

# Political Budget Forecast Cycles

FRANK BOHN\* and FRANCISCO JOSÉ VEIGA†

February 2019

## Abstract

By forecasting overly optimistic revenues opportunistic governments can increase spending in order to appear more competent prior to elections. Ex post deficits emerge in election years, thereby producing political forecast cycles - as also found for US states in the empirical literature. In our theoretical moral hazard model we obtain three results which are tested with panel data for Portuguese municipalities. The extent of manipulations is reduced when (i) the winning margin is expected to widen; (ii) the incumbent is not re-running; and/or (iii) the share of informed voters (proxied by education) goes up.

**JEL classification:** D72, H68, E32

**Keywords:** opportunistic political cycles; political budget cycles; revenue forecasts; deficit; transfers;  
asymmetric information; political economy.

---

\*Radboud University, Institute for Management Research, Department of Economics, P.O. Box 9108, 6500 HK Nijmegen, The Netherlands, phone: +31-24-36-15507, fax: +31-24-36-12379, email: f.bohn@fm.ru.nl.

†*Corresponding author.* Universidade do Minho and NIPE, Escola de Economia e Gestão, 4710-057 Braga, Portugal, phone: +351-253604511, fax: +351-253601380, email: fjveiga@eeg.uminho.pt.

# 1 Introduction

The motivation for this paper is twofold. First and more specifically, there is evidence that governments use revenue forecasts to expand their fiscal room for manoeuvre in election years in order to increase their chances of re-election. Boylan (2008) showed for 49 US states with constitutional balanced budget constraints for the period from 1988 to 2004 that the state revenue growth forecast error is 2.2 % higher in election years.<sup>1</sup> Second, and more generally, there is evidence that governments try to influence the international and domestic public's perception of fiscal conditions, especially during election years. Greece and other European countries cheated to hide "excessive" public debt and/or deficits so that they could gain access to the European Monetary Union and/or fulfill the criteria laid out by the European Stability and Growth Pact.

This paper presents a political economy model which focuses on an opportunistic government and a partially uninformed electorate. The incumbent government can manipulate revenue forecasts in order to expand its provision of public goods. This is a hidden effort because uninformed voters do not understand the reason for the expansion and attribute it to government competence, thereby raising the government's re-election chances. Since forecasts and budgets are larger in election years, we obtain political forecast and budget cycles. Not only do we offer a theoretical mechanism which can explain the results found in the aforementioned studies, but we also provide additional evidence in the same vein. Our own empirical analysis based on data from Portuguese municipalities for the period 1998-2015 confirms the existence of forecast manipulations in election years. An array of robustness tests suggests that the evidence is rather solid.

In addition, this paper investigates the factors that are conducive to increasing the forecast manipulation even further. In the theoretical model we obtain the following results. First, a

---

<sup>1</sup> Election year forecast optimism is also found, for instance, by Heinemann (2006) with respect to (federal) deficit forecasts in Germany from 1969 to 2003; by Boukari and Veiga (2018) with respect to revenue and expenditure forecasts in France and Portugal from 1998 to 2015. Brück and Stephan (2006) argue that forecast optimism may have increased in the eurozone since the introduction of the Stability and Growth Pact.

larger ex ante expected winning margin allows the incumbent to reduce its revenue forecast which leads to a lower level of costly indebtedness. Second, if the government is not running, its own interest in winning the elections is reduced. Again, the motivation for high indebtedness is reduced. Third, if there are more uninformed voters, any manipulation is more effective. Hence the government will expand its effective tool and choose higher revenue forecasts. These findings are supported by the empirical analysis. The expected winning margin is proxied by the previous election winning margin. Uninformedness is captured by alternative education proxies. There is overwhelming evidence, both in the main results and in a battery of robustness tests, in support of our theoretical predictions.

The remainder of the paper is structured as follows. Section 2 outlines the model and its solution. Details for the solution are given in the appendix. Section 3 presents Propositions 1 to 3. The empirical model is set out in Section 4 and the results are presented in Section 5. Additional robustness tests can be found in the appendix. Section 6 concludes.

## 2 Political Forecast Cycle Model

The model captures an incumbent government which has some leverage over its revenue forecasts. It can manipulate them in order to expand its public services with the hope of convincing voters of being more competent and, thereby, increasing its re-election chances. Voters can be informed or uninformed about the government forecasts. If they are informed they can use this information to deduce government competence. If they are uninformed they have to form expectations. Overall, the model is of the Shi and Svensson (2006) and Bohn (2018) type; it captures moral hazard of an opportunistic government thereby producing political cycles.

### Preferences

Every alternate period two opportunistic politicians run for office, an incumbent  $a$  and a challenger  $b$ . Individual voter  $i$ 's utility depends on economic and non-economic considera-

tions:

$$U_t^i = \sum_{s=t}^{\infty} (\beta^i)^{s-t} E_s[u_s(c_s) + G_s^+ + \alpha \chi^i z_s] \quad \text{with } \chi^i = \theta^i - \gamma. \quad (1)$$

The intertemporal utility function for any voter  $i$  comprises additively-separable utility from private consumption,  $u_s(c_s)$ , utility from public consumption  $G_s^+$ , with unity marginal utility (a simplification also used by Shi and Svensson, 2006), and a non-economic component  $\chi^i z_s$ , with relative weight  $\alpha$ , in each period. Formally, discounting between periods is included here, but can be ignored later on because it does not contribute to substance nor exposition as will be seen further down. Utility derived from sympathy represents any attribute of the candidates that does not affect economic policies, be it their stance on societal issues or their good looks. It reflects more or less strong sympathy for one of the two candidates. Without limiting the generality of the analysis we assume that support for incumbent  $a$  is depicted by negative values of  $\chi^i$ , support for challenger  $b$  by positive values. Sympathy utility is constrained to  $\chi^i z_s \in [-\frac{1}{2} - \gamma, \frac{1}{2} - \gamma]$  since  $z_t$  is either  $-\frac{1}{2}$  (when incumbent  $a$  is elected) or  $+\frac{1}{2}$  (when challenger  $b$  is elected); the personal sympathy parameter  $\theta^i$  is uniformly distributed over the interval  $[-1, 1]$ ; and  $\gamma$  is a shift parameter.<sup>2</sup>

Both politicians  $j = a, b$  face a utility function similar to the one for voters consisting, again, of an economic and, if the politician is in power, a non-economic component. The non-economic component is, however, different and includes both a political rent and political (reputation) costs:

$$V_t^j = \sum_{s=t}^{\infty} V_s^j = \sum_{s=t}^{\infty} (\beta^j)^{s-t} E_s[u_s(c_s) + G_s^+ + \mathbf{I}_s X_s - \mathbf{I}_{s-1} \mathbf{I}_s \xi_s D_{s-1}^2], j = a, b. \quad (2)$$

$$\mathbf{I}_r = \begin{cases} 1 & \text{if in power in period } r \\ 0 & \text{otherwise} \end{cases}$$

---

<sup>2</sup> If voter  $i$  has somewhat more sympathies for incumbent  $a$ , say at  $\chi^i = -\frac{1}{2}$ , then her utility derived from sympathy is positive ( $\frac{1}{4}$ ), if the incumbent is elected ( $z_s = -\frac{1}{2}$ ); but it is negative ( $-\frac{1}{4}$ ), if challenger  $b$  is elected ( $z_s = \frac{1}{2}$ ). If  $\gamma = 0$ , incumbent and challenger have equal chances of being elected; with  $\gamma > 0$ , the incumbent has higher chances.

Both politicians are concerned about private and public consumption. In addition, politician  $a$  (in power) receives ego rent  $X_s$  and bears reputation costs  $(\xi_s D_{s-1}^2)$ , if she was also in power in the previous period. Reputation costs rise overproportionally (squared) with the previous period deviation ( $D_{s-1} > 0$ ) from a balanced budget<sup>3</sup> ( $D_{s-1} = 0$ ).<sup>4</sup>

For voters and politicians alike, period  $t$  consumption  $c_t$  is modelled to depend upon trend output  $\bar{y}$  and any deviation of output  $y_t^+$ . For simplification, the taxes (and expenditures) for trend output are not explicitly studied, but would not change the analysis; note, however, that deadweight loss and distributional effects are ignored. We only consider adjustments of taxes for deviations of output, hence each agent's additional net-of-tax income  $(1 - \tau)y_t^+$  in the consumption function:

$$c_t = \bar{y} + (1 - \tau)y_t^+ = \bar{y} + (1 - \tau)\frac{R_t^+}{\tau}. \quad (3)$$

The deviation from trend output,  $y_t^+$ , is a random variable with mean  $E_t[y_t^+] = 0$  and variance  $\sigma^2$ . For a constant tax rate, it can also be expressed in terms of additional revenue the government receives,  $R_t^+$ , which is also a random variable with mean zero.

### Fiscal policy and competence

The planned government budget constraint is expressed in terms of additional public goods,  $G_t^+$ , supplied by the government:

$$G_t^+ = R_t^{+forec} - (1 + r_{t-1})(D_{t-1}) + \eta_t^j; \quad (4)$$

By making overly optimistic revenue forecasts,  $R_t^{+forec}$ , for random variable  $R_t^+$  the incumbent can manipulate the amount of public goods she supplies to voters. The variable  $R_t^{+forec}$

---

<sup>3</sup> Alternatively, deviations from a prespecified deficit target  $\bar{D}$  (i.e.  $D_{s-1} > \bar{D}$ ) could also be modelled, but would produce the same qualitative results.

<sup>4</sup> Leaving reputation costs out would not contradict any of the findings of this paper, but would require the inclusion of subjective discount rates and a careful discussion of interest (debt repayment) versus discount rates. – The quadratic form is the simplest way of capturing how the government's trustworthiness and credibility are affected. The legislature and social groups the government has to deal with may "tolerate" small, but not large, deviations and dislike both surpluses and deficits.

is thus the incumbent's instrument and forms the basis for her budget calculations. To fulfill balanced budget requirement (thereby avoiding a political cost next period) the government has to repay its previous period deficit  $D_{t-1}$  including interest at exogenous rate  $r_{t-1}$ .

The amount of public goods any government  $j$  can supply also depends on the  $j$ 's positive or negative competence shock,  $\eta_t^j$ . Competence could be interpreted, for instance, as tax collection efficiency or public goods provision efficiency. Competence  $\eta_t^j$  consists of a skills shocks for the current period and another one for the previous period:

$$\eta_t^j = \mu_t^j + \mu_{t-1}^j. \quad (5)$$

Hence competence persistence is modelled as an MA(1) process.<sup>5</sup> Each skills shock  $\mu_t^j$  is a random variable with mean 0, distribution function  $F(\mu_t^j) = F(\bullet)$  and density function  $f(\mu_t^j) = f(\bullet) = F'(\bullet)$  which is (weakly) monotonously increasing up to the mean.<sup>6</sup> Past shocks are common knowledge, but current or future shocks are unknown to both politicians and voters. Even the incumbent does not know her own current competence – an idea suggested by Shi and Svensson (2006) – because she always faces new tasks and challenges (like the financial crisis or the European refugee crisis) or wants to start new programmes and cannot foresee how efficiently she can manage them. Not knowing her own competence, any incumbent has an incentive to provide additional public goods in order to appear more competent and increase her re-election chances. Since politicians do not have an informational advantage, there is no signalling, only moral hazard.

The government deficit is obtained residually because forecast revenues are committed according to Equation (4), but actual revenues deviate; we can also determine the expected

---

<sup>5</sup> Limited persistence is a compromise. It allows some persistence while acknowledging that competence also changes over time as new tasks for politicians emerge. For persistence longer than 1 period, the model would not be easily solvable. Rogoff and Sibert (1988)'s and Rogoff (1990)'s suggestion of an MA(1) process is one of two conditions (the other being the assumption of debt being costly) for splitting the model into separate 2-period cycles as is common in this literature. Each cycle consists of an election period and an off-election period. The timing of events (page 6) and the role of these assumptions is outlined further down.

<sup>6</sup> For more unusual density functions (for instance, with  $F''(\mu_t^a) < 0$  for some  $\mu_t^a \leq 0$ ), we could get ambiguous results. However, the limiting case of  $F''(\mu_t^a) = 0$  for some  $\mu_t^a \leq 0$  or even over the entire range (uniform distribution) is acceptable.

deficit given  $E_t^a[R_t^+] = 0$ :

$$D_t \equiv R_t^{+forec} - R_t^+; \quad (6)$$

$$E_t^a[D_t] = R_t^{+forec}. \quad (7)$$

Since the incumbent hopes to facilitate augmented public services in order to increase re-election chances, she accepts (and expects) a positive deficit.

### Timing of events

The timing of events is summarised in Table 1. In election period  $t$ , everybody observes last period's deficit  $D_{t-1}$  and past skills shock  $\mu_{t-1}^a$ . On this basis, incumbent  $a$  chooses its forecast of additional revenue  $R_t^{+forec}$ , thus determining the amount of additional public goods  $G_t^+$  it can provide according to Equation (4). All voting individuals observe  $G_t^+$ , but only informed voters can also observe and make use of the state government's policy choice of the forecast of additional revenue  $R_t^{+forec}$ . They can, therefore, deduce current skills  $\mu_t^a$ , thereby extracting information about the future competence of the incumbent (since  $\eta_{t+1}^a = \mu_{t+1}^a + \mu_t^a$ ). Uninformed voters can only form expectations of the incumbent's current skills,  $\widehat{\mu}_t^a$  based on their perception of the government forecast of additional revenue,  $\widehat{R_t^{+forec}}$ . Then all voters cast their votes based on their different information sets and their different beliefs of  $\mu_t^a$ . What matters is that a share of voters is uninformed, even though they are rational in the end. If government policy could be correctly *observed* by all voters, the government would gain nothing from manipulating the forecast and from expanding public goods.

In period  $(t+1)$ , the winner (incumbent or challenger) takes office and receives an ego rent. If the incumbent stays in office, she also suffers a reputation loss amounting to disutility  $\xi_t D_{t-1}^2$  for not having achieved a balanced budget. A government found to have cheated may be in a weaker position in negotiations with the legislature and social groups. However, voters are no longer relevant for the politician's decision making in  $(t+1)$  because they

Table 1: **The Timing of Events.**

<b>All voters and incumbent <math>a</math> observe:</b> - last period's deficit $D_{t-1}$ - the incumbent's last period skills $\mu_{t-1}^a$  <b>Incumbent <math>a</math>:</b> - chooses forecast of additional revenue $R_t^{+forec}$ - and provides additional public goods $G_t^+$	<b>All voters observe:</b> - additional public goods $G_t^+$  <b>Informed voters observe:</b> - the incumbent's forecast of additional revenue $R_t^{+forec}$	<b>Informed voters:</b> - deduce the incumbent's current skills $\mu_t^a$ - and vote.  <b>Uninformed voters:</b> - form expectations of the incumbent's current period skills $\widehat{\mu}_t^a$ (based on rational expectations of the incumbent's forecast of additional revenue $\widehat{R_t^{+forec}}$ ) - and vote.	The winner of the period $t$ elections takes office and receives an ego rent.  If the incumbent stays in office, she suffers a reputation loss for a period $t$ budget deficit.  The winner repays the deficit of the previous year.
<b>Period <math>t</math></b>			<b>Period <math>t+1</math></b>

cannot vote in period  $(t + 1)$ . Politicians have no incentive for manipulating their forecast of additional revenue  $R_t^{+forec}$ . They want to repay the previous period deficit because the deficit is costly<sup>7</sup> and voters cannot sanction the politician for producing a negative amount of additional public goods, thereby financing deficit repayment. Given that voters are only concerned about politicians' competence after the election it does not matter that voters anticipate in election period  $t$  that any politician will repay the deficit in the off-election period  $(t+1)$ . Note also that voters do not consider expected utility in  $(t+2)$  in their voting decision in  $t$ , because even informed voters cannot distinguish between the incumbent and her challenger in  $(t + 2)$  (competence is an MA(1) process only). Politicians, too, are not concerned about the more distant future, because they have no instrument for affecting

---

<sup>7</sup> Repayment is guaranteed for two reasons. Firstly, because of the aforementioned reputation loss. Secondly, technically, because the marginal utility of additional deficit-financed public goods in  $t$  is 1 (if the subjective discount factor is set to 1 for simplicity), whereas its marginal cost and, therefore, the marginal disutility is  $(1 + r_t)$ , i.e. greater than 1. The unity marginal public goods utility assumption is also used by Shi and Svensson (2006).



utility or re-election chances in  $(t+2)$ . The model can, therefore, be split in 2-period cycles consisting of an election period (period  $t$ ) and an off-election period (period  $t+1$ ). See also footnote 5.

### **Incumbent's probability of winning**

The incumbent maximises her expected utility in  $t$  and  $t+1$  (whereby the discount rate can be set to 0 for simplicity). The  $t+1$  utility depends on the probability of the incumbent of winning the election. First, we must, therefore, determine the probability that an individual agent votes for incumbent  $a$ . We assume prospective voting, i.e. voting depends on whether a voter expects the incumbent or the challenger to deliver a higher level of utility after the elections, i.e. in  $t+1$ . This depends on two components: (i) on the voter's sympathy  $\chi^i = \theta^i - \gamma$  towards the candidates; and (ii) on who can deliver more public goods which, in turn, depends on the politicians' skills in periods  $t$  and  $t+1$ . Agents do not know future skills of incumbent or challenger; nor can they observe any skills of the challenger in period  $t$ . However, they may have expectations on the incumbent's skills ( $E_t[\mu_t^a]$ ) based on her performance in office in period  $t$ . An individual agent votes for incumbent  $a$ , if the following inequality holds:

$$E_t[\mu_t^a] > \alpha(\theta^i - \gamma). \quad (8)$$

First, suppose shift parameter  $\gamma$  is zero, then ex ante incumbent and challenger have an equal chance of winning the election. However, even if incumbent  $a$  is expected to be (slightly) less skilled than average, i.e.  $E_t[\mu_t^a] < 0$ , a voter will vote for incumbent  $a$ , if the voter is sufficiently sympathetic towards the incumbent (remember that  $\theta^i < 0$  indicates sympathy for incumbent  $a$  and  $\alpha$  is a positive weight). Conversely, even if a voter is sympathetic towards the challenger ( $\theta^i > 0$ ), the incumbent could still be chosen, if the incumbent is expected to exhibit sufficiently strong (above average) competence. Second, with shift parameter  $\gamma$  negative, it is easier for the incumbent to convince voters to vote for her; it requires a lower level of expected skill,  $E_t[\mu_t^a] < 0$ .

On this basis, we can derive the probability for the incumbent to win the election:

$$\text{Prob} \left\{ \underbrace{(1 - \psi) \left[ \frac{E_t^{inf}[\mu_t^a]}{2\alpha} + \frac{1 + \gamma}{2} \right]}_{\text{informed}} + \underbrace{\psi \left[ \frac{E_t^{uninf}[\mu_t^a]}{2\alpha} + \frac{1 + \gamma}{2} \right]}_{\text{uninformed}} \geq \frac{1}{2} \right\}. \quad (9)$$

The probability depends on whether informed voters (share  $(1 - \psi)$ ) and uninformed voters (share  $\psi$ ) think that the incumbent's skills are above average ( $E_t[\mu_t^a] > 0$ ) or not. The difference for informed and uninformed voters occurs because informed voters have all the information for deducing  $\mu_t^a$  from the period  $t$  planned government budget constraint (4); uninformed voters do not. Uninformed voters do not observe the forecast of additional revenue  $R_t^{+forec}$ ; instead, they have to use their *perception* of the forecast of additional revenue  $\widehat{R_t^{+forec}}$ . Hence, their mistake amounts to  $\widehat{R_t^{+forec}} - R_t^{+forec}$ . On this basis, we can derive the incumbent's probability of winning  $\text{Prob}^{win}$ :

$$\text{Prob}^{win} = \text{Prob} \left\{ \mu_t^a \geq \psi (\widehat{R_t^{+forec}} - R_t^{+forec}) - \alpha\gamma \right\} \quad (10)$$

$$= 1 - F [\psi (\widehat{R_t^{+forec}} - R_t^{+forec}) - \alpha\gamma], \quad (11)$$

where  $F(\bullet)$  is the distribution function of the skills shock. Note that this equation shows that, *in equilibrium*, the incumbent cannot increase her winning probability by using forecast manipulations, if we assume rational expectations. For  $\gamma = 0$ , we obtain  $\text{Prob}^{win} = 1 - F[0] = \frac{1}{2}$  in equilibrium.

### Incumbent's decision problem

To determine the governments policy choice, we maximise the incumbent's expected utility over any 2-period cycle, i.e. period  $t$  utility *plus* period  $(t + 1)$  utility in case of winning the election multiplied by the probability of winning (as determined in step 2) *plus* period

$(t + 1)$  utility in case of losing multiplied by the probability of losing:

$$\begin{aligned}
max_{R_t^{+forec}} V &= max_{R_t^{+forec}} V_t^a + V_{t+1}^a = \\
max_{R_t^{+forec}} & E_t^a \{ u_t(\bar{y} + (1 - \tau) \frac{R_t^+}{\tau}) + G_t^+ + X_t - \xi D_{t-1}^2 \} \\
&+ E_t^a \{ Prob^{win} [u_{t+1}(\bar{y} + (1 - \tau) \frac{R_{t+1}^+}{\tau}) + G_{t+1}^+ + X_{t+1} - \xi D_t^2] \} \\
&+ E_t^a \{ (1 - Prob^{win}) [u_{t+1}(\bar{y} + (1 - \tau) \frac{R_{t+1}^+}{\tau}) + G_{t+1}^+] \}. \quad (12)
\end{aligned}$$

We can now characterise the government's optimal choice of its forecast of additional revenue  $R_t^{+forec}$  with the first order condition (FOC).

$$1 + F'[-\alpha\gamma]\psi[X_{t+1} - \xi[R_t^{+forec}]^2] - [1 - F[-\alpha\gamma]]2\xi R_t^{+forec} = 0, \quad (13)$$

The first term,  $(-1)$ , is the marginal direct effect of the government's forecast of additional revenue on the deficit, which is positive because spending can be increased. The (additional) revenue forecast is optimally chosen by the government, when the marginal direct effect on the deficit (first term) equals the net effect on the expected return if the incumbent stays in power (second and third terms). The latter consists of countervailing effects. The second term depicts the positive marginal impact of higher forecasts on the perceived competence of the incumbent and thus on the voting probability of receiving the (given) expected net return  $(X_{t+1} - \xi[R_t^{+forec}]^2)$ . The third term captures the negative marginal impact of increased forecasts on the punishment for the lost reputation (since the deficit will be increasing) given the chance of winning the elections.

The optimal choice of the incumbent's forecast of additional revenue  $R_t^{+forec}$  is determined by the FOC (13) given that the second order condition holds. The FOC states that the government wants to increase its forecast of additional revenue until the marginal punishment effect (which is very small for low levels of forecast manipulation) exceeds both the marginal benefit from spending on public goods and the marginal benefit from increasing

the chances of winning. In other words, the first key result of the paper is that there are *political forecast cycles*; forecasts are increased in election years. This also implies higher deficits which are repaid in off-election years. Hence, there is also a political budget cycle. The mechanism is also similar to the one in the political budget cycle model by Shi and Svensson (2006). There is moral hazard because a hidden effort (deficit in Shi and Svensson; and forecasts here) is used by the government for expanding public goods and trying to improve re-election chances.

But how is the government's optimal choice of its forecast manipulation affected by exogenous aspects of the model? In particular, we would like to know (see next section) the effect of an increased winning margin (captured by a higher shift parameter  $\gamma$ ; see Proposition 1), the consequences of an incumbent who is not re-running (embodied by a lower ego rent for the time after the elections,  $X_{t+1}$ ; see Proposition 2), and the effect of increasing the share of uninformed voters (higher  $\psi$ ; see Proposition 3).

### 3 Theoretical Results

**Proposition 1** - The Winning Margin.

*A larger winning margin  $\gamma$  decreases the optimal revenue forecast by the incumbent at the equilibrium.*

$$\frac{d(R_t^{+forec})^*}{d\gamma} < 0.$$

*Proof:* To be shown in the Appendix.

**Proposition 2** - When the Incumbent is not Re-running.

*When the incumbent is not re-running ( $X_{t+1}$  reduced), the optimal revenue forecast by the incumbent is reduced at the equilibrium.*

$$\frac{d(R_t^{+forec})^*}{dX_{t+1}} > 0.$$

*Proof:* To be shown in the Appendix.

**Proposition 3** - The Share of Uninformed Voters.

*A larger share of uninformed voters  $\psi$  increases the optimal revenue forecast by the incumbent at the equilibrium.*

$$\frac{d(R_t^{+forec})^*}{d\psi} > 0.$$

*Proof:* To be shown in the Appendix.

## 4 Data, Setting, and Empirical Model

This section describes the data, the institutional setting for Portuguese municipalities, and the empirical model which are used for testing the implications obtained for the model of Section 2 and the Propositions derived in Section 3.

### *Data and Institutional Setting*

Detailed fiscal data for the 308 municipalities was obtained from the Directorate General of Local Authorities (DGAL), information regarding the dates and results of local elections and on mayors' characteristics from the Ministry of Internal Affairs, and demographic and economic data from the National Statistics Institute (INE) and from Marktest's *Sales Index* database. Since data on municipal initial budgets is only available since 1998, and we have data on other fiscal variables until 2015, our dataset covers the period from 1998 to 2015, during which four elections took place (2001, 2005, 2009, and 2013).

Municipalities are the highest subnational government level in mainland Portugal, and the second in the autonomous regions of Azores and Madeira, which have regional governments. All municipalities are subject to the same laws and regulations, have the same responsibili-

ties for public service provision,<sup>8</sup> and have the same institutional structure. Regarding the latter, the Town Council (Câmara Municipal) holds the executive power, while the Municipal Assembly holds the deliberative power, approving, among other things, the municipal budgets and plans of activities. Voters elect the members of both chambers directly, by casting their votes on closed party or independent lists of candidates. The top candidate of the most voted list for the Town Council becomes the mayor, presides that chamber and plays a leading role in the executive, having substantial power and autonomy. Municipal elections are held every four years, in all municipalities at the same time, generally in October (they were held in December until 2001). Although other elections sometimes occurred in the same year, national, regional, or European elections were never concurrent with municipal elections.

Local governments have financial autonomy, not needing approval from a higher-ranked authority to elaborate and approve their own budgets and final accounts. Nevertheless, most of them heavily depend on grants from the central government or from the European Union (own revenues account, on average, for just one third of total effective revenues). The municipal budget is drafted by the mayor's team, analysed by the Town Council, and approved by the Municipal Assembly, in the last quarter of the year prior to the relevant fiscal year (which corresponds to the calendar year). Municipalities are allowed to run budget deficits, but there are legal limits to the stock of municipal debt.

### ***Empirical Models***

The theoretical model's main result is that there are political forecast cycles. Revenue forecasts are more optimistic in election years (see discussion of first order condition 13 in Section 2). This is tested with the following empirical model (henceforth *baseline model*):

$$R_{i,t}^{+forec} = \beta_1 R_{i,t-1}^{+forec} + \beta_2 \mathbf{Elect}'_{i,t} + \beta_3 \mathbf{X}'_{i,t} + \nu_i + \sigma_t + \xi_{i,t}, \quad (14)$$

where  $R_{i,t}^{+forec}$  is the forecast of additional revenue, here proxied by the difference between

---

<sup>8</sup> Distribution of water, sewage, basic schooling, local health care, social housing, local transportation and communication, property maintenance, promotion of culture and science, recreation and sports facilities, environmental protection, and municipal policing.

the revenue forecast for year  $t$  (taken from the initial municipal budget) and the average past revenues of municipality  $i$ , in real euros (of 2015) per capita;<sup>9</sup>  $\mathbf{Elect}_{i,t}$  is a vector of three electoral dummy variables (the year before the election, the election year, and the year after);  $\mathbf{X}_{i,t}$  is a vector of control variables which may affect forecasted revenues;  $\nu_i$  represents unobserved municipality-specific effects;  $\sigma_t$  represents time-specific effects;<sup>10</sup> and  $\xi_{i,t}$  is the error term.

Based on the theoretical model, on previous empirical evidence of forecast manipulations (for instance, Boylan, 2008; Bischoff and Gohout, 2010), and on political budget cycles found for Portuguese municipalities (Veiga and Veiga, 2007; Aidt et al., 2011; Boukari and Veiga, 2018), we expect a positive  $\beta_2$  for the election-year dummy. This means more optimistic forecasts in election years which, in turn, allow for greater expenditure.

The vector  $\mathbf{X}_{i,t}$  includes the following control variables which may affect the degree of manipulation of revenue forecasts: a dummy variable for left-wing mayors, *MayorLeft*; a dummy variable, *Majority*, which takes the value of one when the mayor is supported by majorities in both the Town Council and the Municipal Assembly, and zero otherwise; the win-margin of the mayor's party in the previous election, *WinMargin*; a dummy variable, *RunReelect*, for mayors who run for reelection; the mayor's number of terms in office, *TermsMayor*; a dummy, *SameParty*, for when the mayor belongs to the main national government party; the municipal unemployment rate, *Unemp*; the regional (NUTS III) rate of GDP growth, *GDPgrowth*;<sup>11</sup> the rate of population growth, *PopGrowth*; a proxy for municipal financial autonomy, *FinAuton*, which corresponds to own revenues as a percentage of total effec-

---

<sup>9</sup> Average past revenues are publicly available information which may help (informed) voters assess whether the forecast for year  $t$  is above normal or not. One alternative would be to use forecast errors, but the problem is that the actual revenues of year  $t$  are not known at the time the forecast is made and announced (in  $t - 1$ ). Nevertheless, as shown in the robustness tests (see Table 3 in Appendix A), the empirical results are practically the same when we use forecast errors in revenues as the dependent variable.

<sup>10</sup> Since the election-year dummy would be collinear with yearly dummy variables, we control for time effects using 4-year mandate dummies.

<sup>11</sup> NUTS is the European Union nomenclature for territorial statistical units. Portugal is subdivided into three NUTS I regions (Mainland, Azores and Madeira), seven NUTS II regions, and 25 NUTS III regions. Each NUTS III region aggregates several municipalities, which correspond to the NUTS IV level. There is no GDP data at the municipal (NUTS IV) level.

tive revenues; and, the percentage of the municipal population above 14 years old with no formal education completed,  $\%NoEduc$ . All economic, demographic and education control variables are lagged one year, since their values for year  $t$  are not known at the time the revenue forecast for year  $t$  is made.

To test the propositions of the theoretical model, the empirical baseline model (14) is extended to check for interaction effects with political or educational variables. The following extension for political variables is used for testing Propositions 1 and 2:

$$R_{i,t}^{+forec} = \beta_1 R_{i,t-1}^{+forec} + \beta_2 ELY_{i,t} + \beta_3 Pol_{i,t} + \beta_4 (ELY_{i,t} * Pol_{i,t}) + \beta_5 \mathbf{X}'_{i,t} + \nu_i + \sigma_t + \xi_{i,t}, \quad (15)$$

where  $ELY_{i,t}$  is a dummy variable which takes the value of 1 in an election year, and equals zero in off-election years;  $Pol_{i,t}$  is a political variable for municipality  $i$  in year  $t$ ; and the remaining variables are as described above.

The extension of baseline model (14) to include educational interaction terms replaces the political variable  $Pol_{i,t}$  in Equation (15) by education variable  $Educ_{i,t}$ . It is used for testing Proposition 3 according to which electoral opportunism is greater in municipalities with higher shares of uninformed voters (see also Shi and Svensson, 2006). Here is the modified model:

$$R_{i,t}^{+forec} = \beta_1 R_{i,t-1}^{+forec} + \beta_2 ELY_{i,t} + \beta_3 Educ_{i,t} + \beta_4 (ELY_{i,t} * Educ_{i,t}) + \beta_5 \mathbf{X}'_{i,t} + \nu_i + \sigma_t + \xi_{i,t}, \quad (16)$$

where  $Educ_{i,t}$  is a proxy for the education level of the population of municipality  $i$  in year  $t$ , and the remaining variables are as described above. The models presented above are estimated for effective revenues (total revenues excluding loans), current revenues, and capital revenues (excluding loans), by fixed effects, with standard errors clustered by municipality. Descriptive statistics of the variables used in this paper are presented in Appendix A (Table 1).



## 5 Empirical Results

Here, we present the results of the empirical analysis, which tests the main predictions of the theoretical model; we also discuss an array of robustness tests.

### *Baseline Model: Political Forecast Cycles*

The results of the estimation of the baseline model of Equation (14) for the difference between forecasted and average past revenues (in real euros per capita), by fixed effects, with standard errors clustered by municipality are reported in Table 2. Consistent with our model's main theoretical result embodied in the discussion of the first order condition (13), there is evidence of more optimistic revenue forecasts in election years. The dummy variable for the election year is highly statistically significant, regardless of whether we consider effective revenues (total revenues excluding loans), current revenues, or capital revenues (excluding loans). The difference between forecasted effective revenues and average revenues of the previous four years increases by 122.70 euros per capita in an election year when compared to the reference year (the second year of the 4-year term). This difference is also significantly bigger in the election year than in the year before or in the year after the election.<sup>12</sup> These effects seem to be mainly driven by capital revenue forecasts, whose estimated coefficients are about three quarters of those for effective revenues. They also indicate that electoral manipulation of local finances starts in the year before the election (as shown by Veiga and Veiga, 2007), although with a considerably smaller magnitude than in the election year.

The lagged dependent variable is always statistically significant, which indicates persistent differences between forecasts and average past revenues. A sample period of 18 years, and an average of about 15 observations per municipality (due to missing values for some years), may not be long enough to completely avoid the so-called Nickel bias, resulting from the correlation of the lagged dependent variable with the municipal fixed effects. One possibility

---

<sup>12</sup> Wald tests, not shown here, clearly reject the equality of the coefficients. Since the only year of the 4-year term for which an election dummy is not included is the second year after the election, this is the reference year against which the others are compared to.

Table 2: PBCs in Revenue Forecasts - Baseline Results

VARIABLES	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues
L.(Revenue forecast - Average revenues of previous 4 years)	0.497*** (7.940)	0.464*** (4.141)	0.517*** (8.116)
Year before election	51.055*** (2.883)	8.482* (1.811)	41.719*** (2.772)
Election year	122.713*** (6.268)	30.294*** (5.162)	91.421*** (5.117)
Year after election	20.811 (1.202)	23.493*** (4.362)	-4.155 (-0.264)
Mayor left	-22.630 (-0.918)	-3.514 (-0.361)	-18.776 (-0.886)
Majority	-46.317** (-1.981)	-16.438* (-1.932)	-29.392 (-1.491)
Win margin (previous election)	0.773 (0.957)	0.461** (2.098)	0.300 (0.411)
Incumbent running for reelection	-23.249 (-1.151)	-0.180 (-0.025)	-22.659 (-1.249)
Terms mayor	-5.866 (-0.966)	-0.584 (-0.292)	-5.189 (-0.929)
Same party	18.286 (1.418)	0.752 (0.168)	17.381 (1.521)
L.Unemployment rate	-19.006*** (-4.731)	-2.152 (-1.590)	-16.828*** (-4.728)
L.GDP growth (NUTS III region)	11.013*** (5.083)	0.587 (0.679)	10.526*** (5.611)
L.Population growth	-1.169 (-0.373)	-4.491** (-2.375)	3.177 (1.249)
L.Financial autonomy (Own revenues / Effective revenues)	0.909 (0.811)	-0.365 (-0.912)	1.441 (1.432)
L.% Population with no education level completed	36.903*** (5.189)	-5.327* (-1.913)	41.047*** (5.714)
Observations	4,492	4,492	4,492
Municipalities	308	308	308
Adjusted R-squared	0.39	0.24	0.44

Notes: Fixed effects regressions with standard errors clustered by municipality and robust to heteroskedasticity. The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ .

is to estimate the model using a dynamic panel data method such as the System Generalized Method of Moments (System-GMM), of Arellano and Bover (1995) and Blundell and Bond

(1998). But, when using this method, we encountered problems related to the validity of the instrument matrix.<sup>13</sup> Since this leads us to question the validity of the System-GMM results, we prefer to use the fixed effects estimator in our regressions.<sup>14</sup>

Regarding the control variables, there is some evidence that mayors supported by majorities in the Town Council and the Municipal Assembly make less optimistic forecasts. As expected, better economic performance (lower unemployment rates or higher regional GDP growth) leads to more optimistic forecasts. A less educated municipal population also seems to be associated with more optimistic forecasts. The remaining control variables are generally insignificant.<sup>15</sup>

### ***Interactions with political variables***

The results of the estimation of the model of Equation (15), which interacts the election-year dummy with several political variables, are reported in Table 3. To economize on space, we only report the results for the coefficients of the election-year dummy and for its interactions with political variables. Since including several election dummies and their interactions would complicate the interpretation of the results, we only use the election-year dummy. In the first estimations we, therefore, replicate the baseline model of Equation (14), excluding the dummies for the years before and after the elections. Again, the results clearly indicate electoral opportunism in the form of more optimistic revenue forecasts in election years than in off-election years.

In the second set of estimations, we interact the election-year dummy with the win-margin of the mayor’s party over the main opposition party in the previous elections. In the absence

---

<sup>13</sup> See the Hansen and Difference-Hansen test results in Table 2 in Appendix A.

<sup>14</sup> It is worth noting that the System-GMM results, reported in Table 2 in Appendix A, are very similar to the fixed effects results of Table 2. In robustness tests (see Table 5 in Appendix A), we use other methods that deal with dynamic panel data, such as Bias-Corrected Least Squares Dummy Variables (Bruno, 2005) and Bias-Corrected Fixed Effects (De Vos et al., 2015). Again, the results are very similar to those of the fixed effects estimations.

<sup>15</sup> The same happens to a dummy for independent mayors, when included, and with a dummy variable for when the mayor’s party has a minority in both chambers (when included instead of the majority dummy). These results are not shown here, but are available from the authors upon request.

Table 3: Interactions with Political Variables

VARIABLES	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues
Election year	89.815*** (6.568)	23.394*** (3.883)	65.223*** (5.778)
Election year	136.697*** (5.450)	24.270*** (2.699)	111.975*** (5.026)
Election year * Win-margin in the previous election	-2.327*** (-2.640)	-0.044 (-0.163)	-2.321*** (-2.809)
Election year	-3.081 (-0.119)	33.561*** (3.764)	-38.314* (-1.654)
Election year * Incumbent running for reelection	120.836*** (4.115)	-13.216 (-1.357)	134.697*** (5.174)
Election year	104.969*** (4.683)	17.166* (1.885)	87.987*** (4.912)
Election year * Mayor left	-29.352 (-1.046)	12.073 (1.340)	-44.102* (-1.907)
Election year	90.419** (2.065)	11.727 (0.692)	78.385** (2.271)
Election year * Majority	-0.744 (-0.017)	14.387 (0.952)	-16.219 (-0.447)
Election year	88.720*** (4.953)	13.316* (1.776)	75.301*** (5.232)
Election year * Same party	2.673 (0.100)	24.644*** (3.139)	-24.619 (-1.101)
Observations	4,492	4,492	4,492
Municipalities	308	308	308

Notes: Fixed effects regressions with standard errors clustered by municipality and robust to heteroskedasticity. The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. All regressions include the full set of control variables of Table 2, except the dummies for the years before and after elections. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

of data on voting intentions for most municipalities, the margin of victory in the previous election is our proxy for how close mayors expect the next elections to be. As expected and consistent with Proposition 1, larger win-margins are associated with less optimistic forecasts for total and capital effective revenues. Figure 1 shows the average marginal effects of the election year, over the values of the win-margin (we omit values above 50, which are roughly the highest 1%). The marginal effects are decreasing, and become insignificant for win-margins close to or above 50 percentage points. That is, mayors may not feel the need

to behave opportunistically when they won the last elections by a very large margin.

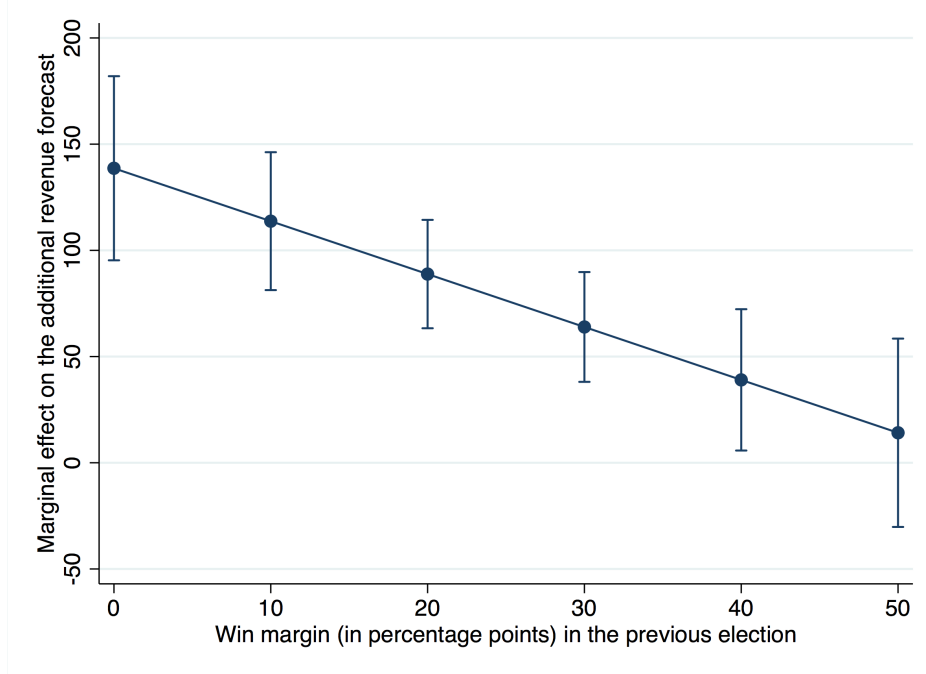


Figure 1: Effects of the Win-Margin on the Average Marginal Effects of the Election Year (vertical axis reports revenue forecast manipulation in real euros (of 2015) per capita)

The third set of estimation results corroborates our Proposition 2 which claims that a reduced ego rent (as a proxy for not running again) leads to less opportunistic behaviour. Obviously, forecast cycles would vanish, if the ego rent were to go away completely. This is actually what our empirical result suggests. Opportunistic (and optimistic) total and capital effective revenue *forecasts* happen only when the mayor runs for reelection. This is also consistent with the results of Veiga and Veiga (2007), who found that opportunism in *actual* capital and total expenditures is greater when the incumbent mayor runs for reelection than when her party has a different candidate. This does not seem to matter for current revenue forecasts.

Regarding the other estimations which test for interaction effects of other political control variables, there is no robust indication that the ideology of the mayor, the support of majorities in the Town Council and Municipal Assembly, or party similarity between the mayor and the prime minister affect the magnitude of the opportunistic management of

revenue forecasts.

### ***Effects of Education on the Magnitude of PBCs***

The estimation of the model of Equation (16) tests Proposition 3 by interacting the election year dummy with several proxies of the education level of the municipal population at least 15 years old. The results are reported in Table 4. To economize on space, we only report the coefficients for the election year, the education proxy, and its interaction. Four variables representing the education level of the municipal population are used: the percentage of the population with no formal education level completed; the percentage of the population with incomplete secondary education; the percentage of the population with at least completed secondary education; and, the Marktest's Education Index.<sup>16</sup>

Regardless of the education proxy used, the results of Table 4 clearly support Proposition 3, indicating that lower education levels are associated with more optimistic revenue forecasts in election years. This is also consistent with the model of Shi and Svensson (2006), according to which opportunism is greater when there is a higher percentage of uninformed voters. Since the coefficients of interactions with continuous variables are sometimes difficult to interpret, we illustrate them in Figure 2, for the first and fourth education proxies.

As can be seen in the graphs on the left hand side, the marginal effect of the election year becomes positive for total effective and capital revenues when the percentage of the population at least 15 years old which did not complete any formal education level is close to or above 15 percent. This education proxy does not seem to matter much for current revenue forecasts, as marginal effects are positive for practically the entire range of values. On the right-hand-side graphs, we see that lower values of the education index are associated with higher marginal effects of the election year, that is, with greater opportunism. It is interesting to note that, when using the Education Index, there is also support for Proposition

---

<sup>16</sup> When calculating the percentages of the population, we only consider people with at least 15 years old. We would prefer to consider the population old enough to vote (at least 18 years old), but there is no data for that age range. The Education Index (*Índice Geral de Ensino*), provided by the firm *Marktest*, is a weighted average of education variables.

Table 4: Education and the Magnitude of Election-year Opportunism

VARIABLES	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues
Election year	29.756*** (3.157)	-76.794* (-1.698)	-106.485** (-2.515)
% Population with no education level completed	17.914*** (6.032)	-8.183*** (-5.353)	26.039*** (8.921)
Election year * % Population with no education level completed	10.484*** (3.615)	-0.515 (-0.895)	11.008*** (4.037)
Election year	-59.012 (-1.626)	19.578** (2.100)	-78.267** (-2.418)
% Population with incomplete secondary education	19.853*** (6.331)	-8.829*** (-5.209)	28.630*** (8.630)
Election year * % Population with incomplete secondary education	9.606*** (4.135)	0.113 (0.223)	9.483*** (4.426)
Election year	232.155*** (6.877)	26.772*** (2.739)	205.049*** (6.843)
% Population with at least complete secondary education	-22.322*** (-5.270)	13.704*** (5.852)	-35.861*** (-9.502)
Election year * % Population with at least completed secondary education	-18.443*** (-4.845)	-0.427 (-0.337)	-17.948*** (-5.531)
Observations	4,492	4,492	4,492
Municipalities	308	308	308
Election year	103.677*** (7.067)	19.429*** (4.252)	84.303*** (6.703)
Education index	-1.761 (-0.417)	2.878 (0.832)	-4.671 (-0.934)
Election year * Education index	-6.457*** (-5.717)	-0.608 (-0.772)	-5.828*** (-6.564)
Observations	4,156	4,156	4,156
Municipalities	283	283	283

Notes: Fixed effects regressions with standard errors clustered by municipality and robust to heteroskedasticity. The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. All regressions include the full set of control variables of Table 2, except the dummies for the years before and after elections. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

3 (more educated voters lower forecast manipulation) regarding current revenue forecasts.

### ***Robustness Tests***

The robustness of our empirical results is checked in several ways.<sup>17</sup> First, we use two

<sup>17</sup> The robustness tests' results are shown in tables only. Nevertheless, the respective figures are similar

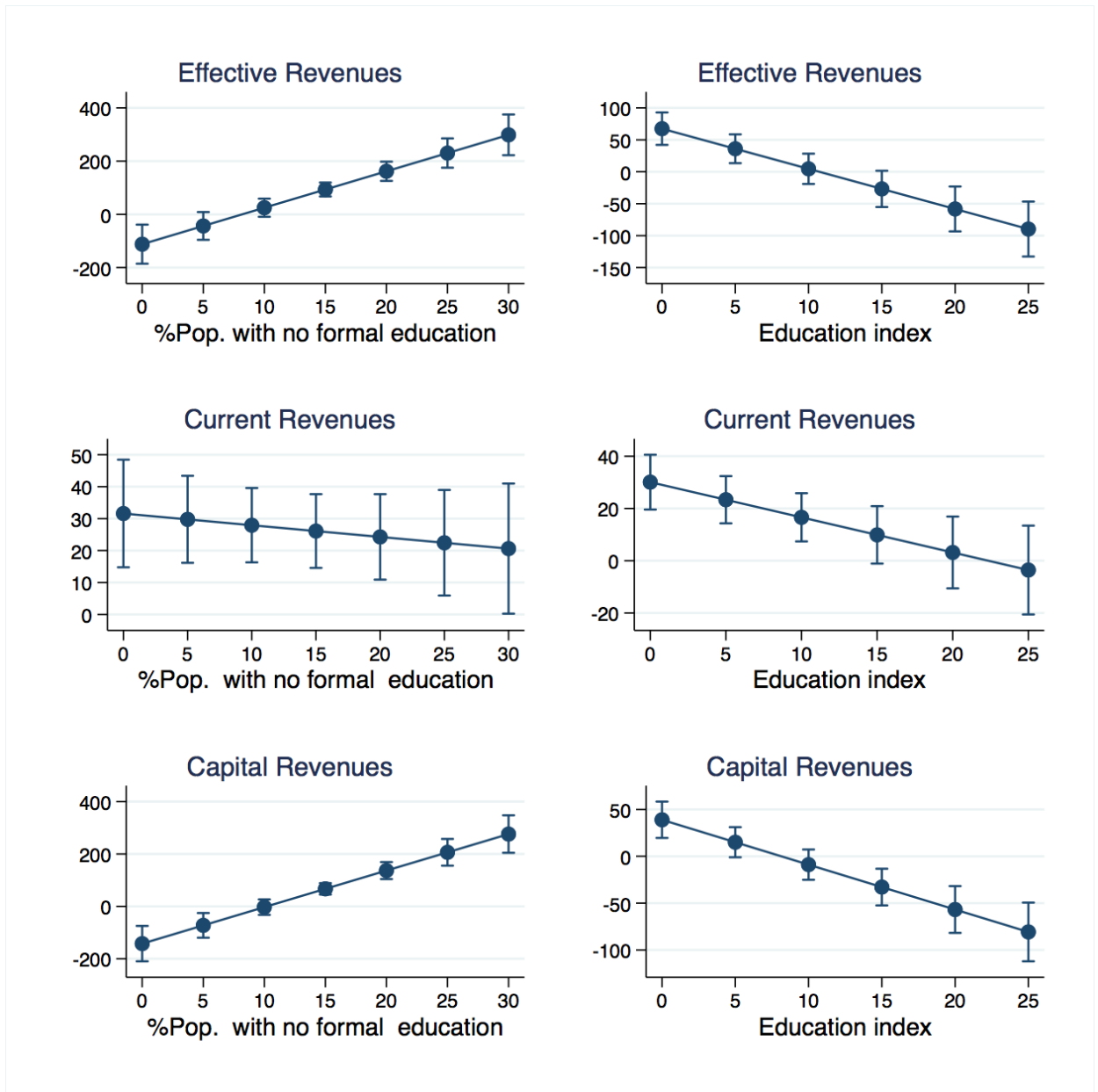


Figure 2: Effects of Education on the Average Marginal Effects of the Election Year (vertical axis reports revenue forecast manipulation in real euros per capita)

alternative definitions of the dependent variable: (1) the difference between the forecasted revenues for year  $t$  and the average revenues of the last eight years (instead of the last four years); and (2), the forecast error, that is, the difference between the forecasted and the actual revenues for year  $t$ . The results of these robustness checks, reported in Table 3 of Appendix A, are very similar to those of Tables 2, 3 and 4, providing further support for

---

to those shown above; they are available from the authors upon request.



our theoretical model’s main result and for the three propositions.

Second, we check if the results are sensitive to two sample restrictions: (1) excluding the 30 municipalities of the archipelagos of Azores and Madeira, as they have regional governments; and (2), excluding term-limited mayors from the sample (term limits only became binding in the 2013 elections), as they have smaller incentives to behave opportunistically in election years. The results, reported in Table 4, are again very similar to those of the main tables.

Third, we check if the results hold for two estimation methods/models designed for dynamic panel data: the Bias-Corrected Least Squares Dummy Variables (BC-LSDV) estimators, developed by Bruno (2005); and the Bias-Corrected Fixed Effects, of De Vos et al. (2015). These are good alternatives to System-GMM, especially for unbalanced data such as ours. Again, as shown in Table 5 of Appendix A, the results are very similar to those of Tables 2, 3 and 4, which indicates that our results are not sensitive to the estimation method/model chosen.<sup>18</sup>

Finally, we test our three propositions at the same time, rather than in separate regressions. That is, the three interactions with the dummy variable for the election year were included simultaneously in the list of explanatory variables. In fact, we do this for two different education proxies. As shown in Table 6, the results again support all three propositions, indicating that it does not matter whether we test them separately or jointly.

---

<sup>18</sup> We also estimated a static Fixed Effects model, excluding the lagged dependent variable from the list of explanatory variables. The results, not shown here but available upon request, are again very similar to those of the main tables.

## 6 Conclusion

This paper presents a political economy model which is consistent with the evidence (Boylan, 2008; Heinemann, 2006; Boukari and Veiga, 2018) indicating that governments use overly optimistic revenue forecasts to expand their fiscal room for manoeuvre in election years in order to increase their chances of re-election. Besides offering a theoretical mechanism which can explain the results found in the aforementioned studies, this paper also investigates the factors that affect the magnitude of the forecast manipulation. The three propositions derived from the model indicate that: (1) a larger ex ante expected winning margin allows the incumbent to reduce its revenue forecast; (2) when the incumbent government is not running, its own interest in winning the elections is reduced, and so is the opportunistic manipulation; and, (3) if there are more uninformed voters, any manipulation is more effective.

These theoretical findings are supported by an empirical analysis based on data from Portuguese municipalities for the period 1998-2015. In fact, we find overwhelming evidence supporting our theoretical predictions, both in the main results and in a battery of robustness tests. That is, our results clearly indicate that there is revenue forecast manipulation in election years and that the manipulation is smaller for a higher win margin at the previous elections (our proxy for the expected win margin), when the incumbent mayor does not run for re-election, and for a lower education level of the municipal population (our proxy for the percentage of uninformed voters).

## References

- Aidt, T. S., Veiga, F. J., Veiga, L. G., 2011. Election results and opportunistic policies: A new test of the rational political business cycle model. *Public Choice* 148 (1-2), 21–44.
- Arellano, M., Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics* 68 (1), 29–51.
- Bischoff, I., Gohout, W., 2010. The political economy of tax projections. *International Tax and Public Finance* 17, 133–150.

- Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87 (1), 115–143.
- Bohn, F., 2018. Political cycles: Beyond rational expectations. *PlosOne*, forthcoming.
- Boukari, M., Veiga, F., 2018. Disentangling political and institutional determinants of budget forecast errors: A comparative approach. *Journal of Comparative Economics*.
- Boylan, R. T., 2008. Political distortions in state forecasts. *Public Choice* 136, 1091–1121.
- Brück, T., Stephan, A., 2006. Do eurozone countries cheat with their budget deficit forecasts. *Kyklos* 59 (1), 3–15.
- Bruno, G. S. F., 2005. Approximating the bias of the lsdv estimator for dynamic unbalanced panel data models. *Economics Letters* 87, 361–366.
- De Vos, I., Everaert, G., Ruysen, I., 2015. Bootstrap-based bias correction and inference for dynamic panels with fixed effects. *Stata Journal* 15 (4), 986–1018.
- Heinemann, F., 2006. Planning or propaganda? An evaluation of germany’s medium-term budgetary planning. *FinanzArchiv* 62, 551–578.
- Rogoff, K., 1990. Equilibrium political budget cycles. *American Economic Review* 80 (1), 21–36.
- Rogoff, K., Sibert, A., 1988. Elections and macroeconomic policy cycles. *Review of Economic Studies* 55 (1), 1–16.
- Shi, M., Svensson, J., 2006. Political budget cycles: Do they differ across countries and why? *Journal of Public Economics* 90 (8-9), 1367–1389.
- Veiga, L. G., Veiga, F. J., 2007. Political business cycles at the municipal level. *Public Choice* 131 (1-2), 45–64.

# Appendix

## A Descriptive Statistics and Robustness Tests

This subsection presents the descriptive statistics and the results of several robustness tests.

Table 1: Descriptive Statistics

VARIABLES	Observ.	Mean	St.Dev.	Min.	Max.
Forecasted effective revenues minus the average of the last 4 years	4,492	609.60	611.19	-1,213.99	7,195.80
Forecasted current revenues minus the average of the last 4 years	4,492	161.33	209.03	-335.06	4,537.01
Forecasted capital revenues minus the average of the last 4 years	4,492	447.86	506.84	-1,808.10	6,946.06
Year before elections	4,492	0.26	0.44	0.00	1.00
Election year	4,492	0.26	0.44	0.00	1.00
Year after elections	4,492	0.21	0.41	0.00	1.00
Mayor left (PS, PCP, or BE)	4,492	0.53	0.50	0.00	1.00
Majority (in the Town Hall and Municipal Assembly)	4,492	0.81	0.39	0.00	1.00
Win-margin (in percentage points) in the previous election	4,492	19.92	14.11	0.02	75.75
Incumbent running for reelection	4,492	0.75	0.43	0.00	1.00
Terms mayor	4,492	2.50	1.75	0.00	10.00
Same party (mayor and prime minister)	4,492	0.42	0.49	0.00	1.00
Unemployment rate	4,492	6.87	2.82	0.64	18.29
GDP growth (NUTS 3 region)	4,492	0.54	3.65	-15.65	14.84
Population growth rate	4,492	-0.29	2.13	-21.56	24.98
Financial autonomy (own revenues as % of effective)	4,492	35.08	19.09	1.14	124.75
% Population with no education level completed	4,492	14.57	5.30	3.97	37.58
% Population with less than complete secondary education	4,492	14.40	5.70	1.99	38.60
% Population with complete secondary education	4,492	8.53	3.19	1.96	21.65
Education index	4,492	3.58	7.24	0.16	106.76

Sources: Directorate General for Local Authorities (DGAL), Ministry of Internal Affairs (MAI), National Statistics Institute (INE), and Marktest's *Sales Index* database.

Table 2: PBCs in Revenue Forecasts - Baseline Results (Using System-GMM)

VARIABLES	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues
L.(Forecast - Average of 4 Previous Forecasts)	0.681*** (7.660)	0.305 (1.284)	0.707*** (9.984)
Year before election	68.057*** (3.087)	16.677** (2.043)	35.726* (1.868)
Election year	121.912*** (4.893)	41.101*** (4.908)	70.425*** (3.357)
Year after election	42.019*** (2.741)	36.493*** (4.752)	8.544 (0.660)
Mayor left	-17.358 (-0.847)	-4.974 (-0.575)	-17.098 (-1.041)
Majority	-4.795 (-0.196)	-8.964 (-0.919)	8.172 (0.409)
Win margin (previous election)	-0.798 (-1.167)	-0.021 (-0.079)	-0.720 (-1.298)
Incumbent running for reelection	5.430 (0.286)	12.769 (1.545)	-5.366 (-0.340)
Terms mayor	5.202 (0.821)	1.982 (0.813)	0.715 (0.145)
Same party	21.005 (1.430)	-1.083 (-0.221)	14.351 (1.056)
L.Unemployment rate	-23.275*** (-2.789)	0.651 (0.215)	-23.074*** (-3.176)
L.GDP growth (NUTS III region)	12.049** (2.140)	4.409*** (3.859)	7.312 (1.395)
L.Population growth	-25.194* (-1.662)	-26.163*** (-2.850)	-3.060 (-0.226)
L.Financial autonomy (Own revenues / Effective revenues)	0.528 (0.602)	-0.241 (-0.613)	0.656 (0.948)
L.% Population with no education level completed	11.688*** (3.215)	0.399 (0.338)	10.466*** (3.854)
Observations	4,492	4,492	4,492
Municipalities	308	308	308
No. of instruments	24	24	24
Arellano-Bond AR(1), p-value	0.00	0.02	0.01
Arellano-Bond AR(2), p-value	0.35	0.75	0.37
Hansen, p-value	0.02	0.00	0.00
Diff. Hansen 1, p-value	0.50	0.00	0.03
Diff. Hansen 2, p-value	0.51	0.06	0.00

Notes: System-GMM estimations for dynamic panel data models. Constant and time dummies are not shown for brevity. The dependent variable and the economic and demographic control variables were treated as endogenous. Only one lag was used as an internal instrument to reduce the number of instruments. Robust standard errors are in parentheses. Diff-Hansen 1 tests the exogeneity of the instruments used in the level part (of the system) as a whole. Diff-Hansen 2 tests the exogeneity of the lagged level of the dependent variable used as an instrument in the level part. The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ .

Table 3: Robustness tests - Alternative Definitions of the Dependent Variable

VARIABLES	Difference to 8-year average revenues			Forecast Errors in Revenues		
	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues	(4) Effective Revenues	(5) Current Revenues	(6) Capital Revenues
Year before election	58.755*** (3.400)	6.608 (1.372)	51.337*** (3.590)	70.830*** (4.361)	12.238** (2.215)	58.292*** (4.231)
Election year	131.021*** (6.713)	26.280*** (4.255)	103.275*** (5.877)	121.418*** (6.672)	8.778* (1.834)	112.674*** (6.608)
Year after election	25.158 (1.442)	25.103*** (4.398)	-1.291 (-0.083)	19.205 (1.189)	-5.134 (-1.082)	22.074 (1.580)
Election year	144.725*** (5.534)	21.715** (2.171)	123.073*** (5.392)	129.234*** (5.442)	8.498 (0.910)	121.383*** (5.672)
Win margin (previous election)	1.878** (2.189)	0.550** (2.335)	1.328* (1.686)	1.667** (2.230)	0.503* (1.954)	1.168* (1.712)
Election year * Win margin (previous election)	-2.648*** (-3.044)	-0.091 (-0.326)	-2.600*** (-3.208)	-2.713*** (-3.441)	-0.350 (-1.103)	-2.375*** (-3.184)
Election year	-2.999 (-0.108)	26.678*** (2.698)	-30.362 (-1.255)	-3.921 (-0.143)	-21.903** (-2.158)	19.149 (0.840)
Incumbent running for reelection	-38.818** (-2.531)	2.112 (0.313)	-40.749*** (-3.116)	-29.166** (-2.036)	-3.303 (-0.496)	-25.255** (-2.134)
Election year * Incumbent running for reelection	122.180*** (4.164)	-8.390 (-0.843)	130.415*** (5.096)	100.874*** (3.518)	30.016** (2.516)	69.883*** (3.080)
Election year	-116.880** (-2.591)	20.070* (1.764)	-136.606*** (-3.312)	-81.692** (-2.016)	-22.994* (-1.887)	-57.092 (-1.603)
% Population with no education level completed	37.811*** (5.211)	-2.227 (-0.780)	39.029*** (5.366)	26.416*** (4.363)	0.621 (0.275)	25.239*** (4.419)
Election year * % Population with no education level completed	14.191*** (4.925)	0.168 (0.294)	13.947*** (5.167)	10.456*** (3.942)	1.612** (2.243)	8.763*** (3.633)
Observations	4,482	4,482	4,482	4,498	4,498	4,498
Municipalities	308	308	308	308	308	308

Notes: Fixed effects regressions with standard errors clustered by municipality and robust to heteroskedasticity. The dependent variable is defined as indicated in the first row (measured in real euros per capita). All regressions include the full set of control variables used in Tables 2, 3, and 4. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 4: Robustness tests - Restricted Samples

VARIABLES	Excluding Azores and Madeira			Excluding Term-Limited Mayors		
	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues	(4) Effective Revenues	(5) Current Revenues	(6) Capital Revenues
Year before election	57.724*** (3.782)	7.089 (1.450)	48.702*** (3.767)	47.592** (2.510)	8.207* (1.847)	38.123** (2.345)
Election year	117.868*** (6.436)	25.398*** (4.182)	89.965*** (5.302)	146.989*** (7.231)	29.053*** (4.621)	116.266*** (6.230)
Year after election	30.116** (2.171)	23.000*** (3.942)	6.682 (0.567)	-12.463 (-0.534)	15.381** (2.258)	-29.904 (-1.402)
Election year	118.442*** (5.001)	19.234* (1.857)	98.340*** (4.902)	145.635*** (5.525)	21.672** (2.032)	123.363*** (5.325)
Win margin (previous election)	0.840 (1.244)	0.417* (1.669)	0.421 (0.709)	0.607 (0.629)	0.320 (1.322)	0.282 (0.313)
Election year * Win margin (previous election)	-2.010** (-2.372)	-0.004 (-0.014)	-2.024** (-2.589)	-1.443* (-1.650)	0.050 (0.168)	-1.498* (-1.841)
Election year	-5.546 (-0.197)	33.661*** (3.640)	-39.601 (-1.602)	-5.546 (-0.197)	33.661*** (3.640)	-39.601 (-1.602)
Incumbent running for reelection	-42.069*** (-2.663)	4.044 (0.602)	-45.918*** (-3.336)	-42.069*** (-2.663)	4.044 (0.602)	-45.918*** (-3.336)
Election year * Incumbent running for reelection	121.685*** (4.085)	-13.561 (-1.348)	135.358*** (5.200)	121.685*** (4.085)	-13.561 (-1.348)	135.358*** (5.200)
Election year	-194.923*** (-5.398)	23.530** (2.268)	-216.097*** (-6.398)	-80.811* (-1.880)	28.125** (2.376)	-107.971*** (-2.731)
% Population with no education level completed	29.369*** (5.801)	-2.577 (-0.944)	29.158*** (6.397)	35.997*** (4.413)	-1.618 (-0.495)	35.976*** (4.392)
Election year * % Population with no education level completed	18.063*** (7.075)	-0.058 (-0.095)	17.874*** (7.331)	12.999*** (4.636)	-0.277 (-0.452)	13.164*** (4.902)
Observations	4,159	4,159	4,159	3,644	3,644	3,644
Municipalities	278	278	278	308	308	308

Notes: Fixed effects regressions with standard errors clustered by municipality and robust to heteroskedasticity. The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. All regressions include the full set of control variables used in Tables 2, 3, and 4.. T-statistics are in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 5: Robustness Tests - Dynamic Panel Models

VARIABLES	Bias Corrected - LSDV			Bias-Corrected Fixed Effects		
	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues	(4) Effective Revenues	(5) Current Revenues	(6) Capital Revenues
Year before election	52.054*** (3.159)	9.915 (1.620)	41.345*** (2.884)	39.401* (1.738)	10.125* (1.882)	29.974* (1.767)
Election year	123.035*** (5.461)	31.029*** (3.748)	91.025*** (4.625)	112.097*** (4.179)	48.598*** (7.723)	64.352*** (3.006)
Year after election	13.621 (0.550)	23.074** (2.539)	-11.024 (-0.511)	16.225 (0.951)	22.541*** (4.399)	-6.735 (-0.419)
Election year	140.888*** (5.611)	23.060** (2.488)	117.674*** (5.379)	155.840*** (5.118)	46.664*** (6.526)	109.048*** (3.698)
Win margin (previous election)	1.340 (1.424)	0.465 (1.339)	0.869 (1.059)	0.419 (0.671)	0.421* (1.897)	-0.021 (-0.029)
Election year * Win margin (previous election)	-2.536** (-2.331)	-0.007 (-0.016)	-2.539*** (-2.685)	-3.449*** (-3.238)	-0.327 (-1.087)	-3.086*** (-2.749)
Election year	-3.590 (-0.089)	34.846** (2.339)	-39.000 (-1.110)	-34.858 (-0.915)	49.176*** (3.617)	-82.238*** (-2.720)
Incumbent running for reelection	-38.683 (-1.260)	3.593 (0.316)	-42.035 (-1.577)	-39.706** (-2.313)	-3.166 (-0.486)	-38.998** (-2.280)
Election year * Incumbent running for reelection	120.933*** (2.661)	-14.976 (-0.895)	136.206*** (3.452)	161.306*** (3.828)	-11.666 (-0.896)	171.394*** (4.856)
Election year	-110.562** (-2.025)	33.776* (1.663)	-142.957*** (-3.021)	-117.272** (-2.486)	31.729** (2.393)	-148.640*** (-2.739)
% Population with no education level completed	33.975*** (3.601)	-1.160 (-0.327)	33.945*** (4.136)	30.876*** (4.048)	3.215 (1.295)	29.046*** (3.941)
Election year * % Population with no education level completed	13.680*** (4.133)	-0.505 (-0.411)	14.070*** (4.901)	14.761*** (4.279)	1.016 (1.407)	13.792*** (3.680)
Observations	4,492	4,492	4,492	3,432	3,432	3,432
Municipalities	308	308	308	308	308	308

Notes: The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. All regressions include the full set of control variables used in Tables 2, 3, and 4.. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



Table 6: Robustness tests - Joint Test of the Three Propositions

VARIABLES	(1) Effective Revenues	(2) Current Revenues	(3) Capital Revenues	(4) Effective Revenues	(5) Current Revenues	(6) Capital Revenues
Election year	-119.898** (-2.101)	40.772*** (3.234)	-159.306*** (-3.025)	-15.614 (-0.522)	38.731*** (3.466)	-52.349* (-1.965)
Win margin (previous election)	1.315 (1.591)	0.473** (2.038)	0.835 (1.100)	0.461 (0.691)	0.474* (1.840)	0.011 (0.019)
Election year * Win margin (previous election)	-2.237** (-2.484)	-0.055 (-0.206)	-2.190** (-2.591)	-1.673** (-2.030)	-0.062 (-0.222)	-1.635** (-2.124)
Incumbent running for reelection	-32.681** (-2.082)	4.191 (0.630)	-36.771*** (-2.694)	-36.554** (-2.320)	5.693 (0.783)	-40.720*** (-3.099)
Election year * Incumbent running for reelection	91.687*** (3.115)	-13.645 (-1.380)	105.579*** (4.124)	150.070*** (5.191)	-9.288 (-0.892)	159.710*** (6.145)
% Population with no education level completed	37.057*** (5.457)	-0.513 (-0.202)	36.416*** (5.392)			
Election year * % Population with no education level completed	12.537*** (4.434)	-0.176 (-0.301)	12.598*** (4.746)			
Education index				-2.481 (-0.598)	0.209 (0.070)	-1.815 (-0.780)
Election year * Education index				-6.685*** (-4.549)	-1.351** (-2.159)	-5.234*** (-4.460)
Observations	4,492	4,492	4,492	4,156	4,156	4,156
Municipalities	308	308	308	283	283	283

Notes: Fixed effects regressions with standard errors clustered by municipality and robust to heteroskedasticity. The dependent variable is the difference between the revenue forecast for year  $t$  and the average revenues of the previous four years, in real euros per capita. All regressions include the full set of control variables used in Table 2. T-statistics are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .