

# Opportunistic political cycles and policies: new evidence for Spanish municipalities based on a Bayesian approach\*

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## Abstract

*This paper analyzes the effect of public spending on the probability of municipal reelection of Spanish local governments during the 2000–2007 period, using Bayesian techniques. The results indicate that, in general, increases in local government spending positively impact on the chances of reelection of local governments. Moreover, the capital expenditure in the early years of the electoral cycle affects positively to the reelection probability and the electorate rewards increases in current expenditures in the period before elections. The use of Bayesian techniques is particularly interesting, since results are not boiled down to a summary effect such as the average; on the contrary, it shows exactly how a given covariate affects the probability of being reelected.*

**Keywords:** Bayesian, election, local government, opportunistic policies

**JEL Classification:** D60, H71, H72, H74, H75

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## 1. Introduction

The existence of political budget cycles (PBC) has been largely analyzed by the literature, obtaining a general result that shows the existence of opportunistic pre-election manipulations on fiscal instruments, with the clear objective to increase the likelihood of a government to be re-elected (Shi and Svensson, 2003). The result of this *opportunism* on reelection is not always desired by governments and policy-makers, and it is possible to find in the literature evidence on both of a reward or a penalty in constituencies' vote due to this behavior. For instance, according to Akhmedov and Zhuravskaya (2004), Veiga and Veiga (2007a), Sakurai and Menezes-Filho (2008) and Aidt et al. (2011), voters reward opportunistic fiscal actions. However, these behaviors are penalized according to other authors such as Peltzman (1992), Kraemer (1997), Brender (2003) and Brender and Drazen (2008).

In the particular case of Spanish local government, on which we focus, despite the importance of the topic, little empirical evidence can be found addressing the issue as to which factors affect the probability of reelection. Specifically, whereas previous literature has analyzed the impact of budgetary variables and socioeconomic policies on the probability of reelection in other countries, in the Spanish case the evidence is entirely yet to come. However, this context is particularly relevant for a number of reasons, two of which are worth mentioning. First, although decentralization stopped at the regional level (*Comunidades Autónomas*), and the number and importance of powers in hands of local governments is far less important than those in hands of regions, their degree of autonomy in terms of budget planning is remarkable (García Sánchez et al., 2011), implying a high degree of flexibility when it comes to implement it (De Haan et al., 1999). Second, the analysis of PBC in Spain has been mainly focused on their existence and composition, but their effect on political reelection remains unexplored.

The main objective of this paper is to explore whether the use of public spending by the ruling party might have had an impact on the likelihood of being reelected. The analysis is carried out on a large sample of Spanish municipalities for the 2000–2007 period. More specifically, we evaluate whether public expenditures, as well as other relevant political and socioeconomic variables, examined at different points in time, and taking into account several lags, may affect the chances of the governing party of being reelected. This will, in turn, enable testing the hypothesis as to whether those governing parties with pre-election opportunistic behavior benefit from it.

As opposed to previous approaches in this literature, most of which were frequentist, we

consider Bayesian (inference) methodologies. In classical statistics, inference relies heavily on the fulfillment of many assumptions which are often violated, especially when dealing with small samples as is common in social sciences studies. Bayesian analyses, which in our particular study will be based on the use of conditional posterior densities of the variables under study simulated by Markov Chain Monte Carlo (MCMC) methods, might provide a better framework to deal with these drawbacks. Bayesian methods have barely been used in the specific context of political budget cycles, and their consideration may shed some light on the links between several covariates considered in the literature and the probability of a given local government to be reelected.

This paper is divided into six sections. After this first introductory section, Section 2 involves a literature review of previous studies on the effect of opportunism on the re-election of governments and changes in pre-election composition of public spending. Section 3 describes the sample and variables used as possible determinants of reelection. In Section 4 we present the model and methodology used in the empirical analysis. Finally, Section 5 describes the main results obtained in the paper, whereas Section 6 is devoted to outline some of the conclusions drawn from the study.

## **2. Literature review and theoretical framework**

Numerous studies (Block, 2002; Galli and Rossi, 2002; González, 2002; Khemani, 2004; Efthyvoulou, 2012; Foremny and Riedel, 2012; Klomp and De Haan, 2013)) have found evidence of a cyclical pattern in public revenue or expenditure that follows the electoral cycle. In their bid for reelection, incumbent governments may reduce taxes or increase public expenditure in the run-up to elections—frequently causing an increase in the budget deficit—in an attempt to gain favour with the electorate and thus secure their votes in the ballot box.

For a sample of French municipalities, Foucault et al. (2008) identified an increase in all expenditure items in the pre-election period. In the case of Portuguese local elections, Veiga and Veiga (2007b) found a higher budget deficit, lower local taxes and higher expenditure in local election year than in the other years of the cycle. In Spain, Lago-Peñas and Lago-Peñas (2008) observed deficit increases in election years for a number of municipalities in Asturias. Results of the study by Vila i Vila (2010) showed that capital expenditure rises in pre-election and election years, in the specific case of the Valencian Community. For the case of the largest Spanish municipalities, Vicente et al. (2013) identified increases in total expenditure during

election years, although only for the least transparent municipalities. However, regardless of the level of financial transparency, increased capital expenditure and reduced taxes are observed during election periods.

In more comprehensive analyses of PBC (Political Budget Cycles), some studies have demonstrated the effect of opportunistic behaviour on the reelection possibilities of incumbent governments, with evidence of both penalisation and reward effects in the polls.

Studies by Peltzman (1992), Kraemer (1997), Meloni (2001), Brender (2003) and Brender and Drazen (2008) reveal that opportunistic behaviours are penalised by the electorate. Peltzman (1992) found that the US electorate penalises governments that increased public expenditure in the run-up to elections. Kraemer (1997) on a set of Latin American and Caribbean countries showed that pre-election deficits do not benefit the incumbent parties. Brender (2003) obtained similar results for the case of local elections in Israel, where a larger deficit in the year prior to elections reduces the probability of the incumbent party's reelection.

Brender and Drazen (2008) observed that in the more developed countries and advanced democracies, governments in a situation of deficit and that introduce tax cuts in an election year have lower chances of reelection. Meloni's (2001) analysis of Argentine electoral districts revealed that an increase in public expenditure negatively affects the percentage of votes obtained by the governing party.

However, other predominant studies in the literature show the opposite effect, namely, that the electorate rewards opportunistic behaviour. Akhmedov and Zhuravskaya (2004) in the case of regional elections in Russia, or Veiga and Veiga (2007a) and Aidt et al. (2011) for Portuguese municipalities, found that an increase in public expenditure prior to elections increases the probability of governments being re-elected. Sakurai and Menezes-Filho (2008) observed that higher expenditure throughout the legislature increases the probability of reelection for Brazilian local governments. In the case of Colombian town councils, Eslava (2005) concluded that although pre-election deficits are penalised in the polls, increased capital expenditure leads to an increase in the percentage of votes for the incumbent party.

For a sample of 68 countries, Mourão and Veiga (2010) found that opportunistic behaviour in public expenditure during election periods has a positive effect on votes for the ruling party. Jones et al. (2012) analysed the effect of public expenditure in the case of the Argentine provinces, finding that the electorate rewards increases in public expenditure at the polls. Specifically, higher expenditure throughout the entire term is rewarded, while no extra gains result from expenditure increases in the election period. Litschig and Morrison (2012) anal-

ysed the effect of additional expenditure on the probability of reelection of incumbent parties in Brazilian municipalities. Their results indicate that a 20% rise in per capita expenditure throughout the whole electoral cycle led to a 10% increase in the probability of reelection of the local ruling party.

Although governments' opportunistic behaviours are generally reflected in pre-election expenditure increases and tax cuts, often causing a situation of fiscal deficit, governments can opt to change the composition of expenditure without having to raise total expenditure or increase the overall budget deficit (Vergne, 2009), known as the composition effect. Local governments can thereby increase expenditure on more visible budget components or those favoured by the electorate, while offsetting through reductions in other budget items, with the clear aim of increasing their popularity and the probability of reelection.

The literature reports mixed results regarding the expenditure components that are manipulated prior to elections. Immediate visibility is usually the main explanation in studies that find increases in current expenditure in the run-up to elections. Vergne's (2009) results indicate a pre-election shift towards more visible current expenditure budget items, along with a decrease in capital expenditure. Similar results are obtained by Sakurai and Menezes-Filho (2011) for the case of Brazilian municipalities, or Katsimi and Sarantides (2012) for a group of OECD countries, where pre-election expenditure increases correspond to current expenditure, while public investments fall.

The opposite finding appears in studies such as Schuknecht (2000), Binet and Pentecôte (2004) and Khemani (2004), where pre-election increases in capital expenditure are found, due in part to the ease with which they can be addressed directly to groups of citizens and specific places.

Veiga and Veiga (2007b) reported an increase in capital expenditure in election year. Drazen and Eslava (2010) demonstrated that infrastructure expenditure increases before municipal elections in Colombia, while certain current expenditure items are reduced. Sedmihradská et al. (2011) observed an increase in capital expenditure in pre-election years, with a more pronounced rise in election year itself, along with a decrease in current expenditure.

### **3. Data, variables and data sources**

The empirical analysis in the present research focused on Spanish municipalities with a population of over 1,000 inhabitants that reported information for the period 2000-2007 (during

which two local elections were held in Spain, in 2003 and 2007). The sample comprises 2,188 municipalities.

The data used were taken from several sources. The election results were provided by the Ministry of the Interior; budget balances came from the Ministry of Finance and Public Administration; and socioeconomic variables were taken from La Caixa Economic Yearbook and the National Institute of Statistics (INE).

### 3.1. Description of variables

The variable this study aims to explain is the level of citizen satisfaction with the governing party in local government, based on a series of budgetary, political and socioeconomic variables. To define this variable, the party of the incumbent mayor in each municipality following the municipal elections of 1999 and 2003 was compared with the party that obtained the most votes in the 2003 and 2007 elections, respectively.<sup>1</sup>

#### 3.1.1. Expenditure variables

**Total public expenditure:** One of the main objectives of this paper is to study the effect of total public expenditure on citizens' level of satisfaction with the local authorities. Although some studies report penalisation for increases in public expenditure or fiscal deficit (Peltzman, 1992; Brender and Drazen, 2008), the general pattern shows that voters reward increased public expenditure, either during the entire election cycle or in the run-up to the election, at national, regional and local levels (Akhmedov and Zhuravskaya, 2004; Veiga and Veiga, 2007a; Sakurai and Menezes-Filho, 2008; Mourão and Veiga, 2010; Aidt et al., 2011; Jones et al., 2012; Litschig and Morrison, 2012).

Therefore, in line with the literature, we expect a positive effect showing a reward for increases made by the local government during its term in office.

**Current and capital expenditure:** The literature on political budget cycles has attempted to determine which expenditure components increase most in pre-election periods. Following the economic classification for expenditure budgets, we distinguished between current and capital expenditure.

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<sup>1</sup>The party with the highest percentage of votes was selected, rather than the party that eventually governed, because in some cases the ruling party governed in coalition with other political groups, and a party with a small percentage of the votes could actually hold the office of mayor. This was considered to be the best option, since it is the variable on which the electorate have the power to decide.

Studies by Vergne (2009), Sakurai and Menezes-Filho (2011) and Katsimi and Sarantides (2012) found an increase in current expenditure before elections, accompanied by a fall in public investment. In contrast, pre-election increases in capital expenditure together with a decrease in current expenditure have been reported by authors such as Drazen and Eslava (2010) or Sedmihradská et al. (2011).

Hence, we aim to analyse whether the expenditure component has different effects on citizens' levels of satisfaction and, therefore, on reelection; in other words, whether the electorate evaluates increases in certain areas of public expenditure differently from others.

### 3.1.2. Revenue variables

Although the main variable to be analysed as a determinant of reelection probability is public expenditure, we also examine another set of budgetary variables that the literature has identified as determinants of incumbent party reelection.

The budgetary variables, related to public revenues, are tax revenues per capita (*Tax*), transfer revenues per capita (*Grants*) and debt (*Debt*). Tax revenues are the total of direct and indirect taxes, while the transfer revenues variable includes the sum of the current and capital transfers received for each of the years in the cycles analysed. The final budgetary variable included in the analysis is the level of debt generated by each municipality, expressed in per capita terms, corresponding to financial liabilities generated in each of the years analysed.

These variables are used to analyse the impact of public revenues on the probability of reelection.

**Tax revenues (*Tax*):** Studies by Khemani (2004), Veiga and Veiga (2007b), Dahlberg and Mörk (2011) and Foremny and Riedel (2012), amongst others, have shown that local governments reduce taxes before elections with the clear objective of gaining favour with the electorate and securing their votes at the polls.

The literature reports mixed results on the impact of local taxes on voting patterns. These results may be classified into three groups: studies that find penalisation for tax increases (Revelli, 2002; Dubois and Paty, 2010); studies that find a positive relation between taxes and votes (Sakurai and Menezes-Filho, 2008; Arvate et al., 2010); and cases in which the relation between local taxes and the percentage of votes is small or insignificant (Boyne et al., 2009; Balaguer and Brun, 2013).

Thus, by introducing the tax revenues variable, we explore the relation between tax revenue and local government reelection for the study sample during the analysed period.

**Grants (*Grants*):** The probability of the incumbent party's reelection may be positively affected by the level of public revenues, as a balanced budget implies that the budget expenditures are financed by budget revenues.

Several studies have found a positive relation between the level of transfers and public expenditure. Veiga and Veiga (2007b), Sedmihradská et al. (2011) and Litschig and Morrison (2012) reported that the transfers a municipality receives positively affect the level of local public expenditure.

Therefore, if the expected effect of public expenditure on reelection holds, an increase in the level of transfer revenues could become a positive determinant of reelection. Solé-Ollé and Sorribas-Navarro (2008) showed, for a sample of Spanish municipalities during the period 1993–2003, that transfer revenues positively affects the election results of the local governing party. Veiga and Veiga (2013) results indicated that an increase in the transfer revenues municipalities receive from central government in election years improves its results in the legislative elections.

**Debt (*Debt*):** The introduction of the variable debt, reflecting the financial liabilities generated in the years analysed, allows us to verify whether the electorate punishes high levels of local debt or whether, on the contrary, it supports certain levels of debt that may derive from higher municipal expenditure.

Brender (2003) examined the effect of fiscal performance on local government election results in Israeli municipalities, finding that the greater the volume of debt generated by the local government, the lower its chances of reelection. Cassette and Farvaque (2013) studied the impact of debt accumulation on the reelection possibilities of French local governments. Their results indicate that the accumulation of debt during the whole term adversely affects their reelection, but in contrast, pre-election debt accumulation favours the election results of the incumbents.

### 3.1.3. Political variables

**Ideology:** Turning to political variables, authors such as Reid (1998), Díaz de Sarralde Míguez (2000) and Sakurai and Menezes-Filho 2008; 2011 included a variable that classifies par-



ties according to their political ideology in order to study the effects of ideology on the probability of reelection, political budget cycles or opportunism by ruling governments. Our study includes the variable of the ideology of the party holding the position of mayor at the time of the election. The introduction of a party variable reveals the effect of political party ideology on reelection probability.

To define the ideology variable, we distinguished parties considered to be on the right from those on the left (Kneebone and McKenzie, 2001; Galli and Rossi, 2002; Veiga and Veiga, 2007b; Vila i Vila, 2010; Aidt et al., 2011). The former are characteristically more conservative, while the latter typically follow the progressive ideological objectives of the left. This variable takes the value 1 when the ruling party in a given municipality can be associated with right-wing ideology, and 0 when it is associated with a leftist party. According to Benito and Bastida (2008) this left-right classification is the most commonly used classification in the literature.

**Alignment:** The next political variable included as a possible determinant of reelection is the ideological alignment of the local government in each municipality with the central government (Sakurai and Menezes-Filho, 2008, 2011; Aidt et al., 2011).

Political alignment can have advantages for municipalities governed by parties of the same ideology as those in higher levels of government. In the case of Argentina, for example, presidents favour the provinces governed by members of their own party in the geographical distribution of the national budget (Bercoff and Meloni, 2009).

Moreover, when the mayor's political ideology coincides with that of the president of the government, his or her chances of remaining in power may be influenced by issues other than purely budgetary questions (Sakurai and Menezes-Filho, 2008). According to Boyne et al. (2009), the electorate's opinion of the central government can have a significant effect on support for municipal governments.

Sakurai and Menezes-Filho (2008) reported a negative relation between the mayor's political alignment with the president and the possibilities of the local incumbent's reelection, based on Brazilian voters' penalisation of the national government due to a succession of economic crises during the period analysed. The negative relation between political alignment and the win-margin obtained by Portuguese mayors, revealed by Aidt et al. (2011), is explained as one way in which the electorate can prevent a concentration of

power in the same party at both national and local level, or as a way of showing dissatisfaction with the national government. Cassette and Farvaque (2013) also find a negative relation between ideological alignment and the probability of reelection.

**Coalition:** The final political variable included in the analysis refers to the support for the party incumbent in the previous polls. A large body of literature has considered this variable in the analysis, although it is measured in different ways.

Veiga and Veiga (2007a) found that the percentage of votes obtained in the previous election has a positive effect on votes in the next election, or according to Aidt et al. (2011), the greater the win-margin obtained by the mayor in the elections prior to those analysed, the greater the win-margin will be in the next election.

Studies by Brender (2003) and Drazen and Eslava (2010) provide evidence that a higher percentage of votes obtained in the previous election has a positive effect on mayors' reelection possibilities. Brender (2003) examined local elections in Israel, where if no candidate obtains more than 40% of the votes in the first round, a second round is held between the two candidates with the most votes. This author also included a dummy variable to distinguish between mayors elected in the first and second round, with the aim of measuring the support obtained by the incumbent party.

Boyne et al. (2009) also used the percentage of votes in the previous election in their analysis of English local government, with the aim of studying the persistence of political support.

Dubois and Paty (2010) included percentage of votes in the previous French local government elections to study the possible existence of inertia in the polls, since some of the electorate usually vote the in same way from one election to another. Their results show a positive relation between the percentage of votes obtained in one election, and voting in the following elections.

According to Mourão and Veiga (2010), "the win-margin from the previous election captures persistence in voting behavior". Their results for legislative elections in 68 countries indicate that parties with good results in one election perform better in the following election, "confirming the persistence of votes over time, which can be due to ideology, among other factors".

Cassette et al. (2013) included the same variable—the percentage of votes of the gov-

ernment in the previous election—in their study. In addition, like Brender (2003) they also introduced a dummy variable that determines whether the mayor was elected or not in the first round of the previous election, and also expected to obtain a positive sign showing this persistence in the local vote. The results for these two variables indicate that the higher the percentage of votes obtained in the previous election, and when the mayor is elected in the first round, the greater the possibilities of increased support in the elections analysed.

Thus, following these studies, we include a dummy variable indicating whether the incumbent party governed as part of a coalition with other political groups or, on the contrary, won an absolute majority, enabling it to govern alone. Zafra et al. (2011) term this variable *political strength*.

The effect of this variable is expected to be negative, indicating that parties governing in coalition and, therefore, not elected by an absolute majority, are less likely to be re-elected than those who governed as a result of broad support from the electorate.

#### 3.1.4. Socioeconomic variables

**Unemployment rate:** The purpose of introducing the municipal unemployment rate into the analysis of the determinants of reelection is to explore the effect of the municipality's economic situation on the reelection chances of their governments, in line with the literature on "economic voting". According to what is known as the responsibility hypothesis, the electorate considers the government to be responsible for economic performance (Lewis-Beck and Paldam, 2000; Paldam, 2004).

The literature reports mixed results on the effect of employment in elections at various levels of government. Analyses of the effect of the national unemployment rate on general election results usually finds that the government is penalised for increases in the unemployment rate (Cerdeira and Vergara, 2007, 2008; Veiga and Veiga, 2004a,b; Mourão and Veiga, 2010).

At the local level, although evidence exists of such penalisation (Martinussen, 2004), a larger number of studies find a weak or insignificant relation between unemployment and support for local government, including research by Núñez (2007), Veiga and Veiga (2007a), Boyne et al. (2009) and Aidt et al. (2011).

**Population:** Studies analysing the reelection possibilities or election results of governments usually include demographic variables to identify patterns of behaviour.

Hence, following in the line of similar research (Sakurai and Menezes-Filho, 2008; Arvate et al., 2010; Veiga and Veiga, 2013), we use population size as a control variable to allow us to observe the relation between the size of a municipality and governments' reelection possibilities.

Furthermore, the literature finds that municipality population size significantly affects level of public expenditure, taxation or debt (Ashworth et al., 2005; Veiga and Veiga, 2007b; Benito and Bastida, 2008; Sakurai and Menezes-Filho, 2011).

#### 4. Methods and models

The main goal of this paper is to model the probability of a local government of being re-elected. For this purpose we use multivariate regression models (McCulloch and Searle, 2001) from a Bayesian point of view. In particular, our response variable *reel* is a dummy variable with 1 value if the reelection has happened and 0 otherwise, a logistic regression was used to analyze the effect of the covariates in the re-election process. These type of models also allow for an easy introduction of a municipality effect. In particular we introduce an independent random effect per municipality.

We consider that each outcome  $reel_{ij}$  for municipality  $i$  with  $i = 1, \dots, 2188$  at year  $j$  with  $j = 2003, 2007$ , follows a Bernoulli distribution with probability is:

$$\text{logit}(p_{ij}) = \mathbf{X}_1\boldsymbol{\beta} + \mathbf{X}_2\boldsymbol{\alpha} + b_{0i} \quad (1)$$

where  $b_{0i}$  is a random effect for each municipality with  $b_{0i} \sim N(0, \sigma)$  for  $i = 1, \dots, 2188$  and  $\mathbf{X}_1$  is a fixed design matrix including intercept:

$$\mathbf{X}_1\boldsymbol{\beta} = \beta_0 + \beta_1 tax_{ij} + \beta_2 grants_{ij} + \beta_3 debt_{ij} + \beta_4 unemp_{ij} + \beta_5 \log(pop)_{ij} \quad (2)$$

$$+ \beta_6 ideol_{ij} + \beta_7 align_{ij} + \beta_8 coal_{ij} \quad (3)$$

The other part of the desing matrix,  $\mathbf{X}_2$ , considers variables related to the expenditure. Depending on how these covariates are decomposed we consider three different models:

**Model 1:** total expenditures for each period of four years is considered as a single covariate,

$$X_2\alpha = \alpha \text{ totalex}_{ij}$$

**Model 2:** total expenditure in each four year period is divided in current and capita expenditures  $X_2\alpha = \alpha_1 \text{ currex}_{ij} + \alpha_2 \text{ capex}_{ij}$

**Model 3:** Both, current and capital expenditures for each term of office is divided in two periods,  $X_2\alpha = \alpha_1 \text{ currex1per}_{ij} + \alpha_2 \text{ currex2per}_{ij} + \alpha_3 \text{ capex1per}_{ij} + \alpha_4 \text{ capex2per}_{ij}$

Using a Bayesian point of view allow us to obtain much richer results in terms of a posterior distribution for each of the unknown parameters.

The computation of posterior probability distributions is not always easy to deal with. In fact, these distributions cannot always be obtained in an analytical way. During many years, the computational challenge of obtaining posterior distributions has been one of the main issues for not using Bayesian statistics. But nowadays this task has been simplified by the increasing capacity of computers together with the development of simulation methodologies based on Montecarlo sampling and Markov Chain Monte Carlo (MCMC) (Green, 2001). These useful simulation procedures result in an approximate sample of the posterior distribution from which we can make inference (posterior means and medians, credible regions, quantiles, etc.). The Markov Chain Monte Carlo (MCMC) method was used, via the WinBUGS software (Lunn et al., 2000), to simulate posterior distributions of all the final model parameters.

But, for adopting a Bayesian approach we need to establish prior believes. Here we use uninformative prior distributions for all the values in the parametric space.

## 5. Results

Although, according to the values for the DIC one might select one or another of the different models considered, we provide results for the three of them—model 1, 2 and 3. Although models 1 and 2 might be better in terms of DIC, the third model is particularly interesting because of the variables used.

Results are shown in Tables 3, 4 and 5 for the posterior distributions of models 1, 2 and 3. The continuous counterpart to these tables is partly reported in Figures 1 and 2. However, they are not exactly the graphical counterparts to the information shown in Tables 3–5, since the figures display only some of the most relevant results.

If we first consider the results concerning municipal spending (*totalex*), we should highlight the generally positive effect on the level of satisfaction of citizens and, therefore, on the

possibility of re-election of local governments. This result confirms the widespread effect existing in the literature on support for the ruling party. Thus, in line with other local studies (Veiga and Veiga, 2007a; Sakurai and Menezes-Filho, 2008; Aidt et al., 2011; Litschig and Morrison, 2012) demonstrates the reward for increases in total spending. This effect is shown by the positive sign for the mean of the *totalex* variable in Table 3, despite its low value (0.00022). The graphical counterpart to this result, displayed in Figure 1a, provides strong support for this finding, since most of the probability mass lies beyond 0—i.e. the effect is positive for most of the distribution. This is a relevant results since, in previous literature, the focus is generally placed on the *average* effect, whereas we provide here much more compelling evidence.

When distinguishing the expenditures between current spending (*currex*) and capital spending (*capex*) we notice that voters have a preference for the latter (investment spending), compared with the former. This is shown in Table 4, whose mean value for *currex* is negative (−0.00055), whereas that for *capex* is positive (0.00129). Therefore, on average, the level of satisfaction of the electorate increases when increases in capital expenditures are observed. The densities in Figure 1b strongly support this finding; in the case of current expenditures (*curex*), the probability mass is almost entirely concentrated below zero; in the case of the capital expenditures (*capex*) the effect is not only positive; in addition, probability mass is entirely concentrated above 0.

If we distinguish by periods, we perceive that the effect of the early years of the election cycle affects more significantly affects the citizen satisfaction, due in part to the costs capital usually display their results in a longer period of time; this can be corroborated by the mean values for *capex1per* and *capex2per* in Table 5. Therefore, the investment can be made in early cycle in order that their results are displayed in the periods close to elections and thereby increase the probability of being reelected.

With regard to current expenditure (*curex1per* and *currex2per*), results also show that the electorate also rewards current pre-election spending increases, probably due to their immediate visibility. Although it could be also seen as overspending in the first term of office (the farthest to the election), they do not have a positive effect on voters' satisfaction with their local governments. This evidence is shown in Table 5, in which it is shown that the mean effect for *curex1per* is, on average, negative (−0.00234), whereas that of *curex2per* is positive (0.00184). The graphical counterpart, shown in Figure 1c, indicates that the probability of having a negative effect of the current expenditures in the first period (*currex1per*) is virtually 100%, since the probability mass is almost entirely concentrated below zero; in contrast, the opposite holds

for *currex2per*, for which the effect is almost entirely positive.

Regarding the variables related to budget revenues (*tax*, *grants* and *debt*), both taxes (*tax*) and transfers received (*grants*) have a positive effect yet little relevance on the level of satisfaction of citizens; while the level of indebtedness (*debt*) has a negative effect. This is shown both on the tables corresponding to the results for the three models (Tables 3, 4 and 5) as well as the corresponding figures (Figures 2.a, 2.b and 2.c). The effect of taxes and the level of indebtedness on the level of citizen satisfaction is generally robust across the three models—regardless of the level of expenditures. This is very apparent in Figures 2.a and 2.c; whereas in the former the probability mass is generally concentrated above 0, pointing out a positive effect, for the latter the effect is mostly negative. However, in the case of *grants*, results depend on the model considered. In this case, the level of transfers received is greatly influenced by how we consider the expenditures' variable, i.e only when considering total expenditures (Model 1) we obtain that the effect of transfers received on the probability of reelection is positive; even though, there is a non-negligible amount of probability mass lying below zero (see Figure 2.b).

The results regarding the variable related to income taxes (*tax*) is consistent with the studies by Sakurai and Menezes-Filho (2008) and Arvate et al. (2010). The literature has demonstrated that taxes are not usually a key factor in local elections (Gibson, 1988). According to Boyne et al. (2009), the fact that the local government is not penalized might be due to the fact that voters do not perceive local rulers as the primary responsables. In addition, if public local management is good enough, a certain level of taxing may be accepted. In addition, we analyze a period prior to the start of the current economic crisis and, therefore, the effect of this variable could change substantially if we analyzed posterior election cycles.

The last variable in the budget group, the level of municipal debt (*debt*), shows a negative impact on local government election which is robust across the different models. This is quite apparent in Tables 3, 4 and 5, where the mean impact is  $-0.00098$ ,  $-0.00147$  and  $-0.00142$ , respectively. These results agree with those obtained by Brender (2003) or Cassette and Farvaque (2013), demonstrating in this way that the electorate penalizes high debt levels throughout the term of office. Figure 2.c is particularly illustrative regarding the effect of this variable, since the probability mass is almost entirely on the l.h.s. of the *OY* axis.

Political variables included in the study are the ideology (*ideol*), the alignment (*align*) of local government with the ruling party at the central government, and the fact of governing in coalition (*coal*). Regarding the first variable (*ideol*), we observed that the probability of right-wing parties to be reelected is higher. This is shown by the positive sign for the mean of *ideol*

in Table 3 (0.31893), 4 (0.34006) and 5 (0.37021). The corresponding density (see Figure 2.d) is particularly illustrative, since probability mass is entirely concentrated on the r.h.s. of the OY axis. The explanation may be due to the very essence of the right-wing ideology, characterized by a more conservative electorate and marked by a greater loyalty to the party, away from certain proposals for change even within the same branch of ideology, compared with the more progressive ideas of leftist parties, which may result in changes in voting among other parties with similar ideologies.

The variable coalition (*coal*) has a negative effect, indicating that mayors who ruled through a coalition with other political forces, because they did not obtain enough votes to govern alone, are less likely to be reelected. This result reinforces the idea that parties with better results in elections, will continue to have more support in the next election, in line with the contributions of Brender (2003), Veiga and Veiga (2007a), Dubois and Paty (2010), Drazen and Eslava (2010) or Aidt et al. (2011) and demonstrating the existence of such persistence in the vote. This result is quite strong as shown not only by the negative signs for the mean in Tables 3, 4 and 5 ( $-1.45182$ ,  $-1.43951$  and  $-1.42261$ ) but also by the probability mass entirely concentrated on the l.h.s. of the OY axis in Figure 2.h.

The alignment with the central government (*align*) shows a negative relationship with the probability of reelection of local governments. Similar results are obtained in the studies by Aidt et al. (2011), Cassette and Farvaque (2013) and Sakurai and Menezes-Filho (2008). This negative relationship could be explained, as pointed out by Aidt et al. (2011), as a way for the electorate to avoid a concentration of power in a single party in the national and local levels, or as a way of showing dissatisfaction with the national government. This negative effect is reported for the three models ( $-0.12785$ ,  $-0.13557$  and  $-0.16043$  for Tables 3, 4 and 5, respectively). Again, it is particularly evident via the densities; in particular, in Figure 2.g most of the probability mass is below zero.

As socio-economic variables we have studied as likely influences the level of unemployment (*unemp*) and the size of the population (*pop*) on the level of satisfaction with the local government. In most studies that have analyzed the influence of local unemployment on the probability of reelection it has obtained either a limited or insignificant effect. However, in our analysis the effect is positive for both variables, and for all three models. When interpreting this variable it must be born in mind that it does not examine whether there has been either an increase or decrease in unemployment and its influence on the probability of reelection, but rather the differences between municipalities with different levels of unemployment.



The absence of penalties for the unemployment rates may be due to the fact that citizens may consider that the local government is not responsible for the level of unemployment. Furthermore, the analysis focuses on a time when unemployment rates were not too high. Coffey (2013) refers to the theory of pain tolerance, according to which there is an unemployment threshold above which the voter will tend to penalize the government; however, for unemployment levels below the threshold the voters will not penalize local authorities. Our results do not entirely corroborate this theories. Although the mean effect, as shown in Tables 3, 4 and 5 is positive throughout (0.00021, 0.01895 and 0.02006 for models 1, 2 and 3), the corresponding density (Figure 2.d) shows these are only *mean* effects, but the probability of a negative effect is high, especially for model 1, as shown by the density depicted with a solid line in Figure 2.d.

Finally, the variable population (*pop*) shows a positive relationship with the level of satisfaction of citizens. This result suggests that small municipalities are more critical of government actions than large municipalities. In this case, as indicated in Tables 3, 4 and 5 the effect is positive throughout (mean effects of 0.20164, 0.25925 and 0.25775, respectively). In this case, however, the density of Figure 2.e corroborates this finding strongly, since the probability mass is entirely concentrated above 0.

## 6. Concluding remarks

In this study we analyzed the effect of the level of public spending on the probability of reelection of Spanish municipalities in the municipal elections of 2003 and 2007. In addition, we also analyzed the effect that other budgetary, political and socioeconomic variables may have on the probability of reelection.

On the methodological side, the article employed Bayesian techniques to conduct the analysis, instead of the most extended frequentist approaches one may find in the literature. These methods have been particularly interesting, since results indicated not only how a given covariate might affect *on average* the probability of being reelected. Complementarily, we obtain information on the entire *a posteriori* distributions, i.e. we may ascertain which is the exact probability of a given covariate to have either a positive or negative impact on the dependent variable.

Results show that an increased municipal spending throughout the term in office benefits local governments. In a more concise analysis of the effect of public spending, in which we

distinguish between current expenditure and capital expenditure, we found that constituencies tend to reward pre-election increases in the budget categories corresponding to current spending, probably due to its immediate visibility. In turn, capital spending in the early years of the election cycle also positively affects the vote, because certain investment projects are visible mainly on the long-term and, therefore, when elections are closer.

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**Table 1: Definition of variables**

Variables	Variable name	Definition
Expenditures	<i>totalex</i>	Average total expenditure per capita
	<i>curcx1per</i>	Average current expenditure <sup>b</sup> per capita in the first period
	<i>curcx2per</i>	Average current expenditure per capita in the second period
	<i>capcx1per</i>	Average capital expenditure <sup>b</sup> per capita in the first period
Budget variables	<i>capcx2per</i>	Average capital expenditure per capita in the second period
	<i>tax</i>	Average tax revenues per capita
Revenues	<i>grants</i>	Average transfer revenues per capita
	<i>debt</i>	Average debt per capita
	<i>ideol</i>	Political ideology of the local government (1: right-wing party; 0: left-wing party)
Political variables	<i>align</i>	Ideological alignment of local government with central government (1: the ideology of the local government coincides with that of the central government; 0: otherwise)
	<i>coal</i>	Coalition in the local government (1: the local government is formed by coalition; 0: otherwise)
	<i>unemp</i>	Average municipal unemployment rate
Socioeconomic variables	<i>log(pop)</i>	Average of the logarithm of the municipal population

<sup>a</sup> Current expenditure is the sum of these budget items: personal expenditures, current goods and services expenditures, financial expenditures and current transfers.

<sup>b</sup> Capital expenditure is the sum of these budget items: investments and capital transfers.

**Table 2: Covariates (budget and socioeconomic variables), summary statistics**

	Budget variables										Socioeconomic variables	
	Expenditures					Revenues					<i>unemp</i>	<i>log(pop)</i>
	<i>totalex</i>	<i>curex</i>	<i>capex</i>	<i>curex1per</i>	<i>curex2per</i>	<i>capex1per</i>	<i>capex2per</i>	<i>tax</i>	<i>grants</i>	<i>debt</i>		
Min.	271.50	179.20	5.85	164.10	172.70	5.75	0.02	46.38	135.90	0.00	0.60	6.91
1 <sup>st</sup> Qu.	729.50	479.60	179.40	454.90	494.10	152.90	178.80	164.90	303.80	6.69	2.48	7.62
Median	907.80	593.40	259.60	569.10	617.70	234.20	272.40	242.10	387.90	35.95	3.33	8.36
Mean	1006.00	640.50	324.60	616.00	665.00	304.40	344.80	285.70	444.50	56.95	3.64	8.58
3 <sup>rd</sup> Qu.	1156.00	743.20	385.50	714.80	773.20	358.70	412.50	344.90	518.60	81.68	4.45	9.31
Max.	5432.00	3226.00	2585.00	3113.00	3654.00	3776.00	3418.00	4879.00	2554.00	1514.00	13.43	14.96

**Table 3:** Summary of posterior distributions in Model 1

	Mean	sd	2.5%	25%	50%	75%	97.5%
Intercept	-0.18757	0.35476	-0.91177	-0.42458	-0.17765	0.05146	0.47402
<i>totalex</i>	0.00022	0.00020	-0.00017	0.00009	0.00022	0.00036	0.00060
<i>tax</i>	0.00011	0.00032	-0.00049	-0.00010	0.00009	0.00032	0.00078
<i>grants</i>	0.00017	0.00029	-0.00041	-0.00002	0.00017	0.00037	0.00075
<i>debt</i>	-0.00098	0.00062	-0.00223	-0.00141	-0.00096	-0.00058	0.00021
<i>unemp</i>	0.00021	0.02524	-0.04830	-0.01670	0.00015	0.01765	0.04652
$\log(\text{pob})$	0.20164	0.03902	0.12870	0.17490	0.20010	0.22805	0.27688
<i>ideol</i>	0.31893	0.07849	0.17182	0.26235	0.31750	0.37270	0.47051
<i>align</i>	-0.12785	0.07539	-0.27408	-0.18027	-0.13010	-0.07729	0.02437
<i>coal</i>	-1.45182	0.08588	-1.61987	-1.51100	-1.45200	-1.39425	-1.27602
$\sigma_b$	0.38841	0.15152	0.08470	0.28617	0.40050	0.50327	0.65287

**Table 4:** Summary of posterior distributions in Model 2

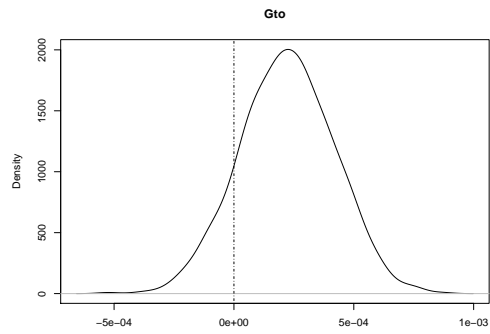
	Mean	sd	2.5%	25%	50%	75%	97.5%
Intercept	-0.54641	0.34760	-1.21690	-0.79365	-0.54970	-0.31415	0.11577
<i>curex</i>	-0.00055	0.00029	-0.00112	-0.00075	-0.00055	-0.00035	0.00005
<i>capex</i>	0.00129	0.00030	0.00071	0.00109	0.00130	0.00150	0.00187
<i>tex</i>	0.00041	0.00038	-0.00033	0.00015	0.00041	0.00067	0.00112
<i>grants</i>	-0.00008	0.00031	-0.00069	-0.00028	-0.00008	0.00013	0.00053
<i>debt</i>	-0.00147	0.00064	-0.00267	-0.00194	-0.00148	-0.00105	-0.00022
<i>unemp</i>	0.01895	0.02576	-0.03186	0.00255	0.01812	0.03599	0.06934
$\log(\text{pop})$	0.25925	0.04060	0.18085	0.23100	0.25880	0.28547	0.33978
<i>ideol</i>	0.34006	0.07763	0.19231	0.28817	0.33850	0.39405	0.49016
<i>align</i>	-0.13557	0.07298	-0.27466	-0.18477	-0.13215	-0.08676	0.00785
<i>coal</i>	-1.43951	0.08674	-1.61692	-1.49900	-1.43700	-1.37925	-1.27702
$\sigma_b$	0.37578	0.17113	0.05667	0.24702	0.39215	0.50190	0.68127

**Table 5:** Summary of posterior distributions in Model 3

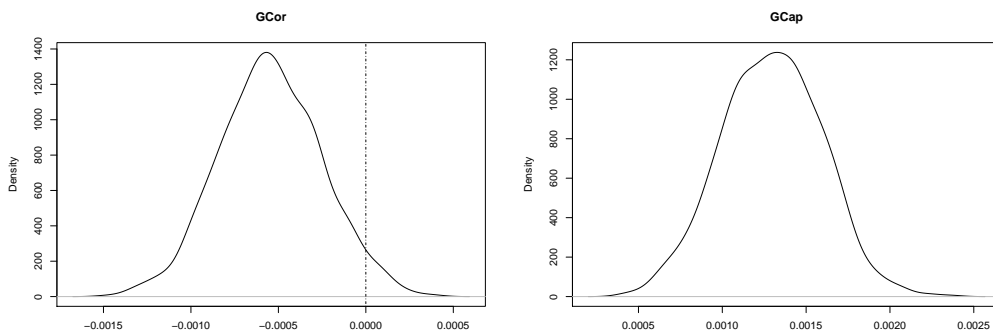
	Mean	sd	2.5%	25%	50%	75%	97.5%
Intercept	-0.58605	0.34922	-1.28380	-0.82322	-0.58805	-0.35430	0.08169
<i>curex1per</i>	-0.00234	0.00049	-0.00333	-0.00268	-0.00234	-0.00201	-0.00139
<i>curex2per</i>	0.00184	0.00051	0.00092	0.00149	0.00183	0.00216	0.00284
<i>capex1per</i>	0.00014	0.00023	-0.00030	-0.00001	0.00014	0.00029	0.00059
<i>capex2per</i>	0.00116	0.00024	0.00070	0.00100	0.00116	0.00133	0.00166
<i>tex</i>	0.00030	0.00039	-0.00043	0.00003	0.00028	0.00055	0.00112
<i>grants</i>	-0.00027	0.00032	-0.00088	-0.00048	-0.00028	-0.00007	0.00035
<i>debt</i>	-0.00142	0.00066	-0.00265	-0.00189	-0.00145	-0.00098	-0.00005
<i>unemp</i>	0.02006	0.02491	-0.02921	0.00305	0.02098	0.03772	0.06885
$\log(pob)$	0.25775	0.03990	0.18081	0.23310	0.25585	0.28315	0.33824
<i>ideol</i>	0.37021	0.07673	0.21644	0.31930	0.36935	0.42097	0.52458
<i>align</i>	-0.16043	0.07253	-0.30650	-0.20963	-0.16005	-0.11032	-0.02351
<i>coal</i>	-1.42261	0.08845	-1.60897	-1.47800	-1.42200	-1.36725	-1.25202
$\sigma_b$	0.22683	0.21449	0.00040	0.01955	0.19155	0.40137	0.65605

**Figure 1:** Posterior densities for expense related covariates

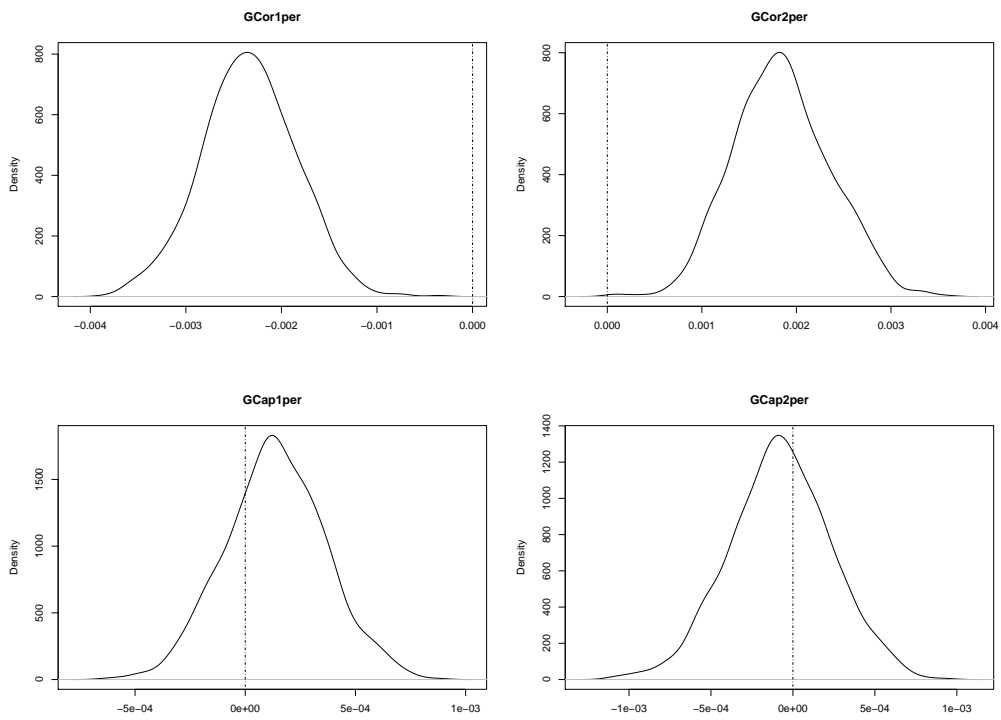
**(a) Model 1**



**(b) Model 2**



**(c) Model 3**



**Figure 2:** Posterior densities for covariates within each model

