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Separating the Accountability and Competence Effects of Mayors on Municipal Spending

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Abstract. The Italian legislation provides a two-term limits for mayors, but it allows term limited mayors to pass on the torch to their deputies as candidates for mayorship. We exploit this feature of the electoral system to design a novel identification strategy for separating 'accountability' (the difference in performance between two politicians facing different incentives in terms of re-elections) and 'competence' (the difference in performance between two politicians with different experience in policy making). Using a panel of 1,203 Italian municipalities, from 1998 to 2006, we find a significant role for competence but not for accountability on municipal spending. Specifically, second-and-last-term mayors, and first-term mayors with previous experience as executive officers, spend less, on average, than inexperienced first-term mayors. We also discuss the policy implications of this finding.

Keywords: Accountability, Competence, Term limits, Italian municipalities.

JEL Codes: D72, H72

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1 Introduction

Two of the desirable features of any electoral system in representative democracies are, on the one hand, making politicians accountable for their choices and, on the other hand, enabling voters to select the more competent representatives among those running for elections. Since the pioneering studies by Barro (1973) and Ferejohn (1986), a large theoretical literature has investigated how elections can mitigate both moral hazard and adverse selection, by creating incentives for improved accountability and by allowing voters to select competent politicians (see, e.g., Persson and Tabellini, 2001; Ashworth, 2005; Besley, 2006; Besley and Smart, 2007). Following these theoretical arguments, several authors have studied the effects of elections on different policies, supporting the role for both accountability and competence (see, for instance, Persson and Svensson, 1989; Tabellini and Alesina, 1990; Rogoff, 1990; Harrington, 1993; Besley and Case, 1995a; Coate and Morris, 1995; Bordignon and Minelli, 2001; Alt and Lassen, 2003; Ashworth, 2012; Gagliarducci and Nannicini, 2013; Bordignon *et al.*, 2017).

Providing separate empirical estimates for the role of accountability and competence on policies can be very useful to guide the institutional design of electoral systems but it has proven a difficult task. In an influential work, Alt *et al.* (2011) exploit variations in the US states electoral systems — comprising one-term, two-term, and no-term limits — to disentangle accountability and competence. They define accountability as the difference in performance between two politicians facing different incentives in terms of re-elections (because of term limitations) but with equal experience in policy making. And competence as the difference in performance between two politicians with a different length of tenure (because of their experience in office) but facing the same incentives in terms of exerting costly effort to gain re-election. Hence, for instance, by comparing measures of policy performance of first-term governors in one-term limit systems (not accountable, short experience) to those of first-term governors in two-term limit systems (accountable, short experience) they can identify the accountability effect of elections. And by comparing the performances of the former to those of second-term governors in two-term limit systems (not accountable, long experience) they can identity the competence effect. By exploiting the presence of electoral systems without term limitations to provide additional references to identify the two effects, the estimates obtained by Alt *et al.* (2011) show that both competence and accountability matter for policy performance of US states governors.

In this paper, we propose a novel empirical strategy for disentangling the accountability and competence effects, which — differently from Alt *et al.* (2011) — is not based on variations in electoral systems across the same type of political jurisdictions.

A crucial feature of our analysis is that we consider policy making in any given municipality as resulting from the collective decisions of a 'team' of politicians — the mayor and her/his deputies within the executive committee of the city council. Our focus is on municipal elections in Italy, where the law imposes a two-term limit for mayors. However, only mayors are subject to the term limit provision, not their deputies. Hence, it is not unusual that — while mayors are serving their last term of office — one of the deputies takes the decision to run for mayorship at the following electoral term.[1] This practice has two implications. First, it affects the incentives of policy making in municipalities governed by second-and-last-term mayors, since the deputy running for mayorship at the following elections faces re-election concerns that the mayor does not face. In a sense, appointing the deputy can be seen as a way to overcome the term limit by the incumbent party. The second implication is that term limitation does not necessarily lead to loss of competence, as 'new' mayors who served as deputies in previous terms do already have experience in municipal administration.

Our empirical strategy to provide separate estimates for the role of accountability and competence is thus as follows. On the one hand, by comparing second-term incumbents with the deputy-mayor running for mayorship to second-term incumbents with the deputy-mayor *not* running for mayorship, we can identify accountability, since, while both experienced, the former are accountable whereas the latter are not. On the other hand, by comparing first-term incumbents with previous experience to first-term incumbents without previous experience, we can identify competence, since, while both accountable, the former are experienced whereas the latter are not.

To set the stage for the empirical analysis, we adapt to our purpose the agency model of political accountability and selection of candidates developed by Alt *et al.* (2011). In particular, we allow the deputies of lame duck mayors to run for mayorship in an electoral system with a two-term limit. Regarding the theoretical framework, we also take in the important observation made by Alt *et al.* (2011, p. 173): the theoretical model is not intended to show the existence and the nature of the accountability and competence effects in elections; rather, assuming that the two effects exist, its function is to deliver a proper identification strategy for the empirical analysis.

The empirical analysis is based on an original dataset covering nine years (from 1998 to 2006) of spending decisions in 1,203 Italian municipalities belonging to the Piedmont Region, a large and rich region in the North-Western corner of Italy. The focus on municipal elections in a specific region allows us to hold constant cultural and socio-

[1] In a recent work on Italian municipalities, Daniele *et al.* (2021) investigate the role of political dynasties — the transmission of power among family members — on policy making at the local level. Our analysis considers political dynasties irrespective of family ties.

economic traits which might affect the behavior of local politicians and voters. Our empirical models control for a number of factors that may affect policy decisions: the political budget cycle, the political alignment with upper government layers from which municipalities receive grants, the degree of electoral competition, voters' ideological hysteresis. We also control for some fiscal characteristics of the municipalities, such as the amount of per capita transfers and the presence of fiscal restraints imposed by the central government.

Our estimates show that competence matters for municipal expenditure, since experienced policy makers spend less — on average about 13% on capital spending — than inexperienced ones. On the contrary, accountability does not play a significant impact on municipal spending *per se*, since first-term policy makers with experience (i.e., mayors who held a deputy position in previous terms) and last-term policy makers — both those governing and those not governing in team with the next candidate for mayorship — set similar levels of per capita expenditure. In terms of the theoretical framework, these findings are coherent with a policy environment in which first term politicians without previous experience are unlikely to be competent in municipal administration, while competent politicians are able to obtain a good policy outcome even without putting much effort in policy making.

Our empirical strategy also allows for a direct comparison with previous empirical studies — that we review in Section 3 — focusing on the impact of term limits on policy choices. Term limits are a controversial issue in political electoral systems. Their advocates argue that, by breaking ties to special interests, term limits reduce the power of lobbies to influence policy making. They are also an effective mean to eliminate incumbency advantage, thus giving the opportunity to 'fresh' politicians to take office and to promote new ideas. Moreover, by reducing the value of holding office, term limits promote 'truthful' behavior since term limited policy makers do not face re-erelection incentives that may distort their decisions. However, term limitation brings also some disadvantages. Along with the careers of bad politicians, term limitation terminates those of good ones, thereby reducing the accountability role of elections. It determines also loss of knowledge, experience and competence, which may even increase the power of lobbies. Finally, the absence of re-election prospects under term limitation attenuates the incentives to exert effort in policy making, with an ambiguous impact on fiscal performance, since effort can be directed to enhance the efficiency of policy interventions but also to pork-barrel projects. Our results suggest that term limitations *per se* do not have a significant impact on municipal spending.[2]

[2]Focusing on different aspects of the above mentioned trade-offs, Bernhardt *et al.* (2004) and Smart and Sturm (2013) address the normative question of characterizing under which conditions term limits

The remainder of the paper is organized as follows. Section 2 presents the theoretical model of local elections with term limits and derives the identification strategy. Section 3 describes the data, sets up the empirical strategy, and presents the estimates of the determinants of spending decisions in our panel of Italian municipalities. Section 4 concludes and addresses the policy implications of our findings, while the details of the theoretical model not included in the text are in a Mathematical Appendix.

2 The theoretical model

Alt *et al.* (2011) set up an infinitely repeated electoral game between a representative voter and politicians to derive testable predictions about accountability and competence effects under three types of electoral systems: one-term limit, two-term limit and no-term limit. We take their two-term limit case and adapt it to fit the situation of Italian municipal elections, which is the focus of our empirical analysis.

We first illustrate the general structure of a political and electoral term, and then describe the specific features of first and second terms of office.

2.1 The general structure of the electoral game

In any given term, there are three kinds of players: a representative voter $\mathcal{V}$, a pair of incumbent politicians $\mathcal{P}$ (the mayor and the deputy-mayor), and a pair of challengers in ticket $\mathcal{C}$ (one for mayorship and one for deputy-mayorship), belonging to the opposition party. The sequence of the events is depicted in Figure 1.

At the beginning of the term, the incumbent politicians can be either 'competent' types θ_C, with probability μ', or 'incompetent' types θ_I, with probability $1-\mu'$. For 'debutant' politicians, at their first term of office, the type is determined by nature $\mathcal{N}$ with probability $\mu' \equiv \mu_0 \in (0,1)$. For 'career' politicians, μ' represents the voter's belief about the types in office, based on the observation of their past policy performance. The voter knows that debutant politicians are competent with probability μ_0 but she does not observe the actual type.[3]

To implement policy, the incumbent politicians take a binary choice about their level of effort: either low effort $\underline{a}$ or high effort $\overline{a}$. Also the policy outcome is binary: either a low (bad) outcome L or a high (good) outcome H. Incompetent types always achieve outcome L, no matter the effort exerted. Instead, competent types exerting high effort always achieve outcome H, while competent types exerting low effort achieve

promote efficient policy making.

[3]We assume that the politicians in ticket are either both competent or both incompetent. For simplicity, we rule out that they can be of mixed types.

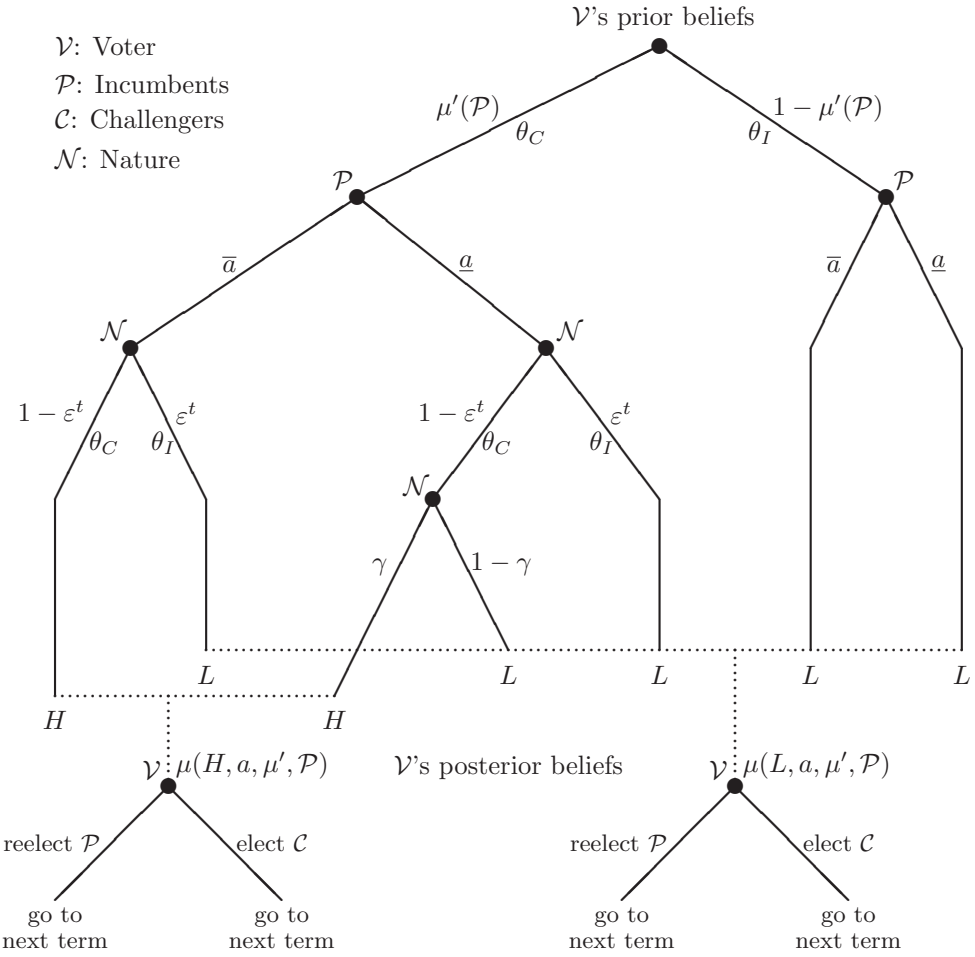

Figure 1: The general structure of the electoral game

outcome H with probability $\gamma \in (0,1)$ and outcome L with probability $1-\gamma$. However, as represented in Figure 1, for competent types there is no direct link between effort and outcome, since with probability $\varepsilon^t > 0$, $\varepsilon \in (0,1)$, a competent type can become incompetent after choosing the level of effort (with ε^t independent of effort), where $t \geq 1$ is a measure of 'experience' (e.g., the number of terms in office). The probability ε^t is decreasing in t to capture the fact that experience in policy making helps to retain competence.

The cost of exerting low effort is normalized to zero, while that of exerting high effort is $c \geq 0$, the value of which is drawn by Nature at the beginning of the game from a given cumulative distribution $F(c)$. The realization of c is private information but the distribution F is common knowledge. For the politicians, the benefits of reelection are equal to $B > 0$, exogenously given, irrespective of effort exerted and competence status. Politicians are assumed to maximize the expected flow of present and future rents of office, net of the cost of effort, discounted at rate $\delta \in (0,1]$ over the relevant time span.

At the end of the term, the voter observes the outcome and then the election is held, in which the incumbent politicians $\mathcal{P}$ run against a ticket of challengers $\mathcal{C}$. Since the challengers are drawn by Nature, the voter's belief that the challengers are competent types is μ_0. As for the incumbents, depending on the observed outcome O (H or L), the belief a about the level of effort taken ($\underline{a}$ or $\overline{a}$), and the prior belief μ' that they were competent at the beginning of the term, the voter forms her posterior belief $\mu(O, a, \mu', \mathcal{P})$ that the incumbents, if reelected, will enter the following term as competent types. The voter is assumed to care only about policy performance in the following political term. Therefore, on the basis of beliefs μ_0 and $\mu(O, a, \mu', \mathcal{P})$, she casts her ballot for the ticket of candidates that maximizes the probability of achieving a high outcome in the ensuing term. It is also assumed that two politicians in ticket who lose an election are both out of politics forever. The policy game is solved for Perfect Bayesian Equilibria in pure strategies.

Following Alt *et al.* (2011), we assume that $\gamma > \mu_0$. This assumption implies that the voter prefers a pair of politicians who exert low effort but are competent with certainty (for whom the probability of achieving a good outcome H is γ) to a randomly drawn pair of new politicians who exert high effort with certainty (for whom the probability of outcome H is μ_0). Without imposing such an assumption, the voter would end up always preferring to vote for the challengers, thus making impossible to re-elect competent incumbents. In our electoral game, we introduce the additional restriction that $\mu_0 > \tilde{\mu}_0 > 0$, which ensures that the voter never reelects a pair of politicians after observing a bad policy outcome L (see the Mathematical Appendix for

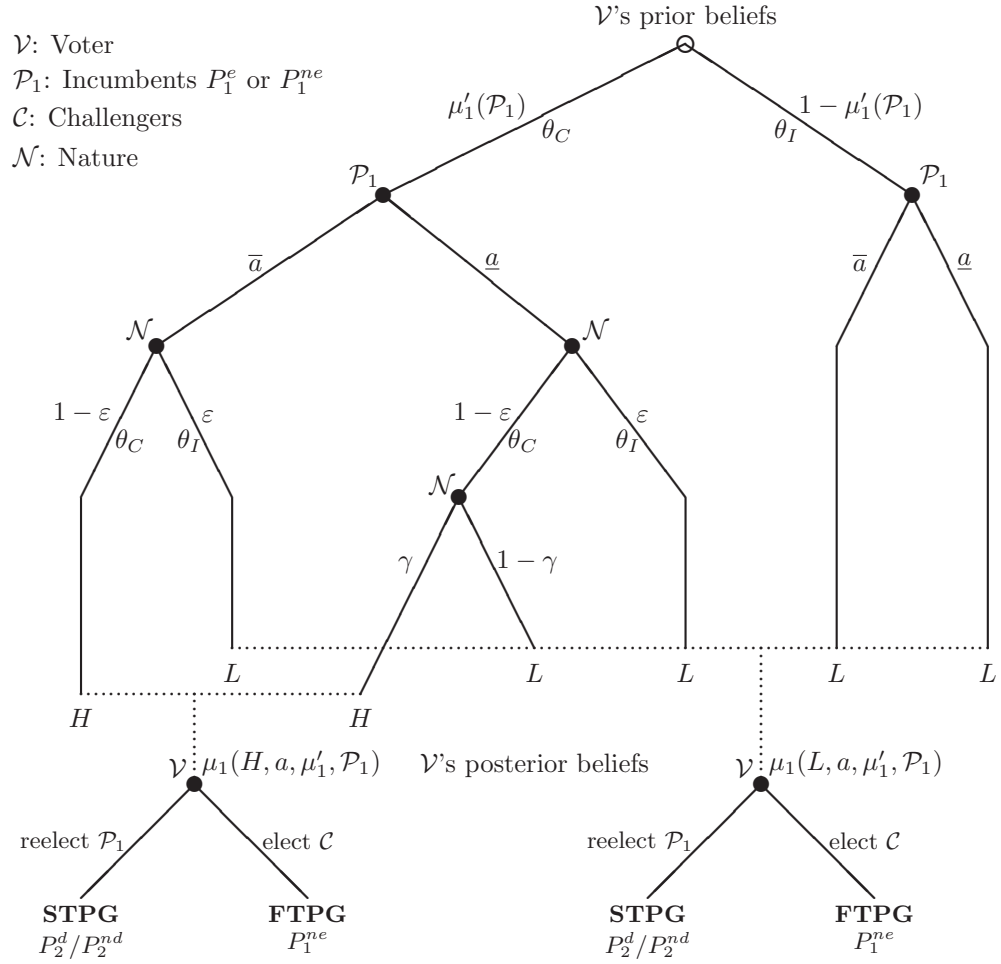

Figure 2: First Term Policy Games (FTPG)

the definition of the threshold probability $\tilde{\mu}_0$).[4]

Given the general structure of the policy game illustrated above, we now describe the specific features of first and second terms of office.

2.2 First Term Policy Games (FTPG)

The two categories of FTPG that fit our empirical data are illustrated in Figure 2. In a FTPG, the incumbent ticket is composed of a 'debutant' mayor and a 'debutant' deputy. However, mayors can be of two classes: either the deputy of the former mayor, or a 'truly debutant' politician who held no role in the previous administration. We label as P_1^e the former, and as P_1^{ne} the latter, class of politicians, where the subscript 1 stands for 'first-term incumbents' and the superscripts e/ne stand for 'mayor *with*

[4]The assumption is meant to limit the types of political equilibria that can emerge, focusing on the ones that are more relevant for our purposes.

previous experience' and 'mayor *without* previous experience', respectively.[5]

The incumbents are of class P_1^e if the last election was won by the deputy mayor of the incumbent party running as candidate for mayorship, with the term-limited mayor passing on the torch to her deputy. Instead, the incumbents are of class P_1^{ne} if the last election was won either by the challengers of the opposition party, or by a 'debutant' candidate of the incumbent party, since the deputy of the former term-limited mayor did not run for elections.

Apart from the possibility of having the two described classes of incumbent politicians, a FTPG evolves as described in the previous section. The only difference is that, if the incumbents are of class P_1^{ne}, then their probability of entering as competent types is equal to $\mu_1'(P_1^{ne}) = \mu_0$ (Nature's draw). If, instead, they are of class P_1^e, then the voter holds a prior belief $\mu_1'(P_1^e) = \mu_2(O, a, \mu_2', P_2^d)$ about them being competent types, based on the observed policy outcome O, the belief about exerted effort a in the previous term (a second term, as policy makers of class P_2^d, see below), and the prior belief μ_2' of being competent types in the previous term.

Note, from Figure 2, that the transition probability of a pair of competent politicians to incompetent types is equal to ε for both classes P_1^e and P_1^{ne} of policy makers. That is, we are assuming that the relevant period determining the transition probability is the number of terms *jointly* served by the mayor and the deputy, which is one term for both classes of first term policy makers, irrespective of whether the mayor served previously as a deputy.[6]

Notice finally that, at the end of the political term, at the election stage (see the bottom part of Figure 2), the game moves on to a second term policy game if the voter reelects the incumbents (where policy makers are of class P_2^d or P_2^{nd}, see below), while it moves to another FTPG if the voter elects the challengers (where policy makers are of class P_1^{ne}).

2.3 Second Term Policy Games (STPG)

The categories of STPG that fit our empirical data are illustrated in Figure 3. As

[5]To avoid confusion, we use the term 'type' to refer to the ability dimension of politicians — competent or incompetent — while we use the term 'class' to refer to their career dimensions — years in office and functions attended.

[6]An alternative assumption is to condition the transition probability to the average number of terms served, not necessarily in ticket, by the policy makers. In this case, the average number of terms served by class P_1^{ne} policy makers is 1 (1 by the mayor, 1 by the deputy: transition probability ε), whereas that of class P_1^e policy makers is 2 (2 as a deputy and 1 as a mayor by the mayor, 1 by the deputy: transition probability ε^2). However, the main results are not significantly affected under this alternative assumption, at the cost of added analytical complexity. On this issue, which is also discussed in footnote 8, analytical details are available upon request.

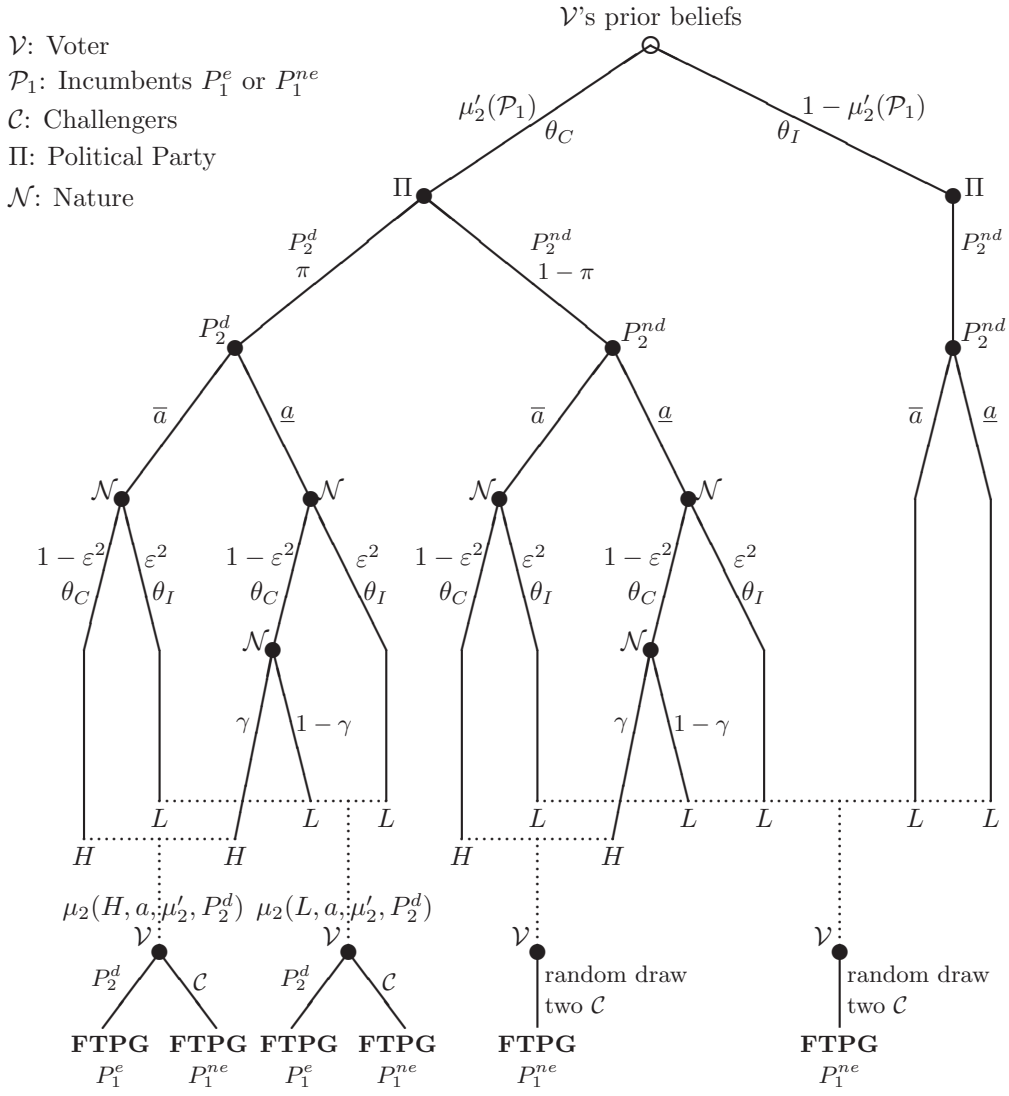

Figure 3: Second Term Policy Games (STPG)

described in the previous section, the first term politicians who enter their second term as incumbents can be of two classes: either P_1^e or P_1^{ne}. Both classes share the common feature that while the incumbent mayor is term limited, the deputy mayor is not. It is not therefore precluded to the latter to take over the leadership and run for mayorship at the following election.

We model the process by which a lame duck mayor passes on the torch to her/his deputy in a simple way. If the incumbent politicians are competent types, their party Π 'promotes' with given probability $\pi \in (0,1)$ the deputy by allowing her/him to run for mayorship at the following election. Instead, if the politicians are incompetent types, their party Π appoints a ticket of debutant candidates.[7] In the former case, the second term incumbents with the deputy running for mayorship are denoted by P_2^d. In the latter case, the second term incumbents with the deputy *not* running for mayorship are denoted by P_2^{nd}. Once the party's decision has been taken, and irrespective of whether the incumbents are of class P_2^d or P_2^{nd}, the political game unfolds — choice of effort, random transition from competent to incompetent types, determination of the policy outcome — in the same way as illustrated in the previous sections. The only relevant difference concerns the transition probability of a pair of competent politicians to incompetent types, which is now equal to ε^2 for both classes P_2^d or P_2^{nd} of policy makers, since in both cases the number of terms *jointly* served by the mayor and the deputy is two.[8]

At the final stage of the STPG, elections are held. If the election is between policy makers of class P_2^d and a ticket of debutant challengers $\mathcal{C}$ of the opposition party (see the bottom-left part of Figure 3), then the voter draws her ballot on the basis of her posterior beliefs $\mu_2(O, a, \mu_2', P_2^d)$ about competence of the incumbents versus that, equal to μ_0, of the challengers. If the winners are the former, then the game moves to a FTPG in which the incumbent politicians are of class P_1^e, whereas, if the winners

[7] We do not model the political party as a strategic player, but instead as a deterministic decision maker. In particular, we assume that the party, after observing the type of its incumbent politicians, promotes with probability π competent deputies and with probability zero incompetent ones. That competent types are not promoted with certainty can be justified by the fact that the deputy may be unable to accept the leadership. For a recent analysis in which parties have an active role in the selection of politicians, see Cerina and Deidda (2017).

[8] Applying the same arguments used in footnote 6, if one assumes that the transition probability depends on the average number of terms served, not necessarily in ticket, by the policy makers, then in STPG the distinction must be done, among second term policy makers, between those whose mayor entered the first term as an experienced politician and those who were not. The class of second term policy makers with the deputy running for mayorship, P_2^d, would then include sub-classes $P_2^{d.e}$ and $P_2^{d.ne}$, while that of policy makers with the deputy not running for mayorship, P_2^{nd}, would include sub-classes $P_2^{nd.e}$ and $P_2^{nd.ne}$. The average number of terms served by classes $P_2^{d.ne}$ and $P_2^{nd.ne}$ is then 2 (2 by the mayor, 2 by the deputy: transition probability ε^2), whereas that of classes $P_2^{d.e}$ and $P_2^{nd.e}$ is 3 (2 as a deputy and 2 as a mayor by the mayor, 2 by the deputy: transition probability ε^3).

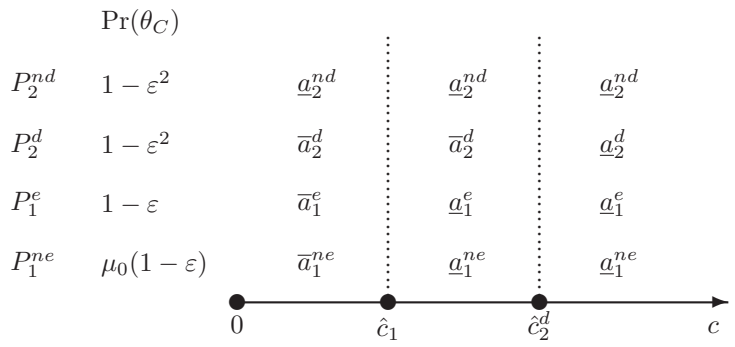

Figure 4: Illustration of Proposition 1 (in the Appendix)

are the latter, then it moves to a FTPG in which the incumbents are of class P_1^{ne}. If, instead, the second term incumbent deputy has not been appointed for mayorship, then (see the bottom-right part of Figure 3) the electoral competitors are identical 'debutant' politicians $\mathcal{C}$ from both political parties, and therefore the voter casts her ballot by flipping a coin.

2.4 Political equilibria and policy outcomes

The Perfect Bayesian Equilibrium, in pure strategies, of the two-term limit political game set up in the previous sections is formally characterized in Proposition 1 of the Mathematical Appendix. In this section, we describe its general features.

Provided that $\tilde{\mu}_0 < \mu_0 < \gamma$, with $\tilde{\mu}_0$ a function of $(\gamma, \varepsilon, \pi)$, in any equilibrium of the policy game, at the end of a first term the voter reelects the incumbent politicians (either of class P_1^{ne} or of class P_1^e) only after observing a good policy outcome H. Otherwise, after observing a bad outcome L, the voter elects the candidates of the opposition party (the challengers $\mathcal{C}$). At the end of a second term, provided that the deputy-mayor is running as a candidate for mayor (class P_2^d politicians), and again only after observing a good outcome H, the voter elects the deputy-mayor; otherwise, after observing a bad outcome L, the voter elects the challengers. If, instead, at end of a second term the deputy is not running for mayorship (class P_2^{nd} politicians), the voter, regardless of the outcome, randomly elects with equal probability one of the two pairs of (identical, because both 'debutants') candidates in ticket.

As for *competence*, given the above equilibrium voting strategies, and given that, by assumption, only competent politicians can obtain a good outcome H, all policy makers elected by the voter observing a good outcome enter the following term as competent types with certainty, and they remain competent on the basis of their seniority in office. Hence, as shown in Figure 4, the probability $\Pr(\theta_C)$ that, after choosing the

effort level, the policy makers remain competent is equal to $1-\varepsilon$ for class P_1^e (since the mayor and the deputy jointly stayed in office for one term), and to $1-\varepsilon^2$ for classes P_2^d and P_2^{nd} (since the mayor and the deputy jointly stayed in office for two terms). As for politicians of class P_1^{ne}, randomly drawn as competent types by Nature with probability μ_0, they remain competent during their first term of office with probability $\mu_0(1-\varepsilon)$.

As for *accountability*, the choice of effort by competent policy makers (recall that, since incompetent types can never obtain a good outcome H, they always choose low effort $\underline{a}$) is then determined by the randomly realized cost c of high effort (recall that the cost of low effort is normalized to zero) and by the future prospects of staying in office. In this respect, Figure 4 shows that (competent) policy makers P_2^{nd} always choose low effort $\underline{a}$, since neither the mayor (term limited) nor the deputy (not running for mayorship) have a direct interest in the following political term. Instead, exerting high effort can be worth the cost for the other three classes of policy makers. Specifically, first-term policy makers P_1^{ne} and P_1^e exert high effort $\overline{a}$ only if $c < \hat{c}_1$, whereas second-term policy makers P_2^d exert high effort $\overline{a}$ only if $c < \hat{c}_2^d$. Note that the probability, $F(\hat{c}_2^d)$, that politicians P_2^d exert high effort is higher than the probability, $F(\hat{c}_1)$, that either P_1^{ne} or P_1^e politicians exert high effort, since $\hat{c}_2^d > \hat{c}_1$. The reason is that, while all are accountable politicians, the probability of obtaining a good outcome by P_2^d is higher than that of both P_1^{ne} and P_1^e, because of the seniority effect of the politicians in ticket, which in turn gives stronger incentives to exert high effort.

2.5 Disentangling accountability and competence

Following Alt *et al.* (2011), the equilibrium probabilities about competence and effort are used to define the policy makers' *expected performance* as the probability of achieving a good outcome H, which is equal to

$$Z = \Pr(\theta_C)\left\{\Pr(\overline{a}) + \gamma \Pr(\underline{a})\right\}.$$

Using the probabilities $\Pr(\theta_C)$ and the thresholds $\hat{c}_1 < \hat{c}_2^d$ shown in Figure 4, and letting $\hat{F}_1 \equiv F(\hat{c}_1)$, $\hat{F}_2^d \equiv F(\hat{c}_2^d)$, the expected performances for the four classes of politicians are shown in Table 1.

Clearly, any comparison between first and second terms politicians includes both a competence and an accountability effect. For instance, in the comparison between P_1^e and P_2^d, the former are not only less accountable, but also less likely to be competent, than the latter. Our empirical strategy to disentangle accountability and competence effects in the elections of Italian municipalities is thus the following.

		Expected competence		
		P_1^{ne}	P_1^e	P_2^d, P_2^{nd}
		$\mu_0(1-\varepsilon)$	$1-\varepsilon$	$1-\varepsilon^2$
	P_2^{nd}			Z_2^{nd}
	0			$(1-\varepsilon^2)\gamma$
Exp.	P_1^{ne}, P_1^e	Z_1^{ne}	Z_1^e	
effort	$\hat{F}_1$	$\mu_0(1-\varepsilon)[\hat{F}_1+(1-\hat{F}_1)\gamma]$	$(1-\varepsilon)[\hat{F}_1+(1-\hat{F}_1)\gamma]$	
	P_2^d			Z_2^d
	$\hat{F}_2$			$(1-\varepsilon^2)[\hat{F}_2+(1-\hat{F}_2)\gamma]$

Table 1: Disentangling accountability and competence in elections.

By comparing the performances of first term policy makers, P_1^{ne} and P_1^e, we can identify a *competence effect*, since, while equally accountable (the expected effort is the same), the politicians with previous experience P_1^e are more likely to be competent types than those without experience. Formally, the *competence effect* is equal to

$$Z_1^e - Z_1^{ne} = (1-\mu_0)(1-\varepsilon)[\hat{F}_1 + (1-\hat{F}_1)\gamma] > 0. \tag{1}$$

By comparing the performances of second term policy makers, P_2^{nd} and P_2^d, we can identify an *accountability effect*, since, while all having the same probability of being competent types, the politicians P_2^d whose deputy is running for mayor are accountable while lame duck policy makers P_2^{nd} are not. Formally, the *accountability effect* is equal to

$$Z_2^d - Z_2^{nd} = \left(1-\varepsilon^2\right)(1-\gamma)\,\hat{F}_2^d > 0. \tag{2}$$

These comparisons in the performance of first- and second-term policy makers are at the heart of our empirical analysis in the next Section.

3 Empirical analysis

3.1 Data, descriptive evidence and essential background information

Our empirical exercise to disentangle accountability and competence is based on an original dataset we built gathering financial, demographic and political information related to all the 1,206 municipalities belonging to the Piedmont Region and covering

the years 1998-2006.[9] Piedmont ranks second (after Lombardy) among the Italian Regions in terms of number of municipalities. It hosts more than 4 million inhabitants, about the same population of Croatia and Ireland in the EU, of Oregon and Kentucky in the USA. Municipalities represent the lowest level of government in Italy, and are responsible both for providing different types of local collective goods (such as the management of the Civil Registry, waste collection, provision of social services, promotion of cultural activities) and for handling local investments (like school buildings, sport facilities, road maintenance).

Financial data on the municipal budgets are taken from the archive of the Ministry of the Interior. All financial figures are deflated using the 1998 price index. Information about local politicians' characteristics and electoral results have been collected from the Electoral Monitoring of the Piedmont Region. Summary statistics for all the variables are reported in Table 2.

Dependent variables. We use three definitions of the per-capita municipal spending as performance measures for local politicians: total expenditure (TOT_EXPEND) and its two separate components, current and capital expenditure (CURR_EXPEND and CAP_EXPEND, respectively). These performance measures will be our dependent variables in the econometric analysis below: *ceteris paribus*, a lower expenditure is considered a better performance.[10] Capital expenditure covers about 42% of total spending and it is more volatile than current expenditure (see the summary statistics in Table 2), likely because it is more reactive to electoral incentives faced by incumbent politicians, as highlighted by the political budget cycle literature (e.g., Drazen and Eslava, 2010).

Classes of politicians. We are able to distinguish the different classes of politicians in office by using a full set of dummy variables. We first consider P_2, a binary variable equal to one for second-term policy makers subject to term limitation according to the Italian legislation. The term limit provision, ruling that mayors in office for two con-

[9]This period is a relatively stable one along several dimension for municipalities: the term-limit clause, introduced in 1993, became effective for all municipalities in 1997, while the revenue structure was defined in 1993, with the introduction of a property tax on real estate (ICI: *Imposta Comunale sugli immobili*) — one of the main own-revenues sources for municipalities — and a surcharge on the Personal Income Tax. Starting from 2007, the Prodi government modified the property tax, by introducing a new deduction for the main residence, which became a full exemption with the Berlusconi government in 2008. The property tax was then substituted in 2011 by a brand new tax (IMU: *Imposta Municipale Unica*).

[10]Alt *et al.* (2011) consider four indicators of performance for US states governors: per capita spending, per capita taxes, borrowing cost, and economic growth. In our case, there are no available data on economic growth at the municipal level. Moreover, by the Italian legislation, municipalities are forbidden to borrow to finance current expenditure and are severely limited in contracting loans to finance capital expenditure, thereby basically imposing a budget balance. For this reason, we employ expenditure as the only indicator of policy performance.

Variable	Obs.	Mean	Std.Dev.	Min	Max
Dependent (Euro per capita)					
TOT_EXPEND	10,827	1,526.55	1,692.20	236.47	37,377.45
CURR_EXPEND	10,827	710.36	435.63	116.23	5,742.92
CAP_EXPEND	10,827	638.28	1,322.66	0.00	33,728.57
Class of politicians (dummies)					
Term-limited mayors: P_2	10,827	0.38	0.49	0	1
Term-limited mayors with deputy-candidates: P_2^d	10,827	0.30	0.46	0	1
First-term mayors without experience: P_1^{ne}	10,827	0.25	0.43	0	1
First-term mayors with experience: P_1^e	10,827	0.37	0.48	0	1
Other political controls					
CYCLE_1	10,827	0.22	0.41	0	1
CYCLE_2	10,827	0.22	0.41	0	1
CYCLE_3	10,827	0.22	0.41	0	1
CYCLE_4	10,827	0.11	0.32	0	1
ALIGN_PROV	10,827	0.15	0.36	0	1
ALIGN_REG	10,827	0.15	0.35	0	1
ALIGN_CENTER	10,827	0.13	0.34	0	1
GRANTS	10,827	237.83	208.62	0	9,301.80
SUPPORT	10,750	68.01	19.34	23	100
IDEOLOGY	10,827	5.45	3.15	1	14
GENDER_MAYOR	10,740	0.10	0.30	0	1
AGE_MAYOR	10,740	51.80	10.45	23	85
PACT	10,827	0.11	0.31	0	1

Table 2: Summary statistics of the variables used in the estimated models.

secutive terms cannot be immediately reelected for the following term, was introduced in Italy in 1993 by Law 81 and applied starting from the municipal elections held in June 1993.[11] However, the term limit clause has been applied in 1993 only for the municipalities — 99 out of 1,206 in our sample — holding elections in June 1993. For all the remaining municipalities, the term limit provision became gradually effective in the following years (for the municipalities holding elections in 1992, one year before the reform, the term limit clause became effective from the elections held in 1997).[12]

Given the dummy variable P_2, in order to distinguish second-term mayors whose deputy did not run for elections (P_2^{nd} in the theoretical model) from those who passed on the torch to their deputy (P_2^d), we also introduce the dummy variable P_2^d equal to one for the latter type of politicians, zero otherwise. Moreover, as for first-term

[11] *Legge 25 marzo 1993, n. 81*, effective from March 28, 1993.

[12] Five years is the 'natural' length of the term of office. In some cases — because of resignation of the mayor, or because the municipality is put under a governative commissioner by the central authority — the term lasts for less than five years. This contributes to partially explain the staggered timing of municipal elections.

mayors, we distinguish those who governed, from those who did not govern, in team with the mayor in the previous term of office, using the dummy variable P_1^{ne} equal to one for the latter class of politicians. Hence, class P_1^e politicians — first-term mayors with previous experience as deputy-mayor — is the excluded category.

The descriptive evidence in Table 2 suggests that most of the municipalities have experienced a term-limited mayor, as well as some occurrences of 'passing on the torch', with former deputies that became mayors. Specifically, the dummy variable P_2 is equal to one for 38% of the observations, while the municipalities that have experienced at least for one year a term-limited mayor are about 80%. The dummy P_2^d is equal to one for 30% of the observations, covering about 60% of the municipalities. The dummy P_1^{ne} is equal to one for 25% of the observations, including about 58% of the municipalities. Finally, the reference category in all the estimated models — mayors at their first-term of office who governed in team with the previous mayor — applies to 37% of the observations, covering 90% of municipalities (dummy variable P_1^e in Table 2).

Political controls. To properly identify accountability and competence effects, we control for the potential role of other determinants of fiscal policy that are traditionally considered in the empirical research.[13] In particular, we control for the presence of opportunistic electoral budget cycles (Rogoff and Sibert, 1988; Rogoff, 1990). To capture these cycles, considering that the municipal term of office lasts five years, we consider four dummy variables identifying the first, the second, the third and the fourth year the mayor is in office (the last year is thus the reference), denoted as CYCLE_1, CYCLE_2, CYCLE_3, and CYCLE_4, respectively.

We also account for developments in the research on budget cycles, highlighting that the presence and the magnitude of cycles depend on country-specific institutional and political features (e.g., de Haan and Klomp, 2013; Dubois, 2016). In particular, budget cycles can be related to the strategic allocation of funds from higher to lower government tiers, depending on whether or not local policy makers are politically aligned with policy makers at higher levels who distribute the grants (e.g., Solé-Ollé and Sorribas-Navarro, 2008; Arulampalan *et al.*, 2009; Bordignon and Turati, 2009; Lema and Streb, 2013; Francese *et al.*, 2014). Since the Italian municipalities — the lowest

[13] Two standard demographic controls in the political budget cycle literature are the shares of elderly and young inhabitants, which are meant to capture variations in the demand for local public goods due to age-related needs (e.g., Brender and Drazen, 2008; Veiga and Veiga, 2007; Sakurai and Menezes-Filho, 2011). However, we do not include these variables in the model specification as in our panel the age structure of the population shows a low within-time variation and its impact on per capita municipal expenditure is already captured by municipal fixed effects. Another powerful explanatory variable for per capita municipal spending is the inverse of the resident population, accounting for scale economies as population size increases. Again, its impact is already captured by municipal fixed effects.

government tier — receive transfers from the Central, the Regional and the Provincial governments, we include three dummy variables indicating whether or not the mayor's party (or supporting coalition) belongs to the same party (or supporting coalition) of the Province's president (ALIGN_PROV), the Region's governor (ALIGN_REG), the Central government's Prime Minister (ALIGN_CENTER).

As an additional control complementing the three dummy variables on political alignement illustrated above, we include the variable GRANTS, defined by the amount of total per capita grants received by the Provincial, the Regional, and the Central governments. According to the modern theories of fiscal federalism (e.g., Weingast, 2009), an important determinant of spending at the local level is the relative importance of own revenues (municipal taxes and users' fees) and grants from higher government tiers, since the higher the relative share of grants with respect to own revenues, the lower the incentives for local policy makers to control spending (see, for instance, the empirical analysis by Jin and Zou, 2002; Borge and Rattsø, 2008; Boetti *et al.*, 2012; Eyraud and Lusinyan, 2013; Francese *et al.*, 2014; Baskaran *et al.*, 2016). To control for this (dis-)incentive effect of grants, we thus include the per capita grants defined above as an indicator of the degree of vertical fiscal imbalance.[14]

As an additional set of political variables, we consider two proxies of the degree of political competition in municipal elections (e.g., Besley and Case, 2003; Sørensen, 2014; Klein *et al.*, 2015). The first one, SUPPORT, defined by the percentage of votes received by the mayor in the last elections, is intended to capture how different margins of victory may affect municipal expenditure. The second one, IDEOLOGY, defined by the number of consecutive years the current mayor's party is in power in the municipality, aims at capturing a possible role of ideological ties on municipal fiscal policy.[15]

We also control for the age and the gender of the mayor (AGE_MAYOR and GENDER_MAYOR, respectively; the latter is equal to one if the mayor is a female), to account for political-economy research stressing the impact of senior and female representatives in determining fiscal outcomes (e.g., Edlund and Pande, 2002; Chattopadhyay and Duflo, 2004; Funk and Gathmann, 2008; Dal Bo and Rossi, 2011; Baltrunaite *et al.*, 2014; Alesina *et al.*, 2019).

[14]Dalle Nogare and Kauder (2017) investigate the effects of terms limits on central government's transfers to Italian municipalities. Their focus on transfers as dependent variable, instead of municipal spending, allows them to assess whether transfers are driven by the central government efforts to buy consensus at the local level or by local politicians' lobbying for grants when municipal elections are close.

[15]At the municipal level, there are also some differences in the electoral rules that are related to municipal size in terms of population. However, these differences, which are all time invariant characteristics, are properly controlled for by municipal fixed effects.

The last variable we include in the vector of political controls is intended to capture whether or not municipalities are constrained in their budget decisions by stringent fiscal rules imposed by the central government (an issue analyzed by, e.g., Rose, 2006; Bordignon and Turati, 2009; Schneider, 2010; Boetti *et al.*, 2012; Piacenza and Turati, 2014; Grembi *et al.*, 2016; Bonfatti and Forni, 2019). What is relevant for our panel is that since 1999 the central government introduced the so-called domestic stability pact (DSP), imposing specific budget goals to municipalities. Although the restraints have been imposed alternatively on expenditure growth and on deficit size, starting from 2001, the municipalities with less than 5,000 inhabitants have been excluded from the DSP. To account for this, we thus introduce a time-varying dummy variable (PACT) that distinguishes the municipalities subjected to the DSP from those that — starting from 2001 — have been excluded from it.

3.2 Empirical strategy

Our goal is to estimate the accountability and competence effects in municipal elections using the identification strategy derived in section 2.5. To this end, we exploit the dummy variables P_2 and P_2^d to distinguish second-term mayors whose deputy did not run at the following elections from those who passed on the torch to their deputy. This comparison allows us to identify the *accountability effect* of elections. We then employ the dummy variable P_1^{ne} to distinguish first-term mayors who governed in team with the mayor in the previous term of office from those who did not. This comparison allows us to identify the *competence effect* of elections.

However, as a preliminary step we consider only the dummy variable P_2 that — by making a direct comparison between first- and second-term mayors — allows us to investigate the effects of term limits on the spending performance of mayors and to relate our analysis to the empirical literature addressing the impact of term limits on policy performance. In our case, the identification of the 'pure' impact of term limitation is based on the staggered pattern of municipal elections.[16]

Compared to the previous literature addressing the impact of term limits on fiscal performance (e.g., Besley and Case, 1995b; Johnson and Crain, 2004; List and Sturm, 2006; Dalle Nogare and Ricciuti, 2011; Klein *et al.*, 2015; Veiga and Veiga, 2019; Lopes da Fonseca, 2020), our analysis therefore acknowledges for the fact that, on the one hand, mayors at their last term of office may face different incentives depending on whether or not they are administering in team with one of the candidates for mayorship

[16]The impact of term limits on political accountability and hence on policy choices is examined, among others, by Ashworth (2005), Dick and Lott (1993), Reed *et al.* (1998), Ferraz and Finan (2008, 2011), and de Janvry *et al.* (2012).

at the following elections. On the other hand, mayors at their first term of office may have different levels of competence, depending on whether or not they hold experience in municipal administration.

According to the above discussion, we consider two model specifications. The first (Model A) basically replicates the available literature on term limitation; it includes only the variable P_2 for mayors at their second and last term of office as main regressor:

$$Y_{it} = \alpha_2 P_{2it} + \beta \mathbf{C}_{it} + M_i + T_t + \varepsilon_{it}. \qquad \text{(Model A)}$$

The second specification (Model B) disentangles the accountability and competence effects of elections. It augments the basic specification by introducing also the two key dummy variables, P_2^d and P_1^{ne}, tagging, respectively, leadership handovers by second-term mayors and (lack of) experience by first-term mayors (mayors at their first-term of office, with previous experience, are our 'reference' group):

$$Y_{it} = \alpha_2 P_{2it} + \alpha_2^d P_{2it}^d + \alpha_1^{ne} P_{1it}^{ne} + \beta \mathbf{C}_{it} + M_i + T_t + \varepsilon_{it}. \qquad \text{(Model B)}$$

In both models, Y_{it} is a measure of per-capita spending (total, current, or capital) in municipality i at time t, $\mathbf{C}_{it}$ is the vector of political controls accounting for a number of variables that may influence municipal expenditure, like the electoral budget cycle, the degree of competition in elections, the political alignment (or misalignment) with higher government tiers, the gender and the age of the mayor. Both models also include a full set of municipality-specific fixed effects M_i, a full set of year-specific fixed effects T_t, and a disturbance term ε_{it}. Standard errors are clustered at the mayor level to capture potential serial correlation in the residuals within each term.

The two models are estimated by starting with a baseline specification (Models A1 and B1) where only the main regressors are included, jointly with the fixed effects M_i and T_t. The political controls $\mathbf{C}_{it}$ are then included in the extended specification (Models A2 and B2). This strategy allows us to test how the raw effect of the main variables — P_2, P_2^d and P_1^{ne} — changes with respect to the inclusion of the other controls.

3.3 Results

Estimates of Models A and B, with and without political controls $\mathbf{C}_{it}$, are in Table 3 for total municipal spending and in Tables 4 and 5 for its two components, current and capital spending, respectively. Since missing financial data for three municipalities reduced the sample to 1,203 units, Models A1 and B1 are estimated using 10,827

Dependent Variable TOT_EXPEND	**Model A1**		**Model A2**		**Model B1**		**Model B2**	
	coeff.	std.err	coeff.	std.err	coeff.	std.err	coeff.	std.err
Term-limited mayors: P_2	45.533	29.311	38.692	30.427	33.886	59.797	42.428	61.183
Term-limited mayors with deputy-candidates: P_2^d	—		—		61.656	59.898	46.047	59.710
First-term mayors without experience: P_1^{ne}	—		—		85.670	40.605**	98.259	41.816**
CYCLE_1	—		89.283	45.428**	—		87.913	45.352*
CYCLE_2	—		107.899	48.330**	—		107.178	48.399**
CYCLE_3	—		110.109	48.282**	—		113.118	48.630**
CYCLE_4	—		118.959	65.227*	—		115.247	65.532*
ALIGN_PROV	—		40.889	38.399	—		39.983	38.303
ALIGN_REG	—		10.834	31.766	—		10.651	31.587
ALIGN_CENTER	—		–47.612	33.467	—		–47.289	33.273
GRANTS	—		0.526	0.374	—		0.526	0.374
SUPPORT	—		0.972	0.912	—		1.102	0.911
IDEOLOGY	—		4.390	4.871	—		5.030	4.874
GENDER_MAYOR	—		1.190	38.907	—		6.115	39.035
AGE_MAYOR	—		–0.665	2.108	—		–0.749	2.101
PACT	—		297.665	211.617	—		307.275	210.619
Number of observations	10,827		10,738		10,827		10,738	
R^2	0.637		0.639		0.637		0.639	

All models include municipality fixed effects M_i and year fixed effects T_t. Standard errors are clustered at the mayor level.
Significance levels: 1%***, 5%**, 10%*.

Table 3: Estimates of competence and accountability effects on *total* municipal expenditure per capita.

Dependent Variable CURR_EXPEND	**Model A1**		**Model A2**		**Model B1**		**Model B2**	
	coeff.	std.err	coeff.	std.err	coeff.	std.err	coeff.	std.err
Term-limited mayors: P_2	–1.444	5.376	–2.168	5.673	4.328	12.418	4.288	12.647
Term-limited mayors with deputy-candidates: P_2^d	—		—		–4.295	12.003	–4.505	11.684
First-term mayors without experience: P_1^{ne}	—		—		6.647	7.242	8.248	7.078
CYCLE_1	—		–10.609	4.640**	—		–10.462	4.620**
CYCLE_2	—		–4.140	5.343	—		–3.773	5.378
CYCLE_3	—		–4.031	5.693	—		–3.504	5.916
CYCLE_4	—		–14.863	6.991**	—		–14.571	7.106**
ALIGN_PROV	—		–12.904	5.208**	—		–13.007	5.217**
ALIGN_REG	—		–10.336	5.462*	—		–10.135	5.484*
ALIGN_CENTER	—		–0.597	4.640	—		–0.476	4.591
GRANTS	—		0.313	0.209	—		0.313	0.209
SUPPORT	—		0.129	0.155	—		0.141	0.154
IDEOLOGY	—		3.938	0.973***	—		3.965	0.977***
GENDER_MAYOR	—		–9.186	6.300	—		–8.776	6.312
AGE_MAYOR	—		–0.555	0.329*	—		–0.556	0.328*
PACT	—		65.542	118.403	—		66.189	118.488
Number of observations	10,827		10,738		10,827		10,738	
R^2	0.922		0.928		0.922		0.928	

All models include municipality fixed effects M_i and year fixed effects T_t. Standard errors are clustered at the mayor level.
Significance levels: 1%***, 5%**, 10%*.

Table 4: Estimates of competence and accountability effects on *current* municipal expenditure per capita.

Dependent Variable CAP_EXPEND	**Model A1**		**Model A2**		**Model B1**		**Model B2**	
	coeff.	std.err	coeff.	std.err	coeff.	std.err	coeff.	std.err
Term-limited mayors: P_2	30.502	25.018	28.087	26.221	13.106	53.910	23.268	56.183
Term-limited mayors with deputy-candidates: P_2^d	—		—		62.735	53.961	49.042	53.583
First-term mayors without experience: P_1^{ne}	—		—		73.072	38.551*	81.617	39.645**
CYCLE_1	—		109.005	43.604**	—		107.530	43.592**
CYCLE_2	—		118.494	48.083**	—		117.344	48.175**
CYCLE_3	—		114.631	46.737**	—		116.775	47.016**
CYCLE_4	—		135.018	63.591**	—		131.156	63.744**
ALIGN_PROV	—		51.942	35.621	—		51.226	35.529
ALIGN_REG	—		24.534	29.019	—		24.103	28.856
ALIGN_CENTER	—		–42.990	29.607	—		–42.842	29.437
GRANTS	—		0.135	0.170	—		0.134	0.170
SUPPORT	—		0.336	0.831	—		0.442	0.822
IDEOLOGY	—		0.806	4.514	—		1.371	4.515
GENDER_MAYOR	—		–12.173	35.261	—		–8.077	35.334
AGE_MAYOR	—		–0.401	2.163	—		–0.479	2.158
PACT	—		191.081	140.326	—		199.270	138.036
Number of observations	10,827		10,738		10,827		10,738	
R^2	0.463		0.465		0.464		0.465	

All models include municipality fixed effects M_i and year fixed effects T_t. Standard errors are clustered at the mayor level.
Significance levels: 1%***, 5%**, 10%*.

Table 5: Estimates of competence and accountability effects on *capital* municipal expenditure per capita.

observations. Due to missing political control variables for some municipalities in some years, Models A2 and B2 are estimated using 10,738 observations.

Consider first Model A, where we estimate only the impact of term limitation on municipal spending. For both specifications (A1 and A2), and for all types of expenditure (total, current and capital), the coefficient for P_2 is never statistically significant at the usual confidence levels. Hence, and in contrast to the above cited previous studies, we find no evidence that term limit *per se* has a statistically measurable impact on municipal spending. This result holds true also for Model B, where both dummy variables P_2 and P_2^d are never statistically significant at the usual confidence levels, implying that we do not detect significant differences in spending between term-limited mayors who *govern* and term-limited mayors who *do not govern* in team with a deputy who takes over the leadership by running for mayorship at the following elections. However, the coefficient for the dummy variable P_1^{ne} is positive and statistically significant for total and capital expenditure (but not for current expenditure), an interesting result suggesting that inexperienced mayors at their first term of office spend more, in per capita terms, than experienced policy makers. Note also that the coefficient for P_1^{ne} increases from Model B1 to Model B2 controlling for the set of political covariates: from 85.7 to 98.3 for total expenditure, from 73.1 to 81.6 for capital expenditure. Overall, these results indicate that municipalities headed by 'experienced' mayors — all types of second-term mayors, and first-term mayors with prior involvement in municipal administration — are characterized by lower levels of per capita expenditure (in particular, capital spending) than municipalities managed by first-term mayors without previous experience in municipal administration. In particular, with reference to average spending reported in Table 2, Model B2 predicts that spending set by experienced mayors is, on average, 6.44% lower for total expenditure, and 12.8% lower for capital expenditure, than that set by inexperienced mayors. These findings point toward the existence of a significant competence effect, but no role for the accountability effect.[17]

In terms of our theoretical model (see Section 2.5), considering as performance index municipal expenditure (where higher expenditure means lower performance), it turns out that $Z_1^{ne} < Z_1^e \approx Z_2^d \approx Z_2^{nd}$. If we look at Eq. (1), we see that a significant gap $Z_1^e - Z_1^{ne} > 0$ can be due, *ceteris paribus*, to a low value of μ_0, or to a low value of ε. However, a low value of ε also implies, from Eq. (2), a significant gap $Z_2^d - Z_2^{nd} > 0$, which is not supported by our data. On the other hand, a negligible gap $Z_2^d - Z_2^{nd}$ can be the result of a large value of γ. And a large value of γ can also explain the

[17]This evidence is compatible with the findings of a previous study using municipal data for Italy (Gagliarducci and Nannicini, 2013), which highlights that local government performances are driven by the selection of competent politicians, rather than by the incentive to be re-elected.

non-significant gap $Z_1^e - Z_2^d$ emerging from our data. In sum, our empirical findings are coherent with an institutional setup in which first term politicians without previous experience are competent with a low probability μ_0, and competent politicians obtain a good outcome with a large probability γ when exerting low effort.

Concerning the political controls, estimates of Models A2 and B2 show additional interesting results. We find clear evidence of a *political budget cycle*, although of markedly different pattern for current and capital spending. Recall that our reference point is the last year of the political term (the fifth, the one leading to elections), while each one of the four dummy variables CYCLE_1-CYCLE_4 tags years 1 to 4 of the term, respectively. Our estimates then show (see Table 4, where CYCLE_1 and CYCLE_4 are negative and statistically significant, while CYCLE_2 and CYCLE_3 are negative but not statistically significant at the usual confidence levels) that local politicians strategically use *current* spending by expanding it in the middle (the second and the third year) and at the end (the fifth year) of the term, while saving resources in the first — the 'honeymoon' period following the elections — and the fourth year of the term — the 'quiet' period preceding the electoral campaign.

As for *capital* expenditure, there is evidence that per capita spending is at its lowest level in the final year of the term, while it increases from the first to the fourth year of the term (see Table 5, where CYCLE_1-CYCLE_4 are positive, of increasing magnitude, and statistically significant at the usual confidence levels). This pattern is consistent with previous studies pointing out that investments in roads or schools are highly 'visible' policy interventions that incumbent politicians can use to 'please' voters before the elections (e.g., Drazen and Eslava, 2010, Aidt *et al.*, 2011, Klein *et al.*, 2015). That expenditure falls in the final (electoral) year is explained by the obvious fact that capital spending produces its effects with some time lag.

Tables 3, 4 and 5 also show that the variables ALIGN_CENTER, SUPPORT, GENDER_MAYOR, GRANTS and PACT are never statistically significant for both models specifications (A2 and B2) and for all types of expenditure (total, current and capital). A statistically significant impact, but only on current spending, can instead be ascribed to the remaining political controls. In particular, see Table 4, ALIGN_PROV and ALIGN_REG are both negative, meaning that municipalities that are politically aligned with the provincial or the regional government have, on average, lower levels of current spending than municipalities that are not politically aligned.[18] Per capita current expenditure is also increasing in the variable IDEOLOGY, which measures the

[18] A possible interpretation is that municipal, provincial, and regional spending are, to some extent, strategic substitutes as means to 'buy' political consensus at the local level when the different government tiers are politically aligned, whereas they are strategic complements when they are politically misaligned.

number of consecutive years the current mayor's party is holding power in the municipality, pointing to a likely lower local government efficiency when electoral ideology dominance is stronger (e.g., Sørensen, 2014). Finally, current spending is decreasing in the variable AGE_MAYOR, suggesting that older politicians spend less, probably because they are more experienced and also expect to have a shorter political career (thus limiting the political budget cycle; e.g., Alesina *et al.*, 2019; Daniele *et al.*, 2021).

4 Concluding remarks

Using a new dataset of more than 1,200 Italian municipalities over a nine-years period, we propose a novel strategy to empirically disentangle accountability and competence effects in elections. Given that the Italian electoral system imposes a two-term limit for mayors but not for deputy mayors, our identification strategy exploits the fact that it is not unusual that second-term mayors pass on the torch to their deputies, who then run for mayorship at the next round of elections. This implies, on the one hand, that incumbent second-term politicians are accountable even if term-limited, since the mayor is lame duck but the deputy is not. On the other hand, second-term deputies who enter first-terms as mayors have already acquired experience in policy making, while truly 'debutant' first-term mayors do not have experience. Taking municipal spending as the performance measure for local politicians, our estimates show that only competence matters since, on average, policy makers with experience in municipal administration spend less than those with no experience. On the contrary, accountability does not seem to play any significant role on municipal spending. Contributing to a large literature, we also show that term-limitations are not important *per se* in affecting policy performance.

Our findings provide interesting insights for the design of electoral systems. Our definition of competence is fundamentally based on the experience gained in administration. Hence, the best way to interpret our findings is that politicians obtain good outcomes after 'learning' how to manage and control spending. For instance, one needs to learn how to organize a call for tenders for efficiently building a swimming pool, or to learn the wage structure of municipal employees to renew their contracts with savings on the total budget. As competence is gained through experience in the administration and competence is what matters for obtaining good outcomes for citizens, one can argue that some experience should be required to candidates running for mayorship. This would suggest that prospective candidates need to 'invest' in their education, starting from a deputy position, for administering a municipality. This might be a way for political parties to select better candidates for the administration of local institutions.

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Mathematical Appendix

Recall, from Section 2, that our two-term limit electoral system involves four classes of policy makers, each one composed by a mayor and a deputy-mayor: first term politicians without previous experience P_1^{ne}; first term politicians with previous experience P_1^e, since the mayor served as a deputy in the previous terms; second term politicians P_2^d, with the deputy running for mayorship at the subsequent elections; and, finally, second term politicians P_2^{nd}, with the deputy *not* running for mayorship at the subsequent elections.

In the First Term Policy Game (FTPG), and in the Second Term Policy Game (STPG), respectively represented in Figures 2 and 3, $\mu_j'(\mathcal{P})$ denotes the voter's prior belief that in term j, $j = 1, 2$, policy makers of class $\mathcal{P}$ are competent types before choosing their effort level, and $\mu_j(O, a, \mu_j'(\mathcal{P}), \mathcal{P})$ denotes the posterior belief that policy makers of class $\mathcal{P}$ — who obtained outcome O by exerting effort a — are competent types.

The following proposition characterizes the pure strategy Perfect Bayesian Equilibria of the policy game.

Proposition 1 *Assume that parameters* $\{\mu_0, \gamma, \varepsilon, \pi\}$ *are such that*

$$\mu_0 < \gamma, \tag{Assumption 1}$$

$$\mu_0 > \tilde{\mu}_0 \equiv \max\left\{\frac{(1-\gamma)(1-\varepsilon^2)\left[\pi + (1-\pi)\gamma\right]}{\left[1-(1-\varepsilon)\gamma\right]\gamma}, \frac{(1-\gamma)(1-\varepsilon^2)}{1-(1-\varepsilon^2)\gamma}\right\}. \tag{Assumption 2}$$

Let $0 < \hat{c}_1 < \hat{c}_2^d$, *where*

$$\hat{c}_1 \equiv \frac{\delta(1-\varepsilon)(1-\gamma)\left[1+\delta(1-\varepsilon^2)\pi\right]B}{1+\delta(1-\varepsilon)(1-\gamma)\pi - \delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi}, \tag{A.1}$$

$$\hat{c}_2^d \equiv \frac{\delta(1-\varepsilon^2)(1-\gamma)\left[1+\delta(1-\varepsilon)\gamma\right]B}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma^2\pi}. \tag{A.2}$$

In any equilibrium of the two-term limits policy game:

A. *If* $0 \leq c < \hat{c}_1$, *then* P_1^{ne}, P_1^e *and* P_2^d *choose* $\overline{a}$ *if competent and* $\underline{a}$ *if incompetent, while* P_2^{nd} *choose* $\underline{a}$, *regardless of competence.*

B. *If* $\hat{c}_1 < c < \hat{c}_2^d$, *then* P_2^d *choose* $\overline{a}$ *if competent and* $\underline{a}$ *if incompetent, while* P_1^{ne}, P_1^e *and* P_2^{nd} *choose* $\underline{a}$, *regardless of competence.*

C. *If* $c > \hat{c}_2^d$, *then all classes of policy makers choose* $\underline{a}$, *regardless of competence.*

D. *The voter reelects* P_1^{ne} *and* P_1^e *if and only if the outcome is* H. *The voter elects as mayor the deputy in ticket with a lame duck mayor — the class of policy makers* P_2^d *— if and only if the outcome is* H.

E. *For all* c, P_1^{ne} *are competent with probability* $\mu_0(1-\varepsilon)$, P_1^e *are competent with probability* $1-\varepsilon$, P_2^d *and* P_2^{nd} *are competent with probability* $1-\varepsilon^2$.

Proof. The proof is divided in two parts: characterization of the equilibrium actions profiles by competent policy makers (parts A, B, C), and determination of the equilibrium voting strategies

(part D). The determination of the equilibrium probabilities of competent politicians (part E) follows directly from the assumptions made in Section 2 about the transition probabilities of competent types to incompetent ones as a function of seniority in office.

Actions strategies (Parts A, B, C). The equilibrium actions profiles — the decision to exert high or low effort — are characterized only for competent policy makers, since incompetent politicians, being unable to obtain a good outcome, always exert low effort.

Given the equilibrium voting strategies defined in Part D of the proposition, and the equilibrium probabilities of competent types defined in Part E, the present value V_1 of the payoffs accruing to first-term policy makers, either P_1^{ne} or P_1^e, and the present value V_2^d of the payoffs accruing to second-term policy makers with deputy-candidates, P_2^d, are characterized by the following two-equation system:

$$V_1 = B - C(a_1) + (1-\varepsilon)\delta g(a_1)\left[\pi V_2^d + (1-\pi)B\right], \tag{A.3}$$

$$V_2^d = B - C(a_2^d) + (1-\varepsilon^2)\delta g(a_2^d)V_1, \tag{A.4}$$

where $C(\underline{a}_1) = 0$, $C(\overline{a}_1) = c$, $g(\underline{a}_1) = \gamma$, $g(\overline{a}_1) = 1$, $C(\underline{a}_2^d) = 0$, $C(\overline{a}_2^d) = c$, $g(\underline{a}_2^d) = \gamma$, $g(\overline{a}_2^d) = 1$. Eq. (A.3) shows that the flow of payoffs for politicians P_1^{ne} and P_1^e is given by current (first-term) payoff $B - C(a_1)$, plus the expected payoff from a second term in office, $\pi V_2^d + (1-\pi)B$ (where the payoff accruing to lame-duck policy makers P_2^{nd} is simply B), weighted by the the probability $1-\varepsilon$ of retaining competence, the probability $g(a_1)$ of obtaining outcome H, and the discount factor δ. Eq. (A.4) shows that the flow of payoffs for politicians P_2^d is given by current (second-term) payoff $B - C(a_2^d)$, plus the expected payoff from a first term in office by the deputy-candidate, V_1, weighted by the the probability $1-\varepsilon^2$ of retaining competence, the probability $g(a_2^d)$ of obtaining outcome H, and the discount factor δ.

By solving the equation system (A.3)-(A.4) in the unknowns V_1 and V_2^d, we obtain the equilibrium payoffs as a function of the actions about effort chosen by the policy makers, as follows:

$$V_1(a_1, a_2^d) = \frac{B - C(a_1) + (1-\varepsilon)\delta g(a_1)\left[B - \pi C(a_2^d)\right]}{1 - (1-\varepsilon)(1-\varepsilon^2)\delta^2 g(a_1)g(a_2^d)\pi}, \tag{A.5}$$

$$V_2^d(a_1, a_2^d) = \frac{B - C(a_2^d) + (1-\varepsilon^2)\delta g(a_2^d)\left[B - \pi C(a_1)\right]}{1 - (1-\varepsilon)(1-\varepsilon^2)\delta^2 g(a_1)g(a_2^d)\pi} + \\ + \frac{(1-\varepsilon)(1-\varepsilon^2)\delta^2 g(a_1)g(a_2^d)(1-\pi)B}{1 - (1-\varepsilon)(1-\varepsilon^2)\delta^2 g(a_1)g(a_2^d)\pi}. \tag{A.6}$$

The policy game admits four possible configuration strategies by policy makers P_1^{ne}/P_1^e and P_2^d (term-limited policy makers P_2^{nd} always set low effort $\underline{a}_2^{nd}$):

$$\mathcal{A} = \left\{(\overline{a}_1, \overline{a}_2^d), (\overline{a}_1, \underline{a}_2^d), (\underline{a}_1, \overline{a}_2^d), (\underline{a}_1, \underline{a}_2^d)\right\}.$$

For any strategy profile $(a_1, a_2^d) \in \mathcal{A}$, the payoffs defined in Eqs. (A.5) and (A.6) can be

expressed as non-increasing linear functions of the cost of effort c, as follows:

$$V_1(a_1, a_2^d, c) = \alpha_1(a_1, a_2^d) - \beta_1(a_1, a_2^d) \times c, \tag{A.7}$$

$$V_2^d(a_1, a_2^d, c) = \alpha_2^d(a_1, a_2^d) - \beta_2^d(a_1, a_2^d) \times c, \tag{A.8}$$

where $\alpha > 0$ denotes the intercept term and $\beta \geq 0$ the slope coefficient.

Under the four configuration strategies, the coefficients of $V_1(a_1, a_2^d, c)$ are equal to

$$\alpha_1(\overline{a}_1, \overline{a}_2^d) = \frac{1+\delta(1-\varepsilon)}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\pi}B, \quad \beta_1(\overline{a}_1, \overline{a}_2^d) = \frac{1+\delta(1-\varepsilon)\pi}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\pi},$$

$$\alpha_1(\overline{a}_1, \underline{a}_2^d) = \frac{1+\delta(1-\varepsilon)}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi}B, \quad \beta_1(\overline{a}_1, \underline{a}_2^d) = \frac{1}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi},$$

$$\alpha_1(\underline{a}_1, \overline{a}_2^d) = \frac{1+\delta(1-\varepsilon)\gamma}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi}B, \quad \beta_1(\underline{a}_1, \overline{a}_2^d) = \frac{\delta(1-\varepsilon)\gamma\pi}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi},$$

$$\alpha_1(\underline{a}_1, \underline{a}_2^d) = \frac{1+\delta(1-\varepsilon)\gamma}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma^2\pi}B, \quad \beta_1(\underline{a}_1, \underline{a}_2^d) = 0,$$

while the coefficients of $V_2^d(a_1, a_2^d, c)$ are equal to

$$\alpha_2^d(\overline{a}_1, \overline{a}_2^d) = \frac{1+\delta(1-\varepsilon^2)+\delta^2(1-\varepsilon)(1-\varepsilon^2)(1-\pi)}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\pi}B,$$

$$\beta_2^d(\overline{a}_1, \overline{a}_2^d) = \frac{1+\delta(1-\varepsilon^2)\pi}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\pi},$$

$$\alpha_2^d(\overline{a}_1, \underline{a}_2^d) = \frac{1+\delta(1-\varepsilon^2)\gamma+\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma(1-\pi)}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi}B,$$

$$\beta_2^d(\overline{a}_1, \underline{a}_2^d) = \frac{\delta(1-\varepsilon^2)\gamma}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi},$$

$$\alpha_2^d(\underline{a}_1, \overline{a}_2^d) = \frac{1+\delta(1-\varepsilon^2)+\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma(1-\pi)}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi}B,$$

$$\beta_2^d(\underline{a}_1, \overline{a}_2^d) = \frac{1}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi},$$

$$\alpha_2^d(\underline{a}_1, \underline{a}_2^d) = \frac{1+\delta(1-\varepsilon^2)\gamma+\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma^2(1-\pi)}{1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma^2\pi}B,$$

$$\beta_2^d(\underline{a}_1, \underline{a}_2^d) = 0.$$

It is then immediate to see that, for $V_1(a_1, a_2^d, c)$,

$$\alpha_1(\overline{a}_1, \overline{a}_2^d) > \alpha_1(\overline{a}_1, \underline{a}_2^d) > \alpha_1(\underline{a}_1, \overline{a}_2^d) > \alpha_1(\underline{a}_1, \underline{a}_2^d) > 0, \tag{A.9}$$

$$\beta_1(\overline{a}_1, \overline{a}_2^d) > \beta_1(\overline{a}_1, \underline{a}_2^d) > \beta_1(\underline{a}_1, \overline{a}_2^d) > \beta_1(\underline{a}_1, \underline{a}_2^d) = 0, \tag{A.10}$$

that is, the intercept decreases, and the slope coefficient decreases in absolute value, as the strategy profile changes from $(\overline{a}_1, \overline{a}_2^d)$ to $(\overline{a}_1, \underline{a}_2^d)$, to $(\underline{a}_1, \overline{a}_2^d)$, to $(\underline{a}_1, \underline{a}_2^d)$.

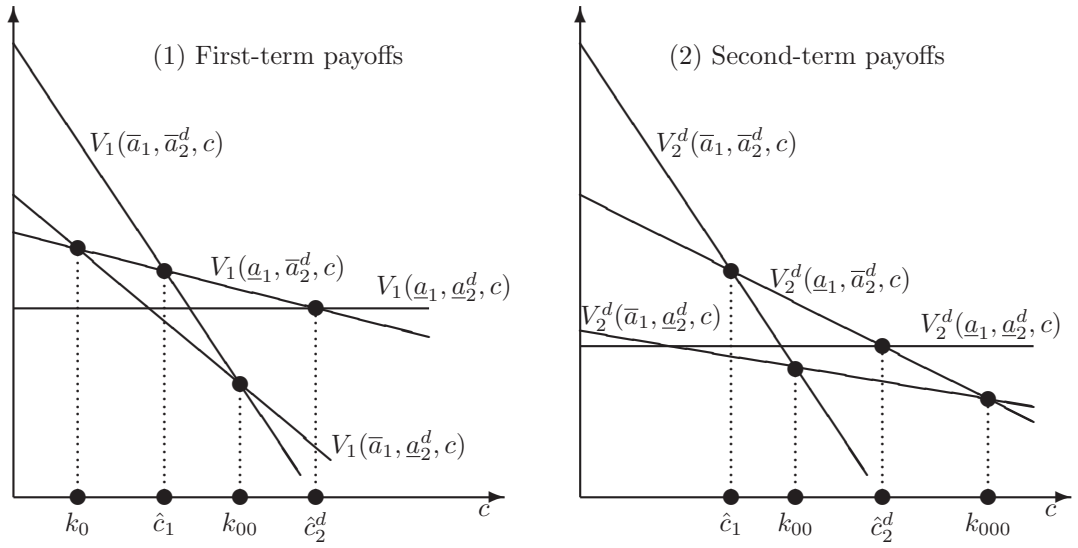

Figure A.1: Politicians payoffs as a function of the cost of effort

As for $V_2^d(a_1, a_2^d, c)$,

$$\alpha_2^d(\overline{a}_1, \overline{a}_2^d) > \alpha_2^d(\underline{a}_1, \overline{a}_2^d) > \alpha_2^d(\overline{a}_1, \underline{a}_2^d) > \alpha_2^d(\underline{a}_1, \underline{a}_2^d) > 0, \tag{A.11}$$

$$\beta_2^d(\overline{a}_1, \overline{a}_2^d) > \beta_2^d(\underline{a}_1, \overline{a}_2^d) > \beta_2^d(\overline{a}_1, \underline{a}_2^d) > \beta_2^d(\underline{a}_1, \underline{a}_2^d) = 0, \tag{A.12}$$

that is, the intercept decreases, and the slope coefficient decreases in absolute value, as the strategy profile changes from $(\overline{a}_1, \overline{a}_2^d)$ to $(\underline{a}_1, \overline{a}_2^d)$, to $(\overline{a}_1, \underline{a}_2^d)$, to $(\underline{a}_1, \underline{a}_2^d)$.

For given cost of high effort c, policy makers choose the strategy profile (a_1, a_2^d) such that

$$(a_1, a_2^d) \in \mathcal{A} = \arg\max V_1(a_1, a_2^d, c), \tag{A.13}$$

$$(a_1, a_2^d) \in \mathcal{A} = \arg\max V_2^d(a_1, a_2^d, c). \tag{A.14}$$

The typical solution is represented in Figure A.1. Denote with $V_1^*(.)$ the payoff function associated to the solution of problem (A.13). Panel (1) of Figure A.1 then shows that $V_1^*(\overline{a}_1, \overline{a}_2^d, c)$ if $0 \leq c < \hat{c}_1$, $V_1^*(\underline{a}_1, \overline{a}_2^d, c)$ if $\hat{c}_1 < c < \hat{c}_2^d$, and $V_1^*(\underline{a}_1, \underline{a}_2^d, c)$ if $c > \hat{c}_2^d$, where

$$\hat{c}_1 = c \text{ such that } V_1(\overline{a}_1, \overline{a}_2^d, c) = V_1(\underline{a}_1, \overline{a}_2^d, c), \tag{A.15}$$

$$\hat{c}_2^d = c \text{ such that } V_1(\underline{a}_1, \overline{a}_2^d, c) = V_1(\underline{a}_1, \underline{a}_2^d, c), \tag{A.16}$$

where $\hat{c}_1$ and $\hat{c}_2^d$ are defined in Eqs. (A.1) and (A.2), respectively.

Denote with $V_2^{d*}(.)$ the payoff function associated to the solution of problem (A.14). Panel (2) of Figure A.1 then shows that $V_2^{d*}(\overline{a}_1, \overline{a}_2^d, c)$ if $0 \leq c < \hat{c}_1$, $V_2^{d*}(\underline{a}_1, \overline{a}_2^d, c)$ if $\hat{c}_1 < c < \hat{c}_2^d$, and $V_d^{2*}(\underline{a}_1, \underline{a}_2^d, c)$ if $c > \hat{c}_2^d$.

To complete the proof, we have to show that the patterns represented in panels (1) and (2) of Figure A.1 are the only possible ones. To this end, we have to show that (i) $\hat{c}_2^d > \hat{c}_1$, (ii) $V_1(\overline{a}_1, \underline{a}_2^d, c) < V_1^*(.)$ for all c, (iii) $V_2^d(\overline{a}_1, \underline{a}_2^d, c) < V_2^{d*}(.)$ for all c.

As for point (i), it is immediate to see that

$$\hat{c}_2^d - \hat{c}_1 = \frac{(1-\gamma)[1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi][\delta(1-\varepsilon)(1-\varepsilon^2)\gamma(1-\pi)+\varepsilon(1-\varepsilon)]B}{[1+\delta(1-\varepsilon)(1-\gamma)\pi-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi][1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma^2\pi]} > 0.$$

As for point (ii), let

$$k_0 = c \text{ such that } V_1(\overline{a}_1, \underline{a}_2^d, c) = V_1(\underline{a}_1, \overline{a}_2^d, c),$$
$$k_{00} = c \text{ such that } V_1(\overline{a}_1, \underline{a}_2^d, c) = V_1(\overline{a}_1, \overline{a}_2^d, c),$$

where

$$k_0 \equiv \frac{\delta(1-\varepsilon)(1-\gamma)B}{1-\delta(1-\varepsilon)\gamma\pi}, \tag{A.17}$$

$$k_{00} \equiv \frac{\delta(1-\varepsilon^2)(1-\gamma)\left[1+\delta(1-\varepsilon)\right]B}{1+\delta(1-\varepsilon^2)(1-\gamma)-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi}. \tag{A.18}$$

That $V_1(\overline{a}_1, \underline{a}_2^d, c) < V_1^*(.)$ for all c follows from the fact that

$$k_{00} - k_0 = \frac{\delta(1-\gamma)[\delta(1-\varepsilon)(1-\varepsilon^2)\gamma(1-\pi)+\varepsilon(1-\varepsilon)]B}{[1-\delta(1-\varepsilon)\gamma\pi][1+\delta(1-\varepsilon^2)(1-\gamma)-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi]} > 0.$$

As for point (iii), let

$$k_{00} = c \text{ such that } V_2^d(\overline{a}_1, \underline{a}_2^d, c) = V_2^d(\overline{a}_1, \overline{a}_2^d, c),$$
$$k_{000} = c \text{ such that } V_2^d(\overline{a}_1, \underline{a}_2^d, c) = V_2^d(\underline{a}_1, \overline{a}_2^d, c),$$

where k_{00} is defined in Eq. (A.18) and

$$k_{000} \equiv \frac{\delta(1-\varepsilon^2)(1-\gamma)B}{1-\delta(1-\varepsilon^2)\gamma}. \tag{A.19}$$

That $V_2^d(\overline{a}_1, \underline{a}_2^d, c) < V_2^{d*}(.)$ for all c follows from the fact that

$$k_{00} - \hat{c}_1 = \frac{\delta(1-\gamma)[1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\pi]}{[1+\delta(1-\varepsilon^2)(1-\gamma)-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi]} \times$$
$$\times \frac{[\delta(1-\varepsilon)(1-\varepsilon^2)\gamma(1-\pi)+\varepsilon(1-\varepsilon)]B}{[1+\delta(1-\varepsilon)(1-\gamma)\pi-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma\pi]} > 0,$$
$$k_{000} - \hat{c}_2^d = \frac{\delta^2(1-\varepsilon^2)\gamma(1-\gamma)\left\{(1-\varepsilon^2)[1+\delta(1-\varepsilon)\gamma(1-\pi)]+1-\varepsilon\right\}B}{[1-\delta(1-\varepsilon^2)\gamma][1-\delta^2(1-\varepsilon)(1-\varepsilon^2)\gamma^2\pi]} > 0.$$

This ends the proof of parts A, B and C of the proposition.

Voting strategies (Part D). The equilibrium voting strategies are characterized in response to each one of the three equilibrium actions profiles of competent types characterized in parts A, B and C of the proposition. The voter always expects low effort from incompetent types, since it is common knowledge that incompetent politicians never obtain a good outcome even

if they exert high effort.

Voting strategies in response to actions profile $A^* \equiv \left\{\overline{a}_1^{ne}, \overline{a}_1^{e}, \overline{a}_2^{d}, \underline{a}_2^{nd}\right\}$ (Part A).

First term. If, expecting actions A^* from competent types, the voter observes outcome H at the end of a first term, then, regardless of her prior beliefs μ_1', her posterior beliefs about competence of either P_1^{ne} or P_1^{e} are

$$\mu_1(H, \overline{a}_1^{ne}, \mu_1', P_1^{ne}) = \mu_1(H, \overline{a}_1^{e}, \mu_1', P_1^{e}) = 1.$$

Hence, the voter reelects either P_1^{ne} or P_1^{e} for a second term, since Assumption 1 implies that

$$1 \times (1-\varepsilon^2)\left[\pi + (1-\pi)\gamma\right] > \mu_0(1-\varepsilon),$$

i.e., the probability of outcome H in a second term by either P_1^{ne} or P_1^{e} is greater than the probability of outcome H in a first term by debutant challengers of the opposition party.

If, instead, expecting actions A^* from competent types, the voter observes outcome L at the end of a first term, then, regardless of her prior beliefs μ_1', her posterior beliefs about competence of either P_1^{ne} or P_1^{e} are

$$\mu_1(L, \overline{a}_1^{ne}, \mu_1', P_1^{ne}) = \mu_1(L, \overline{a}_1^{e}, \mu_1', P_1^{e}) = 0.$$

Hence, the voter does not reelect either P_1^{ne} or P_1^{e} for a second term, since $0 < \mu_0(1-\varepsilon)$, i.e., the probability of outcome H in a second term by either P_1^{ne} or P_1^{e} is zero while the probability of outcome H in a first term by debutant challengers is strictly positive.

Second term. If, expecting actions A^* from competent types, the voter observes outcome H at the end of a second term, then, regardless of her prior belief μ_2', her posterior belief about competence of P_2^{d} is $\mu_2(H, \overline{a}_2^{d}, \mu_2', P_2^{d}) = 1$. Hence, the voter elects the second-term deputy as a first-term mayor, since $1 \times (1-\varepsilon) > \mu_0(1-\varepsilon)$, i.e., the probability of outcome H in a first term by P_1^{e} is greater than the probability of outcome H in a first term by debutant challengers P_1^{ne} of the opposition party.

If, instead, expecting actions A^* from competent types, the voter observes outcome L at the end of a second term, then, regardless of her prior belief μ_2', her posterior belief about competence of P_2^{d} is $\mu_2(L, \overline{a}_2^{d}, \mu_2', P_2^{d}) = 0$. Hence, the voter does not elect the second-term deputy as a first-term mayor, since $0 < \mu_0(1-\varepsilon)$, i.e., the probability of outcome H in a first term by P_1^{e} is zero while the probability of outcome H in a first term by debutant challengers P_1^{ne} is strictly positive.

Whatever the outcome of lame-duck policy makers P_2^{nd}, the voter elects randomly, with equal probability, one of the two identical challengers.

Note finally that, given the equilibrium actions profile A^*, equilibrium prior beliefs are $\mu_1'(P_1^{ne}) = \mu_0$, $\mu_1'(P_1^{e}) = 1$, $\mu_2'(P_1^{ne}) = 1$, $\mu_2'(P_1^{e}) = 1$.

Voting strategies in response to actions profile $B^* \equiv \left\{\underline{a}_1^{ne}, \underline{a}_1^{e}, \overline{a}_2^{d}, \underline{a}_2^{nd}\right\}$ (Part B).

First term. If, expecting actions B^* from competent types, the voter observes outcome H at the end of a first term, then, regardless of her prior beliefs μ_1', her posterior beliefs about

competence of either P_1^{ne} or P_1^e are

$$\mu_1(H, \underline{a}_1^{ne}, \mu_1', P_1^{ne}) = \mu_1(H, \underline{a}_1^{e}, \mu_1', P_1^{e}) = 1.$$

Hence, the voter reelects either P_1^{ne} or P_1^e for a second term, since Assumption 1 implies that

$$1 \times (1-\varepsilon^2)\left[\pi + (1-\pi)\gamma\right] > \mu_0(1-\varepsilon),$$

i.e., the probability of outcome H in a second term by either P_1^{ne} or P_1^e is greater than the probability of outcome H in a first term by debutant challengers of the opposition party.

If, instead, expecting actions B^* from competent types, the voter observes outcome L from P_1^{ne} at the end of a first term, then, given her prior belief $\mu_1'(P_1^{ne}) = \mu_0$, her posterior belief about competence of P_1^{ne} is

$$\mu_1(L, \underline{a}_1^{ne}, \mu_1', P_1^{ne}) = \frac{\mu_0(1-\varepsilon)(1-\gamma)}{\mu_0(1-\varepsilon)(1-\gamma) + \mu_0\varepsilon + 1 - \mu_0}.$$

Hence, the voter does not reelect P_1^{ne} for a second term, since Assumption 2 implies that

$$\frac{\mu_0(1-\varepsilon)(1-\gamma)}{\mu_0(1-\varepsilon)(1-\gamma) + \mu_0\varepsilon + 1 - \mu_0}(1-\varepsilon^2)\left[\pi + (1-\pi)\gamma\right] < \mu_0(1-\varepsilon)\gamma,$$

i.e., the probability of outcome H in a second term by P_1^{ne} is lower than the probability of outcome H in a first term by debutant challengers.

Finally, if, expecting actions B^* from competent types, the voter observes outcome L from P_1^e at the end of a first term, then, given her prior belief $\mu_1'(P_1^e) = 1$ (see below on second term), her posterior belief about competence of P_1^e is

$$\mu_1(L, \underline{a}_1^{e}, \mu_1', P_1^{e}) = \frac{(1-\varepsilon)(1-\gamma)}{(1-\varepsilon)(1-\gamma) + \varepsilon}.$$

Hence, the voter does not reelect P_1^e for a second term, since Assumption 2 implies that

$$\frac{(1-\varepsilon)(1-\gamma)}{(1-\varepsilon)(1-\gamma) + \varepsilon}(1-\varepsilon^2)\left[\pi + (1-\pi)\gamma\right] < \mu_0(1-\varepsilon)\gamma,$$

i.e., the probability of outcome H in a second term by P_1^e is lower than the probability of outcome H in a first term by debutant challengers.

Second term. If, expecting actions B^* from competent types, the voter observes outcome H at the end of a second term, then, regardless of her prior belief μ_2', her posterior belief about competence of P_2^d is $\mu_2(H, \overline{a}_2^d, \mu_2', P_2^d) = 1$. Hence, the voter elects the second-term deputy as a first-term mayor, since $1 \times (1-\varepsilon)\gamma > \mu_0(1-\varepsilon)\gamma$, i.e., the probability of outcome H in a first term by P_1^e is greater than the probability of outcome H in a first term by debutant challengers P_1^{ne} of the opposition party.

If, instead, expecting actions B^* from competent types, the voter observes outcome L at the end of a second term, then, regardless of her prior belief μ_2', her posterior belief about

competence of P_2^d is $\mu_2(L, \overline{a}_2^d, \mu_2', P_2^d) = 0$. Hence, the voter does not elect the second-term deputy as a first-term mayor, since $0 < \mu_0(1-\varepsilon)\gamma$, i.e., the probability of outcome H in a first term by P_1^e is zero while the probability of outcome H in a first term by debutant challengers P_1^{ne} is strictly positive.

Whatever the outcome of lame-duck policy makers P_2^{nd}, the voter elects randomly, with equal probability, one of the two identical challengers.

Note finally that, given the equilibrium actions profile B^*, equilibrium prior beliefs are $\mu_1'(P_1^{ne}) = \mu_0$, $\mu_1'(P_1^e) = 1$, $\mu_2'(P_1^{ne}) = 1$, $\mu_2'(P_1^e) = 1$.

Voting strategies in response to actions profile $C^* \equiv \left\{\underline{a}_1^{ne}, \underline{a}_1^e, \underline{a}_2^d, \underline{a}_2^{nd}\right\}$ (Part C).

First term. If, expecting actions C^* from competent types, the voter observes outcome H at the end of a first term, then, regardless of her prior beliefs μ_1', her posterior beliefs about competence of either P_1^{ne} or P_1^e are

$$\mu_1(H, \underline{a}_1^{ne}, \mu_1', P_1^{ne}) = \mu_1(H, \underline{a}_1^e, \mu_1', P_1^e) = 1.$$

Hence, the voter reelects either P_1^{ne} or P_1^e for a second term, since Assumption 1 implies that

$$1 \times (1-\varepsilon^2)\left[\pi\gamma + (1-\pi)\gamma\right] > \mu_0(1-\varepsilon),$$

i.e., the probability of outcome H in a second term by either P_1^{ne} or P_1^e is greater than the probability of outcome H in a first term by debutant challengers of the opposition party.

If, instead, expecting actions C^* from competent types, the voter observes outcome L from P_1^{ne} at the end of a first term, then, given her prior belief $\mu_1'(P_1^{ne}) = \mu_0$, her posterior belief about competence of P_1^{ne} is

$$\mu_1(L, \underline{a}_1^{ne}, \mu_1', P_1^{ne}) = \frac{\mu_0(1-\varepsilon)(1-\gamma)}{\mu_0(1-\varepsilon)(1-\gamma) + \mu_0\varepsilon + 1 - \mu_0}.$$

Hence, the voter does not reelect P_1^{ne} for a second term, since Assumption 2 implies that

$$\frac{\mu_0(1-\varepsilon)(1-\gamma)}{\mu_0(1-\varepsilon)(1-\gamma) + \mu_0\varepsilon + 1 - \mu_0}(1-\varepsilon^2)\left[\pi\gamma + (1-\pi)\gamma\right] < \mu_0(1-\varepsilon)\gamma,$$

i.e., the probability of outcome H in a second term by P_1^{ne} is lower than the probability of outcome H in a first term by debutant challengers.

Finally, if, expecting actions C^* from competent types, the voter observes outcome L from P_1^e at the end of a first term, then, given her prior belief $\mu_1'(P_1^e) = 1$ (see below on second term), her posterior belief about competence of P_1^e is

$$\mu_1(L, \underline{a}_1^e, \mu_1', P_1^e) = \frac{(1-\varepsilon)(1-\gamma)}{(1-\varepsilon)(1-\gamma) + \varepsilon}.$$

Hence, the voter does not reelect P_1^e for a second term, since Assumption 2 implies that

$$\frac{(1-\varepsilon)(1-\gamma)}{(1-\varepsilon)(1-\gamma) + \varepsilon}(1-\varepsilon^2)\left[\pi\gamma + (1-\pi)\gamma\right] < \mu_0(1-\varepsilon)\gamma,$$

i.e., the probability of outcome H in a second term by P_1^e is lower than the probability of outcome H in a first term by debutant challengers.

Second term. If, expecting actions C^* from competent types, the voter observes outcome H at the end of a second term, then, regardless of her prior belief μ_2', her posterior belief about competence of P_2^d is $\mu_2(H, \underline{a}_2^d, \mu_2', P_2^d) = 1$. Hence, the voter elects the second-term deputy as a first-term mayor, since $1 \times (1-\varepsilon)\gamma > \mu_0(1-\varepsilon)\gamma$, i.e., the probability of outcome H in a first term by P_1^e is greater than the probability of outcome H in a first term by debutant challengers P_1^{ne} of the opposition party.

If, instead, expecting actions C^* from competent types, the voter observes outcome L at the end of a second term, then, regardless of her prior belief μ_2', her posterior belief about competence of P_2^d is

$$\mu_2(L, \underline{a}_2^d, \mu_2', P_2^d) = \frac{(1-\varepsilon^2)(1-\gamma)}{(1-\varepsilon^2)(1-\gamma)+\varepsilon^2}.$$

Hence, the voter does not elect the second-term deputy as a first-term mayor, since Assumption 2 implies that

$$\frac{(1-\varepsilon^2)(1-\gamma)}{(1-\varepsilon^2)(1-\gamma)+\varepsilon^2}(1-\varepsilon)\gamma < \mu_0(1-\varepsilon)\gamma,$$

i.e., the probability of outcome H in a first term by P_1^e is lower than the probability of outcome H in a first term by debutant challengers P_1^{ne}.

Whatever the outcome of lame-duck policy makers P_2^{nd}, the voter elects randomly, with equal probability, one of the two identical challengers.

Note finally that, given the equilibrium actions profile C^*, equilibrium prior beliefs are $\mu_1'(P_1^{ne}) = \mu_0$, $\mu_1'(P_1^e) = 1$, $\mu_2'(P_1^{ne}) = 1$, $\mu_2'(P_1^e) = 1$.

This completes the proof of part D of the proposition.