Local Governments' Re-election and its Determinants: New Evidence Based on a Bayesian Approach

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Resumen: We analyze the effect of public spending on the probability of municipal re-election of Spanish local governments during the 2000–2007 period. Although the literature on political budget cycles is now relatively large, fewer contributions explicitly analyze the determinants of re-election. The use of Bayesian techniques is particularly interesting because, in contrast to most previous studies, results are not boiled down to a summary effect such as the average. On the contrary, our findings show exactly how a given covariate affects the probability of being re-elected. We find that, in general, increases in local government spending positively impact on local governments' chances of re-election. Moreover, the capital expenditure over the whole term positively affects re-election probability, although the pre-electoral capital expenditure is preferred, and the electorate rewards increases in current expenditures only in the period before elections.

Palabras Clave: Bayesian, election, local government, opportunistic policies

Clasificación JEL: D60, H71, H72, H74, H75

1. Introduction

The existence of political budget cycles (PBC) has been widely analyzed by the literature, finding, in general terms, that opportunistic pre-election manipulation of fiscal instruments does exist, with the clear objective of increasing the likelihood of a government being re-elected (Shi and Svensson, 2003). The result of this re-election opportunism is not always desired by governments and policy-makers, and the literature reports evidence of both rewards and penalties in constituency voting patterns as a result of this behavior. 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). This literature is relevant and is still growing, as shown by recent research on the conditional political budget cycle (Persson and Tabellini, 2003; Brender and Drazen, 2005; Shi and Svensson, 2006; Alt and Lassen, 2006), surveyed by de Haan and Klomp (2013), or how different PBC patterns may emerge under different types of suffrage (Aidt and Mooney, 2014).

In the particular case of Spanish local governments, the focus of this paper, despite the importance of the topic little empirical evidence can be found addressing the specific issue of which factors affect the probability of re-election. Whereas previous literature has analyzed the impact of budgetary variables and socio-economic policies on the probability of re-election in other countries, in the Spanish case the evidence is scarce. However, this context is particularly relevant for a number of reasons, some of which are worth mentioning. First, although decentralization stops at the regional level (*Comunidades Autónomas*), and the number and importance of powers in the hands of local governments is far lower than those controlled by the regions, they have a remarkable degree of autonomy in terms of budget planning (García Sánchez et al., 2011), involving a high degree of flexibility in budget implementation (De Haan et al., 1999). Local governments also have ample powers in terms of planning, development and urban structure which, during the boom years, considerably boosted their revenues on average (and led to an even more remarkable collapse of these revenues after the burst of the housing bubble). In this context, the analysis of PBC in Spain has mainly focused on their existence and composition, but their effect on political re-election remains virtually unexplored (Vila i Vila, 2010; Sánchez Mier, 2011; Vicente et al., 2013).

Considering the rationale presented above, the main objective of this study is to explore the

impact of public spending on the probability of local governments' re-election for a large sample of Spanish municipalities. Specifically, we study the effect of total expenditure, and current and capital expenditure, over the whole term, and the expenditure divided into periods distinguishing between expenditure in the first years of each electoral cycle and that corresponding to the pre-electoral period. In addition, we also analyze the effect of other budgetary, political and socioeconomic variables.

As opposed to previous approaches in this literature, most of which were frequentist, we consider Bayesian (inference) methodologies. Bayesian inference allows for a pure mathematical interpretation of the problem (in terms of probability) by combining likelihood and prior beliefs (if any) through the Bayes theorem. Taking a Bayesian approach dispenses with the need for *ad hoc* tests such as heterogeneity or normality tests, which simplifies the analysis. Using Markov Chain Monte Carlo (MCMC) methods we obtain posterior distributions for the parameters in the analysis, which contain much more information than a simple estimation of their values. However, despite their advantages, Bayesian methods have rarely been used in the specific context of PBCs, and their consideration may shed some light on the links between certain covariates considered in the literature and the probability of a given local government being re-elected. In this particular context, an interesting feature of Bayesian methods is that a given variable is neither significant nor non-significant but, instead, we focus on their posterior probability distributions. This shift of focus implies that some of the mixed results previously found in the literature could be reconciled, especially in terms of the effects of some variables (when both evaluating the sign and magnitude of their effects).

Our results can be analyzed from a variety of perspectives. They show that, in general, voters reward local governments for increases in total spending during the entire electoral cycle. More specifically, current expenditure in the pre-electoral period positively affects the possibilities of re-election—probably due to the immediate visibility of these expenditures. Otherwise, increases in capital expenditure over the whole term benefit local governments, although the positive effect for the pre-electoral spending is larger than the expenditure made during the first period of each term. On the revenue side, we find that voters penalize high levels of debt over the whole term. Analysis of the political variables reveals that right-wing parties have more possibilities of being re-elected, which might be due to the conservatism that inhibits shifts between parties, even within the same political wing. Results also show the persistence of vote in the period analyzed. The ideological alignment between local and central government negatively affects mayors, a result that could be explained by the fact that people

tend to avoid concentration of power in a single party, or to express dissatisfaction with the national government. Our analysis of the socio-economic variables revealed a slightly positive relationship between unemployment and re-election. Although the opposite relationship was expected, this could be explained by the fact that voters might not consider local governments to be primarily responsible for this economic outcome at the local level.

The paper is divided into six sections. After this introduction, Section 2 offers 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 re-election. 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, and Section 6 outlines some of the conclusions drawn from the study.

2. Political budget cycles and the determinants of local governments' re-election: theory

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 re-election, 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 favor with the electorate and thus secure their votes in the ballot box.

In more comprehensive studies of political budget cycles, some authors have analyzed the effect of opportunistic behavior on the re-election possibilities of incumbent governments, finding evidence of both penalization and reward effects in the polls. Studies by Peltzman (1992), Kraemer (1997), Meloni (2001), Brender (2003) and Brender and Drazen (2008) reveal that opportunistic behaviors are penalized by the electorate. Specifically, Peltzman (1992) found that the US electorate penalizes governments that increased public expenditure in the run-up to elections, whereas Kraemer (1997), for a set of Latin American and Caribbean countries, found 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 re-election. In a similar vein, 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 re-election. Meloni's (2001) analysis of Argentine electoral districts provides additional evidence in this regard, revealing that an increase in public expenditure negatively affects the percentage of votes obtained by the governing party.

However, other predominant studies in the literature have found opposite effects, namely, that the electorate actually rewards opportunistic behavior. 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 re-election for Brazilian local governments. In the case of Colombian town councils, Eslava (2005) concluded that although pre-election deficits are penalized in the polls, increased capital expenditure leads to an increase in the percentage of votes for the incumbent party. Similar results were obtained by Jones et al. (2012), who analyzed 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 was rewarded, while no extra gains result from expenditure increases in the election period. In the case of Brazilian municipalities, Litschig and Morrison (2012) analyzed the effect of additional expenditure on the probability of re-election of incumbent parties, finding that a 20% rise in per capita expenditure throughout the whole electoral cycle led to a 10% increase in the probability of re-election of the local incumbent party. Some studies have broadened the analysis, extending the sample to several countries. One such case is Mourão and Veiga (2010) who, for a sample of 68 countries, found that opportunistic behavior in public expenditure during election periods has a positive effect on votes for the ruling party.

Although governments' opportunistic behaviors 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 favored by the electorate, while offsetting through reductions in other budget items, with the clear aim of increasing their popularity and the probability of re-election.

In this regard, the literature reports mixed results on 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. For instance, Vergne's

(2009) results indicate a pre-election shift toward 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 converse is reported by Schuknecht (2000), Binet and Pentecôte (2004) and Khemani (2004), who find pre-election increases in capital expenditure, partly due to the ease with which they can be addressed directly to groups of citizens and specific areas.

Other studies falling within this specific category focusing on the expenditure components that can be manipulated are those by Veiga and Veiga (2007b), who reported an increase in capital expenditure in election year; Drazen and Eslava (2010), who demonstrated that infrastructure expenditure increases before municipal elections in Colombia; or Sedmihradská et al. (2011), who observed an increase in capital expenditure in pre-election years.

This diversity of findings may be the result of the circumstances, or context, specific to each analysis. As Aidt and Mooney (2014) noted, context is essential for the capacity of incumbent governments to manage spending in order to benefit in the electoral results. In this regard, Block (2002) states, "political business cycle (PBC), theory, since the seminal papers of Nordhaus (1975), Lindbeck (1976), and Tufte (1978), has been debated by economists and political scientists almost exclusively in the context of industrialized democracies." Although, as it is apparent from this review that several studies have focused on South American countries, many of which can still be regarded as developing, in other contexts such as Africa the evidence is much scarcer, with few exceptions (Block, 2002).

In the specific case of the literature analyzing the determinants of local governments' re-election, the number of contexts for which the empirical evidence is almost entirely yet to come is higher, including several developed countries. This is the case of the setting of our study: Spanish local governments. In this context some studies have analyzed specific groups of municipalities (from a given region). For instance, Lago-Peñas and Lago-Peñas (2008) observe deficit increases in election years for a number of municipalities in Asturias, whereas Vila i Vila (2010) finds that capital expenditure rises in pre-election and election years for the municipalities of the Valencian Community. Considering municipalities from several regions, Benito et al. (2010) observe a tax decrease in the electoral year and, for the case of the largest Spanish municipalities, Vicente et al. (2013) identify increases in total expenditure during election years—although only for the least transparent municipalities. None of these contributions,

however, deals *explicitly* with the determinants of re-election.

3. Data, variables and data sources

The Spanish public sector is divided into three levels of government, namely, the central government, or State, the 17 regional governments or *Comunidades Autónomas*, or regions, and 8,111 municipalities or local governments.[1] Although there is another division (provinces) between regions and municipalities, this is territorial rather than a proper level of government. Municipalities are the basic legal entities of the State organization, and have full capacity to fulfill their aims, as defined by the Regulatory Law 7/1985 on the Foundations of the Local Government System (*Ley Reguladora de las Bases del Régimen Local*). According to the European nomenclature of territorial units for statistics (NUTS or *Nomenclature des Unités Territoriales Statistique*), regions correspond to NUTS level 2. Although municipalities used to have their own NUTS level (NUTS level 5), they are now considered Local Administrative Units (LAU level 2).

Spanish municipalities have several characteristic features, notably their peculiarities in terms of size. There are remarkable discrepancies in terms of population or population density, and many of them are very thinly populated. Although roughly 4,900 councils have fewer than 1,000 inhabitants, in fact these only represent around 3% of total population in Spain.

The empirical analysis in the present study focuses on local governments with a population of over 1,000 inhabitants because some data for the smallest municipalities were either missing or unreliable. Therefore, after removing those municipalities without budgetary data for the period analyzed, our sample comprised 2,188 municipalities, representing roughly 85% of the Spanish population and, as can be seen in Table 1, all the Spanish regions.

Local elections in Spain are held every four years and, therefore, during the period analyzed (2000-2007) two local elections were held (in 2003 and 2007). The electoral system is based on a proportional representation model, where the number of town or city councilors in each party depends on the votes received for each candidacy, and the total number of councilors depends on the number of inhabitants registered in the census.

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 socio-economic variables were taken from La Caixa Economic Yearbook

[1] Corresponding to the number of municipalities in 2007

and the National Institute of Statistics.

The variable this study aims to explain is the probability of re-election of the incumbent party in local governments based on a series of budgetary, political and socio-economic 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.[2]

Once the dependent variable (*reel*) has been defined, we explain the variables analyzed as determinants of local governments re-election, classified into four groups: expenditure, revenue, political and socio-economic. The variables are defined in Table 2, and the summary statistics are reported in Table 3.

3.1. Expenditure variables

Total public expenditure (*totalex*)

One of the main objectives of this paper is to study the effect of total public expenditure on the probability of re-election of the incumbent party. Although some studies report penalization 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 would expect a positive effect showing a reward for increases made by the local government during its term in office.

Current and capital expenditure (*currex* and *capex*)

The literature on PBC 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. 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-

[2]The party with the highest percentage of votes was selected, rather than the party that eventually governed, because in some cases the incumbent 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 has the power to decide.

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 analyze whether the expenditure component has different effects on re-election; in other words, whether the electorate evaluates increases in certain areas of public expenditure differently from others. We also include both components of expenditure divided into periods in order to analyze whether the impact on re-election changes depending on the moment when the spending is made. Therefore we distinguish between expenditure in the first years of each electoral cycle and the farthest away from the election ($currex1per$ and $capex1per$) and the expenditure in the pre-electoral period ($currex2per$ and $capex2per$).

Sakurai and Menezes-Filho (2008) observed that higher capital expenditures in the three years previous to an election and rises in current spending in the election year, increase the probability of re-election of Brazilian mayors. Results from the study by Eslava (2005), show that pre-electoral increases in capital expenditure, benefit the incumbent party. Veiga and Veiga (2007a) found a positive relationship between the percentage of votes for the incumbent local government and increases in investment expenditures in election years.

3.2. Revenue variables

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

The budgetary variables, related to public revenues, are tax revenues per capita (tax), transfer revenues per capita ($grants$) and debt per capita ($debt$). 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 analyzed. 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 analyzed. These variables are therefore used to analyze the impact of public revenues on the probability of re-election.

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 favor 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 penalization for tax increases (Revelli, 2002; Bosch and Solé-Ollé, 2007; 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). By introducing the tax revenues variable, we explore the relation between tax revenue and local government re-election for the study sample during the analyzed period.

Grants (*grants*)

The probability of the incumbent party's re-election 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 re-election holds, an increase in the level of transfer revenues could become a positive determinant of re-election. Solé-Ollé and Sorribas-Navarro (2008) showed, for a sample of Spanish municipalities during the period 1993–2003, that transfer revenues positively affect the election results of the local governing party. Veiga and Veiga's (2013) results indicated that an increase in the transfer revenues that municipalities receive from central government in election years improves their results in the legislative elections.

Debt (*debt*)

The introduction of the variable debt, reflecting the financial liabilities generated in the years analyzed, 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 re-election. Cassette and Farvaque (2013) studied the impact of debt accumulation on the re-election possibilities of French local governments. Their results indicate that the accumulation of debt during the whole term adversely affects their re-election, but in contrast, pre-election debt accumulation favors the election results of the incumbents.

3.3. Political variables

Ideology (*ideol*)

Turning to political variables, a large number of studies include a variable that classifies parties according to their political ideology in order to study its effect on the probability of re-election, PBC or opportunism by incumbent governments. Our study includes the variable of the ideology of the incumbent party at the time of the election. This variable allows us to study the impact of ideology on the probability of local governments' re-election.

To define the ideology variable, we distinguished between right-wing and left-wing parties (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 progressive ideological objectives. This variable takes the value 1 when the incumbent party in a given municipality can be associated with right-wing ideology, and 0 when it is associated with a left-wing party. This left-right classification is the most commonly used in the literature.

Alignment (*align*)

The next political variable included as a possible determinant of re-election is the ideological alignment of the local government 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 favor 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 re-election, based on Brazilian voters' penalization of the national government due to a succession of economic crises during the period analyzed. 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 re-election.

Coalition (*coal*)

The final political variable included in the analysis refers to the support obtained by the incumbent party in the previous polls. A large number of studies have included a variable measuring past support for the incumbent government with the aim of studying the persistence of political support and the possible existence of inertia in the polls, since some of the electorate usually votes in the same way from one election to another. The generalized result in the literature indicates that parties with better results in an election, will continue to have more support in the next election (Brender, 2003; Bosch and Solé-Ollé, 2007; Veiga and Veiga, 2007a; Drazen and Eslava, 2010; Dubois and Paty, 2010; Aidt et al., 2011; Cassette et al., 2013).

In order to study how past electoral results affect the present election and the existence of this persistence in voting behavior and political support, we include a dummy variable which indicates whether the incumbent party governed as part of a coalition with other political groups because it did not obtain sufficient votes to govern alone, or whether it won an absolute majority.

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 that governed as a result of broad support from the electorate.

3.4. Socio-economic variables

Unemployment rate (*unemp*)

The purpose of introducing the municipal unemployment rate into the analysis of the determinants of re-election is to explore the effect of the municipality's economic situation on the re-election 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 outcomes in the elections at different levels of government. At the central level, the generalized result points to a penalization of the government for increases in the unemployment rate (Cerda and Vergara, 2007, 2008; Veiga and Veiga, 2004a,b; Mourão and Veiga, 2010). However, at the local level, although there is evidence of such a penalty (Martinussen, 2004), a large number of studies find a weak or insignificant relationship between local unemployment and support for local governments, including research by Veiga and Veiga (2007a), Boyne et al. (2009) and Aidt et al. (2011).

Population (log(*pop*))

Studies analyzing the re-election possibilities or election results of governments usually include demographic variables to identify patterns of behavior.

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' re-election 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; Sakurai and Menezes-Filho, 2011).

4. Methods and models

The main goal of this paper is to model the probability of a local government 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 a

value of 1 if the government is re-elected and 0 otherwise; a logistic regression was therefore used to analyze the effect of the covariates in the re-election process. This type of model also allows a municipality effect to be easily introduced. We introduce an independent random effect intending to assume any unknown information about the specific municipality .

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

$$\text{logit}(p_{ij}) = \boldsymbol{X}_1\boldsymbol{\beta} + \boldsymbol{X}_2\boldsymbol{\alpha} + b_i \tag{1}$$

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

$$\begin{aligned} \boldsymbol{X}_1\boldsymbol{\beta} &= \beta_0 + \beta_1\, tax_{ij} + \beta_2\, grants_{ij} + \beta_3\, debt_{ij} + \beta_4\, unemp_{ij} + \beta_5 \log(pop)_{ij} \\ &+ \beta_6\, ideol_{ij} + \beta_7\, align_{ij} + \beta_8\, coal_{ij} \end{aligned} \tag{2}$$

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

Model 1: total expenditure for each four-year period is considered as a single covariate, $\boldsymbol{X}_2\boldsymbol{\alpha} = \alpha\, totalex_{ij}$.

Model 2: total expenditure in each four-year period is divided into current and capital expenditures, $\boldsymbol{X}_2\boldsymbol{\alpha} = \alpha_1\, currex_{ij} + \alpha_2\, capex_{ij}$.

Model 3: Both, current and capital expenditures for each term of office are divided into two periods, $\boldsymbol{X}_2\boldsymbol{\alpha} = \alpha_1\, currex1per_{ij} + \alpha_2\, currex2per_{ij} + \alpha_3\, capex1per_{ij} + \alpha_4\, capex2per_{ij}$.

As mentioned in the introduction, following a Bayesian approach yields much richer results in terms of a posterior distribution for each of the unknown parameters, thus avoiding the ad hoc test of classical methodology. In this study we use Markov Chain Monte Carlo (MCMC) methods (Green, 2001) via the WinBUGS software (Lunn et al., 2000), to simulate posterior distributions of all the final model parameters.

However, to adopt a Bayesian approach prior distributions for the parameters in the model must first be established. We use non-informative prior distributions for all the values in the parametric space. Using non-informative priors allows for an objective Bayesian analysis when there are no clear beliefs. In this case we use normal priors with large variance for the

regression parameters and a uniform prior with support $(0, 3)$, i.e. $U(0, 3)$, for the variance of the municipality random effect.

5. Results

Table 4 shows deviance information criterion (DIC) for the three models considered. DIC is a Bayesian measure that weighs calculates goodness-of-fit and complexity of the estimated models (Spiegelhalter et al., 2002) (the smaller the DIC, the better the fit). Using this criterion, model 3 is the best of the compared models. The results for the three models are shown, however, since we believe it is useful to understand the effect of all the expenditure measurements. Results are shown in Tables 5, 6 and 7 for the posterior distributions of models 1, 2 and 3. The continuous counterpart to these tables is reported in Figures 1 and 2.

We first consider the results concerning municipal spending (*totalex*); of note is the generally positive effect on the probability of local governments' re-election. This result confirms the widespread effect reported in the literature on support for the ruling party. Thus, in line with other local government studies (Veiga and Veiga, 2007a; Sakurai and Menezes-Filho, 2008; Aidt et al., 2011; Litschig and Morrison, 2012) the result demonstrates the reward for increases in total spending over the whole term. This effect is shown by the positive sign for the mean of the *totalex* variable in Table 5. The corresponding Figure 1a, provides strong support for this finding, since most of the probability mass lies beyond 0—i.e., this indicates a strong posterior probability for the effect being positive. This is a relevant result since the previous literature has generally focused on the *average* effect, whereas we provide here much more compelling evidence.

When current spending (*currex*) and capital spending (*capex*) are differentiated, voters show a preference for the latter (investment spending). Table 6 displays this finding, reporting a negative mean value for *currex* (-0.00055), whereas that for *capex* is positive (0.00129). Therefore, on average, the probability of local governments' re-election increases when capital expenditures rise. The densities in Figure 1b strongly support this finding; in the case of current expenditures (*currex*), the probability mass is almost entirely concentrated below zero; in the case of capital expenditures (*capex*), not only is the effect positive, but also all the probability mass is entirely concentrated above 0.

If we distinguish by periods, we observe that the capital expenditure in both periods positively affects the probability of re-election. These effects are shown by the positive signs for

the mean values for *capex*1*per* (0.00014) and *capex*2*per* (0.00116) in Table 7. However, a more detailed observation of the the corresponding figure (Figure 1c) reveals that pre-electoral capital spending has a more significant effect on the probability of re-election, since the probability mass is entirely concentrated above 0.

With regard to current expenditure (*currex*1*per* and *currex*2*per*), results also show that the electorate rewards current pre-election spending increases, probably due to their immediate visibility. By contrast, the expenditure in the first period of each term (the farthest away from the election) could be seen as overspending since it does not have a positive effect on re-election. This evidence is presented in Table 7, which shows that the mean effect for *currex*1*per* is, on average, negative (-0.00234), whereas that of *currex*2*per* is positive (0.00184). The corresponding Figure 1c indicates that the probability of current expenditures in the first period (*currex*1*per*) having a negative effect is virtually 100%, since the probability mass is almost entirely concentrated below zero; in contrast, the opposite holds for *currex*2*per*, for which the posterior density mass is almost entirely concentrated above 0.

Regarding the variables related to budget revenues, taxes (*tax*) and transfers received (*grants*) have little impact on re-election probability. However, level of indebtedness (*debt*) has a quite clear negative effect. This is shown both in the tables reporting the results for the three models (Tables 5, 6 and 7) and in the corresponding figures (Figures 2.a, 2.b and 2.c).

Despite its low relevance, the variable related to income taxes (*tax*) has a positive mean effect (0.00011, 0.00041, 0.00030 for models 1, 2 and 3 respectively), which is consistent with studies by Sakurai and Menezes-Filho (2008) and Arvate et al. (2010). According to Boyne et al. (2009), the fact that the local government is not penalized might be because voters do not perceive prime responsibility to lie with local governments. In addition, if local public management is regarded as sufficiently good, a certain level of taxation may be accepted. Furthermore, the period analyzed prior to the current economic crisis and, therefore, the effect of this variable could change substantially if posterior election cycles were studied. It is, however, important to keep in mind that according to the literature, taxes are not usually a key factor in local elections (Gibson, 1988).

In the case of *grants*, the sign of the effect depends on the model. In this case, the level of transfers received is greatly influenced by how the expenditure variable is considered; only when total expenditures (Model 1) are considered do we obtain a positive effect of transfers received on the probability of re-election; even so, there is a non-negligible amount of probability mass lying below zero (see Figure 2.b).

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 5, 6 and 7, where the mean impact is -0.00098, -0.00147 and -0.00142, respectively. These results coincide with those obtained by Brender (2003) or Cassette and Farvaque (2013), thus demonstrating 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 posterior probability mass is almost entirely on the l.h.s. [3] of the OY axis.

Political variables included in the study are ideology (*ideol*), the ideological alignment (*align*) of local government with the incumbent party at the central government, and the fact of governing in coalition (*coal*). Results for the first variable (*ideol*) show that right-wing parties are more likely to be re-elected, as reflected by the positive sign for the mean of *ideol* in Tables 5 (0.31893), 6 (0.34006) and 7 (0.37021). The corresponding density (see Figure 2.f) is particularly illustrative, since posterior probability mass is entirely concentrated on the r.h.s[4]. of the OY axis. The explanation may be that right-wing ideology characteristically has a more conservative and party-loyal electorate, that are reticent to proposals for change even within the same branch of ideology, compared with the more progressive ideas of left-wing parties, which may result in vote swings to other parties with similar ideologies.

Alignment with the central government (*align*) shows a negative relationship with the probability of re-election of local governments. Similar results are obtained in 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 prevent a concentration of power in a single party 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 5, 6 and 7, respectively). Again, it is particularly evident via the posterior densities; in particular, in Figure 2.g most of the probability mass is below zero.

The variable coalition (*coal*) has a negative effect, indicating that mayors who governed in coalition with other political forces, because they did not obtain enough votes to govern alone, are less likely to be re-elected. 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)

[3] Left hand side. i.e. below 0

[4] Right hand side i.e. above 0

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 5, 6 and 7 (-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 socio-economic variables studied were the effect of the level of unemployment ($unemp$) and the size of the population ($\log(pop)$) on the probability of re-election of the incumbent party.

Most studies that have analyzed the influence of local unemployment on the probability of re-election find either a limited or insignificant effect. Our results coincide with these findings since the effect of unemployment, while positive, is quite low. In fact, although the mean effect is positive throughout, as reported in Tables 5, 6 and 7 (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 ($\log(pop)$) shows a positive relationship with the probability of re-election of local governments. This result suggests that small municipalities are more critical of government actions than large municipalities. In this case, as indicated in Tables 5, 6 and 7 the effect is positive throughout (mean effects of 0.20164, 0.25925 and 0.25775, respectively). The density corresponding to Figure 2.e strongly corroborates this finding, since the posterior probability mass is entirely concentrated above 0.

6. Concluding remarks

In this study we have analyzed the effect of public spending levels on the probability of re-election in Spanish municipalities for the local elections of 2003 and 2007. We have also analyzed the effect that other budgetary, political and socioeconomic variables may have on the probability of re-election. The study used Bayesian techniques in the analysis, rather than the most widespread frequentist approaches found in the literature. These methods have proved particularly interesting, since the results indicate not only how a given covariate might affect, on average, the probability of being re-elected. At the same time, we obtain information on the entire a posteriori distributions, i.e., we can ascertain the exact probability of a given covariate having either a positive or a negative impact on the dependent variable. This would imply that, while some of the previous findings in the literature could have been driven by random

events, in our case we have been able to define the probability for the effects of our hypotheses.

Results show that increased municipal spending throughout the term in office benefits local governments' election outcomes. In a more concise analysis of the effect of public spending, distinguishing between current expenditure and capital expenditure, we find that constituencies tend to reward pre-election increases in the budget categories corresponding to current spending, probably due to their immediate visibility. Otherwise, increases in capital expenditure over the whole term benefit local governments, although the positive effect for pre-electoral spending is larger than expenditure in the first period of each term.

On the revenue budget side, results show that the level of municipal debt has a quite clear negative effect on the probability of re-election. Voters penalize high levels of municipal debt, as Brender (2003) and Cassette et al. (2013) find. Results from the analysis of political variables show that right-wing parties are more likely to be re-elected, probably due to conservatism, which makes swings between parties more difficult—even within the same political wing. The results also show the persistence of vote in the period analyzed, in line with Brender (2003) and Veiga and Veiga (2007a). The ideological alignment between local and central government affects mayors negatively. This could be because people tend to avoid concentration of power in a single party or to show the dissatisfaction with national government. Similar results were obtained in Aidt et al. (2011) and Cassette et al. (2013).

Results for the socio-economic variables reveal a slightly positive relationship between unemployment and re-election. Although the opposite relationship was expected, this could be because citizens do not consider local governments to be primarily responsible for unemployment rates. Finally, the probability of re-election is higher for the largest municipalities. This result suggests that small municipalities are more critical of government actions than large municipalities

References

Aidt, T. and Mooney, G. (2014). Voting suffrage and the political budget cycle: Evidence from the London Metropolitan Boroughs 1902–1937. *Journal of Public Economics*, (doi: 10.1016/j.jpubeco.2014.01.003).

Aidt, T., Veiga, F., and Veiga, L. (2011). Election results and opportunistic policies: A new test of the rational political business cycle model. *Public Choice*, 148:21–44.

Akhmedov, A. and Zhuravskaya, E. (2004). Opportunistic political cycles: test in a young democracy setting. *The Quarterly Journal of Economics*, 119:1301–1338.

Alt, J. E. and Lassen, D. D. (2006). Fiscal transparency, political parties, and debt in OECD countries. *European Economic Review*, 50(6):1403–1439.

Arvate, P. R., Mendes, M., and Rocha, A. (2010). Are voters fiscal conservatives? Evidence from Brazilian municipal elections. *Estudos Econômicos (São Paulo)*, 40(1):67–101.

Ashworth, J., Geys, B., and Heyndels, B. (2005). Government weakness and local public debt development in Flemish municipalities. *International Tax and Public Finance*, 12(4):395–422.

Balaguer, M. T. and Brun, M. I. (2013). El efecto del gasto público sobre las posibilidades de reelección de los gobiernos locales. *Revista de Contabilidad*, 16(1):74–80.

Benito, B., Bastida, F., and Múñoz, M. (2010). Factores explicativos de la presión fiscal municipal. *Revista de Contabilidad*, 13(2):239–283.

Bercoff, J. J. and Meloni, O. (2009). Federal budget allocation in an emergent democracy: evidence from Argentina. *Economics of Governance*, 10(1):65–83.

Binet, M. E. and Pentecôte, J. S. (2004). Tax degression and the political budget cycle in French municipalities. *Applied Economics Letters*, 11(14):905–908.

Block, S. A. (2002). Political business cycles, democratization, and economic reform: the case of Africa. *Journal of Development Economics*, 67(1):205–228.

Bosch, N. and Solé-Ollé, A. (2007). Yardstick competition and the political costs of raising taxes: An empirical analysis of spanish municipalities. *International Tax and Public Finance*, 14(1):71–92.

Boyne, G. A., James, O., John, P., and Petrovsky, N. (2009). Democracy and government performance: Holding incumbents accountable in English local governments. *The Journal of Politics*, 71(4):1273–1284.

Brender, A. (2003). The effect of fiscal performance on local government election results in Israel: 1989–1998. *Journal of Public Economics*, 87:2187–2205.

Brender, A. and Drazen, A. (2005). Political budget cycles in new versus established democracies. *Journal of Monetary Economics*, 52(7):1271–1295.

Brender, A. and Drazen, A. (2008). How do budget deficits and economic growth affect reelection prospects? Evidence from a large panel of countries. *American Economic Review*, 87:2203–2220.

Cassette, A. and Farvaque, E. (2013). Are Elections Debt Brakes? Evidence from French Municipalities. *Munich Personal RePEc Archive, Paper n. 48808*.

Cassette, A., Farvaque, E., and Héricourt, J. (2013). Two-round elections, one-round determinants? Evidence from the French municipal elections. *Public Choice*, 156:563–591.

Cerda, R. and Vergara, R. (2007). Business cycle and political election outcomes: Evidence from the Chilean democracy. *Public Choice*, 132:125–136.

Cerda, R. and Vergara, R. (2008). Government subsidies and presidential election outcomes: Evidence for a developing country. *World Development*, 36(11):2470–2488.

Dahlberg, M. and Mörk, E. (2011). Is there an election cycle in public employment? Separating time effects from election year effects. *CESifo Economic Studies*, 57(3):480–498.

De Haan, J., Moessen, W., and Volkerink, B. (1999). Budgetary procedures-aspects and changes: New evidence for some European countries. In Poterba, J. and Von Hagen, J., editors, *Fiscal institutions and fiscal performance*, pages 265–300. University of Chicago Press.

Drazen, A. and Eslava, M. (2010). Electoral manipulation via voter-friendly spending: Theory and evidence. *Journal of Development Economics*, 92:39–52.

Dubois, E. and Paty, S. (2010). Yardstick competition: which neighbours matter? *Annals of Regional Science*, 44(3):433–452.

Efthyvoulou, G. (2012). Political budget cycles in the European Union and the impact of political pressures. *Public Choice*, 153(3-4):295–327.

Eslava, M. (2005). Political budget cycles or voters as fiscal conservatives? Evidence from Colombia. *DOCUMENTOS CEDE 2005-12*.

Foremny, D. and Riedel, N. (2012). Business taxes and the electoral cycle. *Document de Treball, IEB 2012/3*.

Galli, E. and Rossi, S. P. S. (2002). Political budget cycles: the case of the Western German Länder. *Public Choice*, 110(3):283–303.

García Sánchez, I. M., Prado Lorenzo, J. M., and Cuadrado Ballesteros, B. (2011). Do progressive goverments undertake different debt burdens? Partisan vs. electoral cycles. *Revista de Contabilidad*, 14(1):29–57.

Gibson, J. (1988). Rate increases and local elections: a different approach and a different conclusion. *Policy & Politics*, 16(3):197–208.

González, M. (2002). Do changes in democracy affect the political budget cycle? Evidence from Mexico. *Review of Development Economics*, 6(2):204–224.

Green, P. (2001). *Complex Stochastic System*, chapter A Primer on Markov Chain Monte Carlo. Chapman and Hall/CRC.

Jones, M. P., Meloni, O., and Tommasi, M. (2012). Voters as fiscal liberals: Incentives and accountability in federal systems. *Economics & Politics*, 24(2):135–156.

Katsimi, M. and Sarantides, V. (2012). Do elections affect the composition of fiscal policy in developed, established democracies? *Public Choice*, 151(1):325–362.

Khemani, S. (2004). Political cycles in a developing economy: effect of elections in the indian states. *Journal of Development Economics*, 73(1):125–154.

Klomp, J. and De Haan, J. (2013). Do political budget cycles really exist? *Applied Economics*, 45(3):329–341.

Kneebone, R. D. and McKenzie, K. J. (2001). Electoral and partisan cycles in fiscal policy: An examination of Canadian provinces. *International Tax and Public Finance*, 8(5):753–774.

Kraemer, M. (1997). Electoral budget cycles in Latin America and the Caribbean: incidence, causes, and political futility. Working Paper 291, IDB.

Lago-Peñas, I. and Lago-Peñas, S. (2008). Explaining budgetary indiscipline: Evidence from Spanish municipalities. *Public Finance and Managament*, 8(1):36–69.

Lewis-Beck, M. S. and Paldam, M. (2000). Economic voting: an introduction. *Electoral Studies*, 19(2):113–121.

Lindbeck, A. (1976). Stabilization policies in open economics with endogenous politicians. *American Economic Review Papers and Proceedings*, 66:1–19.

Litschig, S. and Morrison, K. (2012). Government spending and re-election: quasi-experimental evidence from Brazilian municipalities. *Barcelona GSE Working Paper Series, WP n.515*.

Lunn, D. J., Thomas, A., Best, N., and Spiegelhalter, D. (2000). WinBUGS - A Bayesian modelling framework: Concepts, structure, and extensibility. *Statistics and Computing*, 10:325–337.

Martinussen, P. E. (2004). Government performance and political accountability at subnational level: The electoral fate of local incumbents in Norway. *Scandinavian Political Studies*, 27(3):227–259.

McCulloch, C. E. and Searle, S. R. (2001). *Generalized, Linear, and Mixed Models*. Wiley.

Meloni, O. (2001). Gobernadores y elecciones: ¿Es "negocio" ser austero? Evidencia a partir de datos de panel. *XXXVI Reunión Anual de la AAEP*.

Mourão, P. and Veiga, L. (2010). Elections, fiscal policy and fiscal illusion. *NIPE Working Paper 18/2010. Universidade do Minho*.

Nordhaus, W. (1975). The political business cycle. *Review of Economic Studies*, 42:169–190.

Paldam, M. (2004). Are vote and popularity functions econeconomic correct? In Rowley, C. and Schneider, F., editors, *The Encyclopedia of Public Choice*, pages 49–59. Norwell: Kluwer Academic.

Peltzman, S. (1992). Voters as fiscal conservatives. *Quarterly Journal of Economics*, 107(2):327–361.

Persson, T. and Tabellini, G. (2003). *The Economic Consequence of Constitutions*. MIT Press, MA.

Revelli, F. (2002). Local taxes, national politics and spatial interactions in English district election results. *European Journal of Political Economy*, 18(2):281–299.

Sakurai, S. N. and Menezes-Filho, N. (2011). Opportunistic and partisan election cycles in Brazil: new evidence at the municipal level. *Public Choice*, 148:233–247.

Sakurai, S. N. and Menezes-Filho, N. A. (2008). Fiscal policy and reelection in Brazilian municipalities. *Public Choice*, 137:301–314.

Schuknecht, L. (2000). Fiscal policy cycles and public expenditure in developing countries. *Public Choice*, 102(1):115–130.

Sedmihradská, L., Kubík, R., and Haas, J. (2011). Political business cycle in Czech municipalities. *Prague Economic Papers*, 2011:59–70.

Shi, M. and Svensson, J. (2003). Political budget cycles: a review of recent developments. *Nordic Journal of Political Economy*, 29(1):67–76.

Shi, M. and Svensson, J. (2006). Political budget cycles: Do they differ across countries and why? *Journal of public economics*, 90(8):1367–1389.

Solé-Ollé, A. and Sorribas-Navarro, P. (2008). Does partisan alignment affect the electoral reward of intergovernmental transfers? *CESifo Working Paper*, page n.2335.

Spiegelhalter, D., Best, N. G., Carlin, B. P., and van der Linde, A. (2002). Bayesian Measures of Model Complexity and Fit. *Journal of the Royal Statistical Society. Series B (Statistical Methodology)*, 64(4):583–639.

Sánchez Mier, M. (2011). Endeudamiento y ciclo político-presupuestario: aplicación a los municipios asturianos. *Presupuesto y Gasto Público*, 65:75–96.

Tufte, E. (1978). *Political Control of the Economy*. Princeton University Press, Princeton.

Veiga, F. J. and Veiga, L. G. (2004a). Popularity functions, partisan effects, and support in parliament. *Economics & Politics*, 16(1):101–115.

Veiga, F. J. and Veiga, L. G. (2004b). The determinants of vote intentions in Portugal. *Public Choice*, 113(3):341–364.

Veiga, L. G. and Veiga, F. J. (2007a). Does opportunism pay off? *Economics Letters*, 96:177–182.

Veiga, L. G. and Veiga, F. J. (2007b). Political business cycles at the municipal level. *Public Choice*, 131:45–64.

Veiga, L. G. and Veiga, F. J. (2013). Intergovernmental fiscal transfers as pork barrel. *Public Choice*, 155:335–353.

Vergne, C. (2009). Democracy, elections and allocation of public expenditures in developing countries. *European Journal of Political Economy*, 25(1):63–77.

Vicente, C., Benito, B., and Bastida, F. (2013). Transparency and political budget cycles at municipal level. *Swiss Political Science Review*, 19(2):139–156.

Vila i Vila, J. (2010). Endeudamiento, gastos de inversión, y ciclo político presupuestario en las haciendas locales. El caso de los ayuntamientos valencianos. In *XVII Encuentro de Economía Pública, Murcia*.

Table 1: Percentage of municipalities representing each Spanish region

Andalusia	17.79%
Aragon	3.84%
Asturias	0.82%
Balearic Islands	2.10%
Canary Islands	3.52%
Cantabria	2.33%
Castilla-La Mancha	8.96%
Castilla-León	8.23%
Catalonia	13.31%
Valencian Community	9.88%
Extremadura	5.99%
Galicia	11.02%
La Rioja	0.82%
Madrid	3.11%
Navarre	1.97%
Basque Country	5.17%
Region of Murcia	1.14%

Table 2: Definition of variables

Variables		Variable name	Definition
Budget variables	Expenditures	*totalex*	Average total expenditure per capita
		currex	Average total current expenditure[a] per capita
		*currex*1*per*	Average current expenditure[a] per capita in the first period
		*currex*2*per*	Average current expenditure[a] per capita in the second period
		capex	Average total capital expenditure[b] per capita
		*capex*1*per*	Average capital expenditure[b] per capita in the first period
		*capex*2*per*	Average capital expenditure[b] per capita in the second period
	Revenues	*tax*	Average tax revenues per capita
		grants	Average transfer revenues per capita
		debt	Average debt per capita
Political variables		*ideol*	Political ideology of the local government (1: right-wing party; 0: left-wing party)
		align	Ideological alignment of local government with central government (1: the ideology of the local government coincides with that of the central government; 0: otherwise)
		coal	Coalition in the local government (1: the local government is formed by coalition; 0: otherwise)
Socioeconomic variables		*unemp*	Average municipal unemployment rate
		log(*pop*)	Average of the logarithm of the municipal population

[a] Current expenditure is the sum of these budget items: personal expenditures, current goods and services expenditures, financial expenditures and current transfers.
[b] Capital expenditure is the sum of these budget items: investments and capital transfers.

Table 3: Covariates (budget and socioeconomic variables), summary statistics

	Budget variables										Socioeconomic variables	
	Expenditures							Revenues				
	totalex	*currex*	*capex*	*currex*1*per*	*currex*2*per*	*capex*1*per*	*capex*2*per*	*tax*	*grants*	*debt*	*unemp*	log(*pop*)
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
1st 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
3rd 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 4: DIC values for considered models

Model	DIC
1	4506.21
2	4481.49
3	4453.50

Table 5: 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
totalex	0.00022	0.00020	–0.00017	0.00009	0.00022	0.00036	0.00060
tax	0.00011	0.00032	-0.00049	-0.00010	0.00009	0.00032	0.00078
grants	0.00017	0.00029	–0.00041	–0.00002	0.00017	0.00037	0.00075
debt	–0.00098	0.00062	–0.00223	–0.00141	–0.00096	–0.00058	0.00021
unemp	0.00021	0.02524	–0.04830	–0.01670	0.00015	0.01765	0.04652
log(*pop*)	0.20164	0.03902	0.12870	0.17490	0.20010	0.22805	0.27688
ideol	0.31893	0.07849	0.17182	0.26235	0.31750	0.37270	0.47051
align	–0.12785	0.07539	–0.27408	–0.18027	–0.13010	–0.07729	0.02437
coal	–1.45182	0.08588	–1.61987	–1.51100	–1.45200	–1.39425	–1.27602
σ_b	0.38841	0.15152	0.08470	0.28617	0.40050	0.50327	0.65287

Table 6: Summary of posterior distributions in Model 2

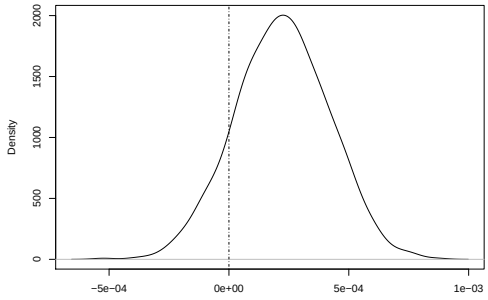
	Mean	sd	2.5%	25%	50%	75%	97.5%
Intercept	-0.54641	0.34760	-1.21690	-0.79365	-0.54970	-0.31415	0.11577
currex	–0.00055	0.00029	–0.00112	–0.00075	–0.00055	–0.00035	0.00005
capex	0.00129	0.00030	0.00071	0.00109	0.00130	0.00150	0.00187
tax	0.00041	0.00038	–0.00033	0.00015	0.00041	0.00067	0.00112
grants	–0.00008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

Table 7: Summary of posterior distributions in Model 3

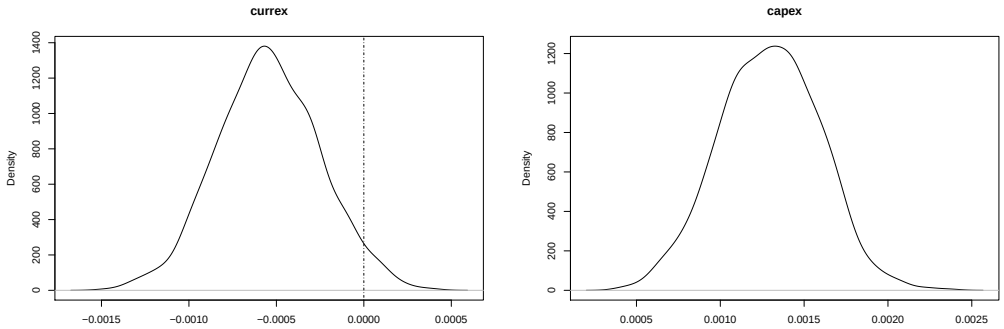
	Mean	sd	2.5%	25%	50%	75%	97.5%
Intercept	–0.58605	0.34922	–1.28380	–0.82322	–0.58805	–0.35430	0.08169
$currex1per$	–0.00234	0.00049	–0.00333	–0.00268	–0.00234	–0.00201	–0.00139
$currex2per$	0.00184	0.00051	0.00092	0.00149	0.00183	0.00216	0.00284
$capex1per$	0.00014	0.00023	–0.00030	–0.00001	0.00014	0.00029	0.00059
$capex2per$	0.00116	0.00024	0.00070	0.00100	0.00116	0.00133	0.00166
tax	0.00030	0.00039	–0.00043	0.00003	0.00028	0.00055	0.00112
$grants$	–0.00027	0.00032	–0.00088	–0.00048	–0.00028	–0.00007	0.00035
$debt$	–0.00142	0.00066	–0.00265	–0.00189	–0.00145	–0.00098	–0.00005
$unemp$	0.02006	0.02491	–0.02921	0.00305	0.02098	0.03772	0.06885
$\log(pop)$	0.25775	0.03990	0.18081	0.23310	0.25585	0.28315	0.33824
$ideol$	0.37021	0.07673	0.21644	0.31930	0.36935	0.42097	0.52458
$align$	–0.16043	0.07253	–0.30650	–0.20963	–0.16005	–0.11032	–0.02351
$coal$	–1.42261	0.08845	–1.60897	–1.47800	–1.42200	–1.36725	–1.25202
σ_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

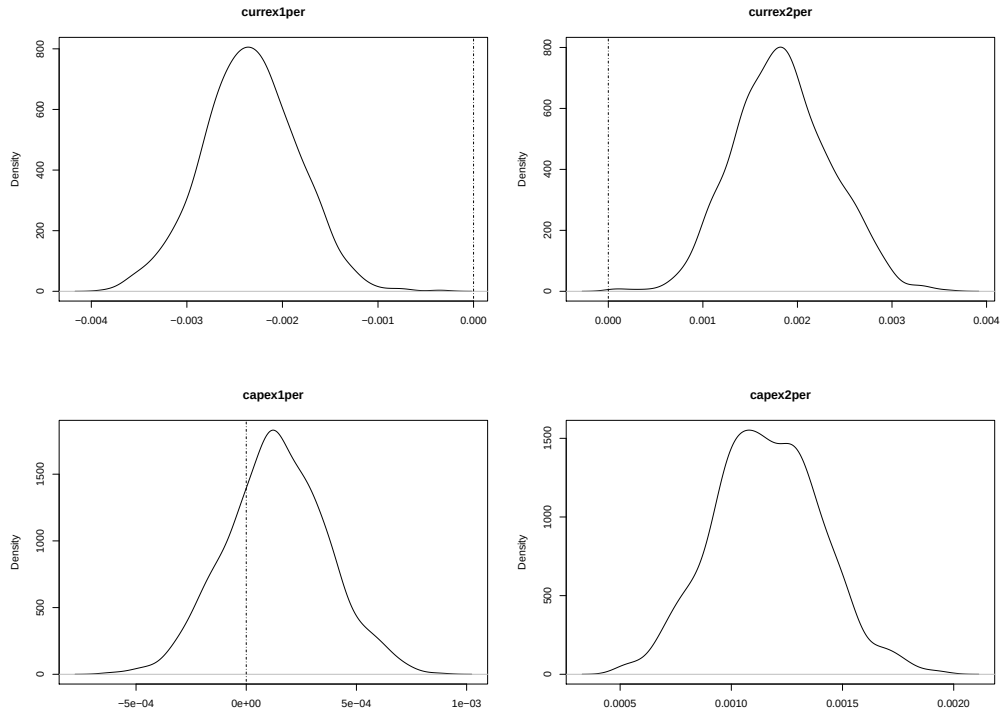


Figure 2: Posterior densities for covariates within each model