory explaining PBC, which might result to be more suitable for mature democracies is that by Drazen and Eslava (2010), pointing to the asymmetric information between preferences of politicians and preferences of voters. Along these lines, politicians, maximizing their chances of re-election, decide to target a group of swing voters by signaling that their preferences are aligned with them. Previous literature (Khemani, 2004) tested it indirectly, taking as evidence of targeting behaviour an increase in capital expenditure with respect to current expenditure before elections. The idea is that it is easier to target restricted groups by using capital expenditure (infrastructure projects, such as roads, schools, or water plants) rather than current expenditure (wage of public employees). Also, Bonfatti and Forni (2019) find that in Italy in the pre-electoral year capital expenditure increases with respect to the election year. This effect is more muted for municipalities subject to the Italian sub-national fiscal rule (Domestic Stability Pact). Other papers related to targeting behaviour are those finding the PBC holding for specific items (Frigerio and Vandone, 2020; Repetto, 2018; Sakurai and Menezes-Filho, 2008; Veiga and Veiga, 2007). However, at the best of our knowledge there is no work showing direct evidence of targeting decisions of politicians using the potential role played by targeted voters.

Our work is also related to the wide-spread literature testing for the presence of PBC on both local taxes and expenditure (Galli and Rossi, 2002; Baleiras and Costa, 2004; Geys, 2007; Aidt and Mooney, 2014; Foremny and Riedel, 2014; Galindo-Silva, 2015; Klein and Sakurai, 2015; Baskaran et al., 2016; Kis–Katos and Sjahrir, 2017; Burret and Feld, 2018; Foremny et al., 2018; Revelli, 2019; Bohn and Veiga, 2021). Lastly, our research also ties in the emerging literature tackling the challenges, especially at the local level, of linking PBC and physical output of public policy, given that we also test the impact of the increase in road services investment due to the PBC on the level of road accidents, including electricity service provision (Baskaran et al., 2015), public hospital (Takako and Bessho, 2018), high-school student grades (Pereira dos Santos et al., 2021), legislative production (Lagona and Padovano, 2008), and injury rate of car accidents (Bertoli and Grembi, 2021).

[1] In this regard, in 2021, council leaders in Edinburgh have set out proposals to invest an extra £6 million to improve roads, including £2 million to repair potholes and £4 million to resurface roads and pavements. Such an announcement has been labelled by the opposite coalition to be '[…] a cynical attempt' close to the election to '[…] influence the public' (*The Herald*, 27th April 2021). Opening a new road, and being there in person to cut the ribbon itself, with as much fanfare as possible – is what gets you re-elected while there is no political return in clearing out mud and debris from culverts along 300 km of rural road or re-grading the road after the wet season has passed', cites the international I.T. Transport blog https://www.ittransport.co.uk/blog/why-planning-design-and-engineering-are-really-the-silent-partners-in-infrastructure-development/.

3. Institutional setting

The Italian Constitution defines four administrative layers of government: the central government, regions, provinces, and municipalities. While most regions and provinces are ruled by ordinary statutes, some of them—the autonomous regions and provinces—are ruled by special statutes.[2] Furthermore, Italy counts 107 provinces, which have been reformed (law 56/2014) when their public functions were reduced, and the direct election of their own representatives eliminated. Finally, municipalities are the smallest level of jurisdiction and number around 8,000; the average size is around 6,400 inhabitants, and most have less than 15,000 inhabitants (approximately 90%).

Italian municipalities are responsible for a large array of important public programmes in the fields of welfare, territorial development, local transport, infant schools, sports and cultural facilities, local police, as well as infrastructure spending. As a share of the general government budget, in the timespan covered by our empirical analysis (2005–2015), municipalities account on average for about 8% of total public expenditure, which corresponds to €65 billion per year. The same figure accounts, on average, for 21% in the case of investments, corresponding to €14 billion per year. In relation to the timing of policy decisions, every December the municipal government draws up a draft of the budget, a planning document that details both the total amount and distribution of the municipal expenditures across functions in the year to come and how they will be financed. The budget is discussed in the municipal council and must be approved by the end of the year.

According to the structure of the balance sheets of Italian municipalities, before 2016 the expenditure on investments can be grouped into homegenous functions. It is thus possible to get information on the amount of spending devoted to the twelve expenditure functions (administration & management, justice, police, education, culture, sport, tourism, road & transport, planning & environment, social welfare, in-house production services, and economic development). Approximately 82% of total investments is concentrated in four functions: road & transport services, administration & management, planning & environment, and education (Fig. 1). In particular, the biggest share (42%) of municipal investments is that of road & transport services. The remaining 18% of investments are allocated to the municipal police, welfare, culture, sports, and tourism. Finally, a very low level of resources for investments goes to three other functions: economic development, in-house production services, and justice.

In relation to the municipal-level electoral system, since 1993 Italy has opted for a mayor– council system: the municipal council members and the mayor are separately and directly elected by citizens in elections normally held every five years. The mechanism of direct election implies that the mayor is endowed with strong powers over municipal politics, thereby making herself as the main decision maker as it regards local expenditure and local taxes, even though the council retains the power to dismiss the mayor by means of a vote of no confidence.

4. Data

The empirical analysis is based on a dataset of Italian municipalities resulting from a combination of different archives publicly available. In Italy there are regions and provinces ruled by special statutes, which, due to their special autonomy, are allowed to set their own fiscal rules and transfer policies to their municipal governments, thereby leading to biased conclusions if compared to municipalities belonging to ordinary statute regions. Therefore, we restrict the sample to municipalities located in ordinary-statute regions, and we do not include municipalities with missing values. We obtain a balanced panel sample of 6,574 municipalities, including 72,314 observations spanning from 2005 to 2015.[3] The summary statistics for all variables used in the analysis are reported in Table A1 of the Online Appendix.

4.1. Dependent variables

Data on municipal expenditures recorded on accrual basis are contained in the balance sheets and available from the Ministry of Interior, Department for internal and territorial affairs. Notice that after 2015 there has been a change in the accounts classification and financial data would not be comparable with those before 2015. As previously mentioned, investment decisions of local governments can be grouped into twelve expenditure functions. According to the spending distribution across functions, from Fig. 1 it emerges that on average, the investment allocated to road and transport (*road & transport*) is the most relevant item of the Italian municipal investments. Spending in this function consists of – but it is not limited to – (i) construction of new municipal roads and sidewalks and their maintenance, including repairing of potholes and resurface of roads and pavements (*road services*); (ii) installation and maintenance of public lighting (*public lighting*) and (iii) investments in public transportation, including the purchase of buses, trams, and subways (*public transport*). Turning now to the distribution of these services within the road and transport expenditure function, from Fig. 2 it emerges that on average, the largest portion is allocated to road services (73%), followed by public transport services (20%), and public lighting (7%).

[2] Italy has four autonomous regions (Sicily and Sardinia, which are insular territories, and Valle d'Aosta, and Friuli-Venezia Giulia, which are northern boundary territories) and two autonomous provinces (Trento and Bolzano, which are northern boundary territories).

[3] Since 2015 the Italian municipal budgets follow a different classification. It is therefore not possible to have the same expenditure functions after 2015.

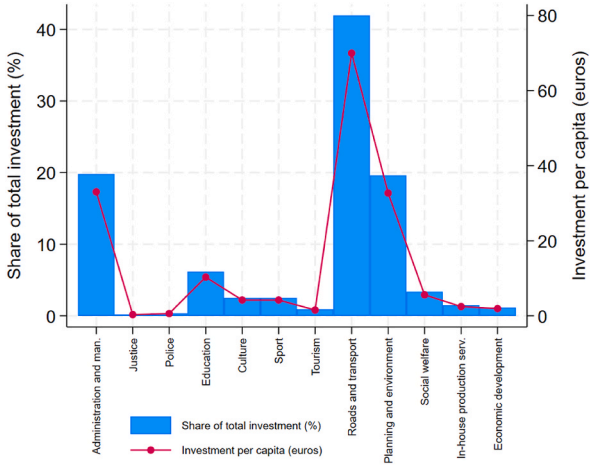

Fig. 1. Municipal investments by functions, average value 2005–2015.

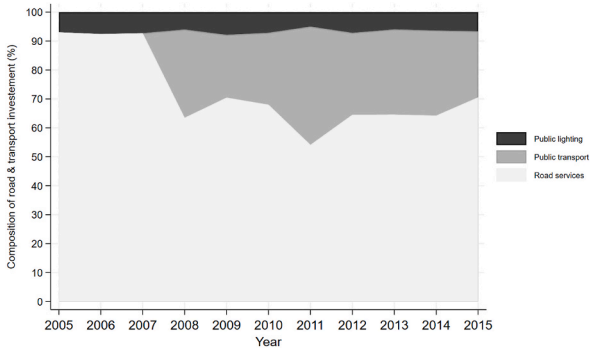

Fig. 2. Composition of road and transport investment, 2005–2015.

4.2. *Construction sector intensity and local procurement in roads*

To build up a measure of the intensity of the construction sector in each municipality we collect information on the economic sector composition of the firms from the 2010 Census in each municipality. We use the percentage of firms in the construction sector relative to the total number of firms as proxy for the presence of the targetable group. We define the variable *high density* equal to 1 if this percentage in the municipality is higher than the 75th percentile of the sample distribution, 0 otherwise.

Furthermore, we use information on public procurement for road construction and maintenance by Italian municipalities, over the period 2010–2015 from a national database managed by the Italy's National Anti-Corruption Authority (ANAC). Notice that these data are available only from 2010 onwards. This will limit our analysis to ANAC data referring to 2010–2015. We collected them until 2015, because our financial data stop at 2015. The ANAC dataset includes all public procurements in Italy with value above € 40,000, and we use only procurements related to roads. These features restrict a lot the number of available municipalities.[4] Second, we take from the Orbis – Bureau van Dijk database the names, social security numbers (*codici fiscali*), and the address (*municipality ISTAT code*) of all Italian firms. We merge these two datasets to obtain the number of local public procurements above € 40,000 in each municipality and for each year, distinguishing between contracts assigned to firms located in the same municipality of the contracting municipality and contracts to firms located in other municipalities. We define the variable *probability of local procurement* as the ratio between the number of road procurements in the municipality won by local firms and the total number of road procurements in the municipality. The *probability of local procurement* could take a minimum value of zero if all the public road procurements in the municipality are assigned to firms not located in the municipality, and a maximum value of one if all public road procurements are given to firms in the same municipality in a specific year.

[4] We show in Table A3 the summary statistics of the socio-economic characteristics of the municipalities inside the ANAC dataset.

4.3. Municipal elections

Municipal elections are normally held every five years between April and June, but the timing is not the same for all municipalities. We collect municipal election results from the Italian Ministry of Internal Affairs. The staggering of electoral dates is the result of local governments having to resign before the end of their term because not able anymore to form a majority in the city council supporting the local government, or because of political scandals or judicial impeachments.[5] As a result, each municipality follows its own electoral cycle (Fig. 3). Specifically, more than half of the municipalities in the sample had elections in 2009 and 2014. The remaining municipalities hold elections in the other years along the period 2005–2015. We build up dummy variables accounting for the year of the election and the years before the election along the electoral term.

4.4. Control variables

The dataset also includes some time-varying control variables that account for differences among municipalities in terms of their population structure and economic condition. The demographic and socio-economic controls include the log of the population (*log population*), population density (*population density*), computed as the ratio between square kilometers of the municipal area and its population, the log of the per capita personal income tax (*log income per capita*), the ratio between the active population, aged between 15 and 64, and, the inactive population, aged between 0 and 4 or over 65 (*age dependency ratio*). These variables can capture the presence of scale economies in the provision of public goods and account for some specific age-related public needs such as nursery schools or assistance to old people.

Since 2001, the Italian Central Government, to fulfil the obligations of the European Stability and Growth Pact, has imposed the so-called Domestic Stability Pact on each municipality with more than 3,000 inhabitants and above 5,000 between 2005 and 2012 and, above 1,000 since 2013. The Domestic Stability Pact essentially implies a tight municipal deficit. Hence, we include a dummy (*domestic stability pact*) that equals 1 if a municipality must fulfil the Domestic Stability Pact, and zero otherwise; this variable should lead to a lower level of capital expenditure (Grembi et al., 2016) and moderate also the effect of the PBC (Gootjes et al., 2021; Bonfatti and Forni, 2019). In addition, considering Galletta (2017), who shows that a commissioner significantly reduces local investments, we include a dummy variable accounting for the presence of a commissioner (*commissioner*). Yet, since the quality of roads affecting the probability of having an accident might be influenced by the number of cars and any other means of transportation using them, we collected data at the municipal level of the vehicle fleet measured in per capita terms (*vehicle fleet*). Finally, the personal characteristics of the mayors may affect policy outcome at the local level. Therefore, we account for the mayor's characteristics: age (*age*), gender (*gender*),educational attainment (*education*), previous occupation (*profession*), party (*left wing* and *right wing*), tenure in office (*years in office*), and difference in vote share between the mayor and the challenger candidate in the last election (*margin of victory*).[6] Municipal geographical characteristics and municipal population data are taken from the Italian Statistical Office (ISTAT), municipal income from the fiscal declarations (Ministry of Economy), municipal number of vehicles from Ministry of Transport, and characteristics of the elected mayors from the Census of Local and Regional Administrators (Ministry of the Interior).

5. Empirical strategy

We are interested in understanding how investment decisions in road and transport services are affected by political incentives. Nevertheless, it is worth mentioning that providing causal evidence of the existence of the PBC is not an easy task, as it might be difficult to separate any year-of-the-term effect from other changes in macroeconomic conditions. A possible way to overcome this issue is to exploit the staggered time of elections: a typical feature of Italian municipalities. More specifically, the staggered timing of the Italian municipal elections is mainly the result of historical events and probably unrelated to modern-day outcomes.[7] Therefore, the model we estimate takes the following form:

$$y_{it} = \alpha + \beta \boldsymbol{d}_{it} + \gamma \boldsymbol{X}_{it} + \tau_i + \mu_t + \epsilon_{it} \tag{1}$$

[5] More specifically, the staggered nature of local elections can be attributed to historical reasons. In fact, at the end of the Second World War in 1946, all the ruling war councils had to be replaced. Despite the replacement occurring at the same time for all cities, in subsequent decades several municipalities faced government crises, and new elections took place. Moreover, early terminations for other reasons, such as dissolution for suspected mafia infiltration in the council, commissioner intervention, merging with other municipalities and violations of the law and absence of candidates, changed the length of terms and the timing of elections.

[6] In more detail, *gender* is a dummy variable that is equal to one if the mayor is female and zero otherwise. *Education*, is a categorical variable that captures the maximum level of education of the mayor, corresponding to 1 for having obtained a middle school diploma, 2 for a high school diploma, and 3 for a bachelor's degree or more than that. *Profession* is a categorical variable indicating the occupation of the mayor before the election, ranging from 1 to 8, where 1 = managers; 2 = high-level professions (engineers, doctors, etc.); 3 = freelancers, teachers, and educators; 4 = office workers; 5 = traders and dealers; 6 = artisans and farmers; 7 = factory workers; 8 = unemployed, job seekers, retirees, and others; 9 = police and military. *Left wing* is a dummy variable equal to one if the mayor is elected in a list supported by center left-wing parties. *Right wing* is a dummy variable equal to one if the mayor is elected in a list supported by center right-wing parties. *Years in office*, computed as in Coviello and Gagliarducci (2017), counts the number of years from the date of election of the incumbent mayor.

[7] See Coviello and Gagliarducci (2017) for a detailed discussion of the staggered election dates in Italy.

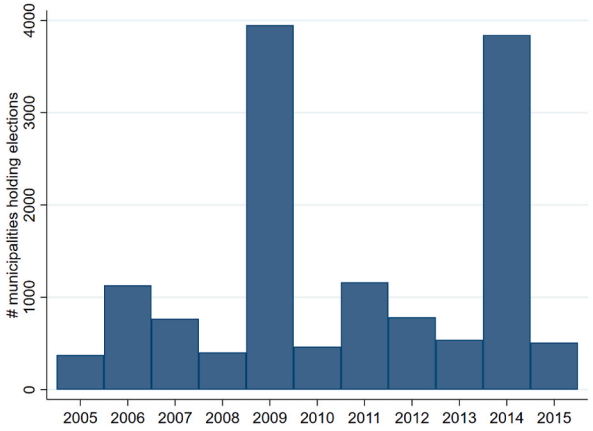

Fig. 3. Timing of municipal elections in Italy.

where y_{it} is the log of per capita investment in road and transport of municipality i at the year t, $\boldsymbol{d_{it}}$ is a set of four dummies for each municipality i and for each year in the term defined as follows:

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

and zero otherwise, where the indicator relative to the election year, d_{it}^{τ}, is excluded from the estimation to avoid perfect multicollinearity, which would make it impossible to estimate all five year-in-term indicators, and so all coefficients of the four dummies can be interpreted as deviations from the election year. The vector $\mathbf{X}_{it}$ includes municipality, mayor-level, and political controls as described in section 3.4. τ_i is an unobserved municipal specific effect, μ_t is a year specific effect and ϵ_{it} is the error term, clustered at the municipal level. In practice, following the specification outlined in Eq. (1), the year-in-term indicators capture any fluctuations in spending due to the PBC and vary cross-sectionally by municipality, as municipalities are at different points of the electoral cycle. Moreover, given that in each year there are municipalities that hold elections and municipalities that do not hold elections, it is possible to control for common shocks to all municipalities (as changes in macroeconomics conditions) by including time-year dummies.

6. Results

6.1. Baseline results

The first round of results is shown in Table 1. Each of the four columns correspond to different specifications of Equation (1). The baseline specification, which factors in municipal and year fixed effects, is reported in Column (1). The model in Column (2) includes all socio-demographic and economic factors and all the personal characteristics of the mayors described in Section 4.4. Since Italian regions might grant municipalities of additional transfers for investment purposes, one might argue that there could be some other unobservable characteristics related to the specific region that might influence the municipal decision on investment in the road and transport function along time, thus affecting our dependent variable. So in Column (3) we include a set of region-by-year fixed effects to account for unobservable region-specific characteristics that vary over time.

The results in Table 1 show a path consistent with the presence of the PBC at the local level.[8] Taking the election year as the baseline, our estimates suggest that municipal investment in road and transport services increases as elections get close and then drops just after elections, before continuing to rise again. Following Column (3), investment two years before the election is 20.9% higher than in the election year. Investment increases of 26.7% in the year immediately before the election. In the year after the election the investment drops, in fact the differential effect with respect to the election year is not statistically significant. Three years before the next election, the cycle begins again, in fact the investment is found to be 19.3% higher with respect to the election year.

The presence of zero values in the dependent variable is relevant (12.96% of total observations), since when we use the log linear transformation we must drop all observations with zero expenditure. Therefore, the PBC coefficients could be sensitive to the log linear

[8] We replicated the same regression by using as dependent variable road and transport pc. Results, reported in Table A6, do not change.

Table 1
Political budget cycle effect of per capita investment in road and transport.

	(1)	(2)	(3)	(4)
	Log road & transport pc	Log road & transport pc	Log road & transport pc	Road & transport pc PPML
One year before election	0.286[a]	0.267[a]	0.267[a]	0.253[a]
	(0.031)	(0.034)	(0.035)	(0.039)
Two years before election	0.272[a]	0.247[a]	0.209[a]	0.193[a]
	(0.030)	(0.032)	(0.033)	(0.036)
Three years before election	0.217[a]	0.197[a]	0.193[a]	0.137[a]
	(0.030)	(0.031)	(0.032)	(0.035)
One year after election	0.021	0.012	0.032	0.045
	(0.030)	(0.031)	(0.031)	(0.034)
Log population		−2.405[a]	−2.111[a]	−1.296[a]
		(0.367)	(0.341)	(0.310)
Age dependency ratio		0.340[a]	0.217[a]	−0.118
		(0.077)	(0.079)	(0.083)
Population density		−0.001	−0.001	−0.002[a]
		(0.001)	(0.001)	(0.000)
Log income per capita		0.140	0.146	0.045
		(0.230)	(0.233)	(0.222)
Domestic stability pact		−0.130[a]	−0.130[a]	−0.169[a]
		(0.048)	(0.048)	(0.047)
Commissioner		−0.192[b]	−0.255[a]	−0.277[a]
		(0.086)	(0.087)	(0.097)
Age		−0.001	−0.001	−0.002
		(0.002)	(0.002)	(0.002)
Gender		−0.039	−0.059	−0.041
		(0.047)	(0.046)	(0.041)
Education		0.015	0.019	0.005
		(0.026)	(0.025)	(0.023)
Profession		0.000	0.001	−0.001
		(0.007)	(0.007)	(0.007)
Margin of victory		0.076	0.056	0.076
		(0.051)	(0.049)	(0.053)
Left wing		0.003	−0.000	0.082[c]
		(0.050)	(0.051)	(0.047)
Right wing		−0.072[c]	−0.073[c]	−0.005
		(0.041)	(0.041)	(0.041)
Years in office		0.005	0.004	−0.006
		(0.004)	(0.004)	(0.005)
Constant	3.702[a]	20.036[a]	18.082[a]	14.613[a]
	(0.021)	(3.450)	(3.480)	(3.283)
Observations	28,345	28,293	28,293	72,139
R-squared	0.408	0.415	0.436	0.534
Number of municipalities	3,413	3,413	3,413	6,569
Municipalities FE and Year FE	YES	YES	YES	YES
Municipal and mayor controls	NO	YES	YES	YES
Region×year FE	NO	NO	YES	YES

Robust standard errors in parentheses, clustered at municipal level.
[a] $p < 0.01$.
[b] $p < 0.05$.
[c] $p < 0.1$.

transformation of the dependent variable. To address this issue, we adopt the Poisson Pseudo-Maximum-Likelihood (PPML) method[9] (Santos Silva and Tenreyro, 2006). The results using the PPML estimation are in line with the log-linear estimation (Table 1 – Column 4): road and transport investment increases of 25.3% in the year immediately before the election. Taken together, these results show the presence of the PBC for Italian municipalities.

We exploit the granularity of our database by analysing the different components of the investment in road and transport. The road and transport function is composed by three services: (i) road services; (ii) public lighting, and (iii) public transport.

We estimate Equation (1) separately using each of these three services as dependent variable. It is so possible to detect whether the PBC is associated with a specific component of the road and transport spending function. The results of this analysis, shown in Figs. 4 and 5, indicate that the incentive to manipulate policy outcomes close to elections is entirely driven by road services (Fig. 4).[10]

[9] To implement the PPML estimation, we use the Stata's package *ppmlhdfe* (Correia et al., 2020).
[10] The estimates of Fig. 5 are from Table A4 of the Online Appendix.

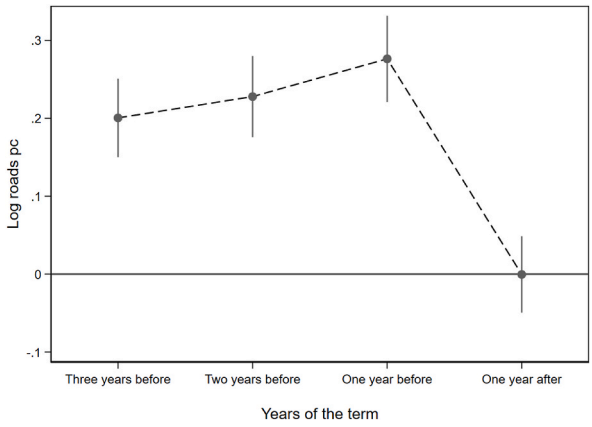

Fig. 4. The political budget cycle on per capita investment in road services.

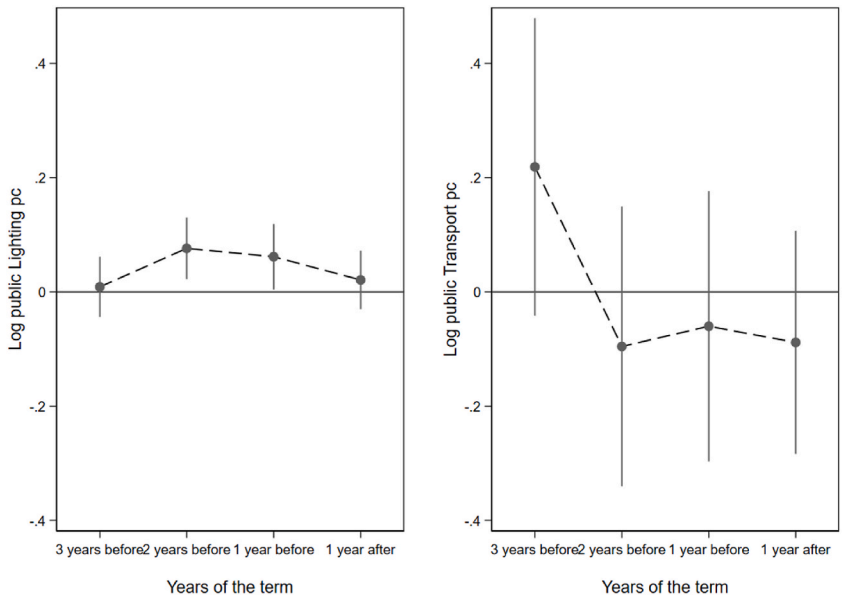

Fig. 5. Political budget cycle in public lighting and public transport investment.

In particular (Table 2 - Column 3),[11] it turns out that, compared to the electoral year, two years before election, municipalities increase investment in road services by 19.6%. Also, in the year before the election investment in road services increases with respect to the election year of 27.2%. After the election, the investment in road services decreases while raising again three years before elections. We obtain the same results by using the PPML estimation (Table 2 – Column 4).

For the other two items of the road and transport function (Fig. 5), it emerges that these services are not plagued by political manipulation as there is no evidence of PBC, neither for public lighting, nor for public transport.

Therefore, the incentive to manipulate policy outcome close to the election increases municipal investments devoted to roads. In practice, as elections are approaching, local policy makers invest in repairing potholes and resurfacing roads and pavements.[12]

6.2. *The targeting explanation*

To test if the pre-electoral road services' investments is higher in cases where targetable groups are present (Drazen and Eslava, 2010), we collect information on the economic sector composition of the firms in each municipality from the 2010 Census. We use the percentage of firms in the construction sector on the total number of firms as proxy for the presence of the targetable group. We use a

[11] We replicated the same regression by using as dependent variable road services pc. The results, reported in Table A7, do not change.
[12] For this reason, from this point of the paper onwards, we adopt road services investment per capita as our main variable of interest.

Table 2
Political budget cycle effect on per capita investment in road services.

	(1)	(2)	(3)	(4)
	Log road services pc	Log road services pc	Log road services pc	Road services pc PPML
One year before election	0.298[a]	0.276[a]	0.272[a]	0.238[a]
	(0.030)	(0.034)	(0.034)	(0.041)
Two years before election	0.255[a]	0.228[a]	0.196[a]	0.183[a]
	(0.030)	(0.032)	(0.032)	(0.038)
Three years before election	0.222[a]	0.200[a]	0.197[a]	0.137[a]
	(0.030)	(0.031)	(0.031)	(0.036)
One year after election	0.012	−0.000	0.025	0.030
	(0.029)	(0.030)	(0.031)	(0.036)
Log population		−2.426[a]	−2.176[a]	−1.356[a]
		(0.351)	(0.336)	(0.326)
Age dependency ratio		0.283[a]	0.189[b]	−0.144
		(0.076)	(0.078)	(0.088)
Population density		−0.001	−0.001	−0.002[a]
		(0.001)	(0.001)	(0.001)
Log income per capita		0.053	0.099	−0.038
		(0.222)	(0.228)	(0.233)
Domestic stability pact		−0.093[b]	−0.102[b]	−0.185[a]
		(0.047)	(0.046)	(0.049)
Commissioner		−0.214[b]	−0.293[a]	−0.282[a]
		(0.085)	(0.087)	(0.107)
Age		−0.001	−0.001	−0.002
		(0.002)	(0.001)	(0.002)
Gender		−0.053	−0.067	−0.084[b]
		(0.044)	(0.043)	(0.042)
Education		0.023	0.030	0.001
		(0.024)	(0.024)	(0.024)
Profession		−0.002	−0.001	−0.000
		(0.007)	(0.007)	(0.008)
Margin of victory		0.059	0.047	0.064
		(0.050)	(0.049)	(0.056)
Left wing		0.040	0.043	0.100[b]
		(0.048)	(0.048)	(0.049)
Right wing		−0.066[c]	−0.068[c]	0.005
		(0.040)	(0.040)	(0.044)
Years in office		0.006	0.004	−0.004
		(0.004)	(0.004)	(0.005)
Constant	3.599[a]	21.060[a]	18.962[a]	15.787[a]
	(0.020)	(3.438)	(3.484)	(3.411)
Observations	30,182	30,121	30,121	72,078
R-squared	0.412	0.418	0.437	0.529
Number of municipalities	3,413	3,413	3,413	6,563
Municipalities FE and Year FE	YES	YES	YES	YES
Municipal and mayor controls	NO	YES	YES	YES
Region×year FE	NO	NO	YES	YES

Robust standard errors in parentheses, clustered at municipal level.
[a] $p < 0.01$.
[b] $p < 0.05$.
[c] $p < 0.1$.

dummy variable accounting for high density of construction firms (*high density*) [13] which equals 1 if the percentage of firms in the construction sector in the municipality is higher than the 75th percentile.[14] In this percentile 24% of total firms belongs to the construction sector.[15]

[13] We show in Table A2 the summary statistics of the socio-economic controls for the two samples of municipalities with low and high density of construction firms.

[14] One could argue that municipalities with high density of construction firms are also those more populated and so the effect we find is simply due to population. However, the correlation between the high-density dummy and population is negative (−0.113) and not statistically significant. Moreover, to check whether the impact of the density of construction firms on the PBC effect is due to population, we replicated Eq. (2) by interacting each term with the log of population. The triple interaction between political budget cycle, high density and log of population turns out to be not statistically significant at the conventional level. Hence, we can conclude that population does not affect the impact of the high-density dummy on the PBC effect.

[15] As robustness test, in Table A5 we use different definitions of high intensity: percentage in the construction sector higher than the median. Results do not change.

We interact this *High density* dummy variable with the $\boldsymbol{d_{it}}$ set of year-term dummies and estimate the following equation:

$$y_{it} = \alpha + \beta_1 \boldsymbol{d_{it}} + \beta_2 \boldsymbol{d_{it}} \times High\ density_i + \gamma \boldsymbol{X_{it}} + \tau_i + \mu_t + \epsilon_{it}. \quad (2)$$

According to the estimates of Table 3 – Column 1,[16] we find that the increase in road service investments in the pre-electoral year is significantly higher in municipalities characterized by high presence of construction firms. In the year before election municipalities with a high density of construction firms, increase road services investment by 40.2%, while for municipalities with a low presence of construction firms, road investment increases by 26.2%. Therefore, the increase in road services investment is more marked for municipalities with a strong presence of the targeted group, represented by the construction firms. Notice that the PBC is channelled through the targeting behaviour of the policy maker only in the year before elections. The PPML estimation (Table 3 – Column 2) confirms this result.

But is the estimated increase in investment going to local firms? To answer this question, we run a regression using as dependent variable the *probability of local procurement* which is, for each municipality, the ratio between the number of road procurements won by local firms and the total number of road procurements in the same municipality. We find (Table 4) that in municipalities with high density of construction firms the year before the election the probability of a local public procurement increases by approximately 52 percentage points with respect to the electoral year, while public procurement does not change in the pre-electoral year with respect to the electoral year in municipalities with low density of construction firms.

Our result is of course not only because the owners of the construction firms can vote the politician who is targeting them, but also because plausibly they can influence other voters linked to their business. The more the firms in the targeted sector are, the more jobs they can create, and the more income can circulate and so convince benefitting people to vote the politician granting the procurements. This effect is important in a sector like construction which is very labor intensive. As an example, recently four construction companies (https://economictimes.indiatimes.com/markets/stocks/news/election-push-coming-4-construction-contracting-companies-with-buy-recos-have-upside-potential-of-up-to-36/articleshow/101413085.cms) in India have been estimated to have an upside potential up to 36%, because of the push due to the incoming elections. This forecast will mean increase in the wealth of people owning the shares of these companies, but also a big increase in employed people in the sector. For the same reason politicians also target the construction sector in UK. (https://www.hst.uk.com/news/how-could-the-election-affect-the-construction-industry/)

6.3. Impact on road accidents

This increase in the road services' investment could also result in improved local road safety, mitigating the idea that the PBC implies waste of public resources. To test the plausibility of this assumption, we collect additional information from ISTAT over the period 2010–2015 on accidents on urban and non-urban roads directly managed by municipalities.

If investments in road services affect safety, by repairing potholes and resurfacing roads and pavements, one should expect to observe a decline in the probability of accidents. Therefore, we estimate the extent to which the probability of having an accident in the municipal roads depends on the amount of investment in road services. The model we estimate takes the following form:

$$\Pr Accident_{it+\theta} = \gamma' Roads_{it} + \delta Vehicle\ fleet_{it} + \beta' X_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (3)$$

where $\Pr Accident_{it+\theta}$ is the probability of observing an accident in a road of municipality i at time $t + \theta$, where θ is equal to 1 and 2, $Roads_{it}$ is the per capita investments for road services in municipality i at time t. $Vehicle\ fleet_{it}$ is the number of the vehicle fleet for each municipalities and for each year, measured in per capita terms. The vector X_{it} includes control variables described in Section 3.4, while μ_i and τ_t are municipal and year fixed effects. Robust standard errors (ε_{it}) are clustered at the municipal level. We do not find any link between the road services investment and the probability of having an accident (Table 5). This is a suggestive result even if it is true that there may be many other unobservable driving the result. Interestingly we also find the same result (Table 6) when we exploit the change in spending decisions due to the PBC in a two-stage model. More in details, we adopt Eq. (1) as the first stage,[17] whose fitted values are used in the second stage, Eq. (3).[18]

From our results it seems therefore unlikely that the observed increase in investment on road services induced by the PBC is motivated by road safety-security reasons.

6.4. Robustness tests

We conducted a battery of robustness tests that address possible issues related to the research design that could bias the baseline estimates.

More precisely, we first check whether the council resignation/dismissal is endogenous to local area circumstances. Second, we test

[16] We replicated the same regression by using as dependent variable road services pc. The results, reported in Table A8, do not change.

[17] The Hansen J-test for overidentifying restrictions reported at the bottom of Table 6 does not reject the validity of the instruments in all specifications. This last evidence, together with the strong statistical significance of the year-in-the-term dummies instruments, detected in the estimate of Table A6, indicates that the instruments are valid.

[18] It is worth mentioning that such a two-stage estimation strategy allows to mitigate the endogeneity bias, due to the fact that the decision to invest in roads infrastructure might be simultaneously determined with the probability of observing an accident.

Table 3
Political budget cycle impact on per capita investment in road services with high-density interaction.

	(1)	(2)
	Log road services pc	Road services pc PPML
One year before election	0.262[a]	0.211[a]
	(0.031)	(0.038)
One year before election × High density	0.140[c]	0.150[b]
	(0.077)	(0.070)
Two years before election	0.185[a]	0.195[a]
	(0.029)	(0.038)
Two years before election × High density	−0.005	0.051
	(0.068)	(0.063)
Three years before election	0.131[a]	0.120[a]
	(0.027)	(0.037)
Three years before election × High density	0.006	0.142[b]
	(0.064)	(0.064)
One year after election	0.050	0.031
	(0.028)	(0.039)
One year after election × High density	0.092	0.131
	(0.066)	(0.085)
Constant	21.263[a]	23.791[a]
	(3.693)	(4.507)
Observations	30,121	72,078
R-squared	0.457	0.776
Number of municipalities	3,143	6,563
Municipalities FE	YES	YES
Year FE	YES	YES
Municipal and mayor-specific controls	YES	YES
Region×year FE	YES	YES

Robust standard errors in parentheses, clustered at municipal level. Municipal controls: log population, age dependency ratio, log income per capita, commissioner, domestic stability pact, and population density. Mayor-specific controls: age, gender, education, profession, left wing, right wing, years in office, and margin of victory.
[a] $p < 0.01$.
[b] $p < 0.05$.
[c] $p < 0.1$.

whether variables that cannot be influenced by the local policy maker (i.e. transfers) are affected by the PBC. Third, we replicate our analysis by using our dependent variable as shares (over the total amount on expenditure in investments) instead of levels. We exploit the peculiarity of the Italian municipal electoral system, which establishes a limit of no more than two consecutive mandates, to test the incentive to manipulate policy outcome close to elections, as no term-limited mayors are expected to strategically manipulate investments before elections, while such incentives should be less marked for term-limited mayors. We test whether politicians strategically raise spending before elections to buy consensus in areas characterized by less educated voters as compared to areas with high educated ones. We check whether our main findings are sensitive to the exclusion of a single region, given the key role of regional governments in setting additional grants to municipalities for investment purposes.

All results of the robustness check are described and reported in Section B of the Online Appendix and confirm our main results.

7. Conclusions

Italy is a good laboratory to test whether local policy makers have incentives to strategically manipulate policy decisions close to elections, for at least two reasons. First, Italian municipalities are characterized by staggered election times, so that it is possible to separate the year-in-term effects from any other shock common to all municipalities. Second, the granularity of the balance-sheet of municipalities allows information on all spending functions, as well as on every single service within each of these functions, to be collected and analysed.

In this paper, we have exploited these unique features to analyse whether road and transport services, an economically relevant to voters spending item of the budget, are plagued by political manipulations close to elections with the aim to target a specific group of voters. We found evidence of the PBC, as investment for road services two years before elections increases around 20% with respect to the election year, and it continues to grow one year before the election, by 27% with respect to the election year, while decreasing in the year just after the election. We dig into the mechanism behind this result and find that politicians use road services investment to target construction sector areas. In fact, in municipalities where the number of construction firms is high the investment on road services increases in the year before the election, with respect to the electoral year, about the double than in other areas. Moreover, we found that local public procurement on road increases by 52 percentage points in the year before the election with respect to the electoral year, only in municipalities with high density of construction firms.

We further investigate whether the increase in investments on road services observed before elections is driven by politicians who

Table 4
Political budget cycle effect on the probability of local procurement.

	(1)
	Probability of local procurement
One year before election	0.083
	(0.065)
One year before election × High density	0.435[a]
	(0.226)
Two years before election	0.020
	(0.066)
Two years before election × High density	0.095
	(0.234)
Three years before election	0.086
	(0.062)
Three years before election × High density	−0.035
	(0.212)
One year after election	−0.017
	(0.064)
One year after election × High density	−0.052
	(0.234)
Constant	−0.231
	(1.787)
Observations	8,309
Number of municipalities	1,212
Year FE	YES
Municipalities FE	YES
Municipal and mayor-specific controls	YES
Region×year FE	YES

Robust standard errors in parentheses, clustered at municipal level. Municipal controls: population, age dependency ratio, income per capita, commissioner, domestic stability pact, and population density. Mayor-specific controls: age, gender, education, profession, left wing, right wing, years in office, and margin of victory.
[a] $p < 0.1$.

Table 5
Effect of per capita investment in road services on the probability of having accidents, OLS specification.

	(1)	(2)
	Probability of having accidents (t+1)	Probability of having accidents (t+2)
Road services pc	−0.001	0.001
	(0.001)	(0.001)
One year before election	−0.921	0.343
	(0.751)	(1.049)
Two years before election	−0.703	−0.646
	(0.700)	(0.965)
Three years before election	−0.774	0.504
	(0.664)	(0.855)
One year after election	−0.011	−0.271
	(0.665)	(0.794)
Vehicle fleet	−7.310	4.424
	(5.767)	(5.647)
Constant	75.071[a]	65.573[a]
	(9.314)	(11.690)
Observations	31,258	25,006
Number of municipalities	6,252	6,252
R-squared	0.645	0.675
Municipalities FE	YES	YES
Year FE	YES	YES
Municipal and mayor-specific controls	YES	YES

Robust standard errors in parentheses, clustered at municipal level. Municipal controls: population, age dependency ratio, income per capita, commissioner, domestic stability pact, and population density. Mayor-specific controls: age, gender, education, profession, left wing, right wing, years in office, and margin of victory.
[a] $p < 0.01$.

simply want to enhance their probability to get re-elected or, instead, if the rise in the road services' investment also reflects an improvement in local road safety. We find suggestive evidence that the investment in road services, following the PBC, does not affect the probability of having an accident in roads directly managed by municipalities. Of course, the probability of having an accident can

Table 6
Effect of per capita investment in road services on the probability of having accidents, second stage of a 2SLS specification.

	(1)	(2)
	Probability of having accidents (t+1)	Probability of having accidents (t+2)
Road services pc	−0.031	0.001
	(0.038)	(0.038)
Vehicle fleet	−3.659	7.814
	(8.346)	(7.771)
Observations	31,258	25,006
R-squared	−0.042	0.006
Hansen J statistic (p-value)	0.745	0.242
Number of municipalities	6,252	6,252
Municipalities FE	YES	YES
Year FE	YES	YES
Municipal controls	YES	YES
Mayor-specific controls	YES	YES
Region×year FE	YES	YES

Robust standard errors in parentheses, clustered at municipal level. Municipal controls: population, age dependency ratio, income per capita, commissioner, domestic stability pact, and population density. Mayor-specific controls: age, gender, education, profession, left wing, right wing, years in office, and margin of victory. First stage estimations are reported in Table A6, Column 3.

also be influenced by other variables which we may not consider in our estimate.

What all of this seems to point to is that the budget cycle in Italian municipal spending is sizeable, as investment in road and transport the year before elections is almost one-third higher on average than in election years, corresponding to about 1.2 billion euros more. Such an increase seems to be guided by a targeting strategy for electoral concerns.

To avoid the impact of this behaviour on the level of expenditure a first approach could consist in setting a spending threshold in the year before the election for some items of the budget, and precisely those that are likely to be the targeted, such as road and transport services. An alternative could consist in establishing a formula such that investment spending in some items of the budget cannot exceed, within the mandate of the mayor, the level of investment set during the previous year. This rule would commit mayors to reshape their investment plan in such a way to reach the maximum level in the first year of their mandate and to have a decreasing, or at least the same level of investment in the following years. In this case, where the level of investment is motivated by real needs, such an investment would be constrained to what has been planned in the first year, thereby reinforcing the role of having an adequate, and supervised, investment plan.

CRediT authorship contribution statement

Massimiliano Ferraresi: Writing – review & editing. **Leonzio Rizzo:** Writing – review & editing. **Riccardo Secomandi:** Writing – review & editing.

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- none third party had the right to review the paper prior to its circulation;
- the manuscript represents valid work and that neither this manuscript nor one with substantially similar content under my authorship has been published or is being considered for publication elsewhere;
- that each co-author participated sufficiently in the work to take responsibility for the content;
- the work did not involve data relating to human or animal experimental investigations or involving human subjects;
- none of the authors use generative AI and AI-assisted technologies in the writing process of this paper.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ejpoleco.2024.102589.

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