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THE EFFECTS OF PARTY COMPETITION ON BUDGET OUTCOMES: EMPIRICAL EVIDENCE FROM LOCAL GOVERNMENTS IN SPAIN[a]

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ABSTRACT: This paper investigates the link between local budget outcomes and the intensity of party competition, measured as the margin of victory obtained by the incumbent in the previous local election (i.e. the difference between the vote share and 50%). Two competing hypotheses are tested in the paper. On the one hand, the *Leviathan* government hypothesis suggests that the lower the intensity of party competition is, the greater is the increase in the size of the local public sector, irrespective of the ideology of the party in power. On the other hand, the *Partisan* government hypothesis suggests that the incumbent will find it easier to advance its platform when intensity of competition is low (i.e., parties on the left/right will increase/decrease the size of the local public sector when the intensity of the challenge from the opposition is low). These hypotheses are tested with information on spending, own revenues and deficit for more than 500 Spanish local governments over 8 years (1992-1999), and information on the results of two local electoral contests (1991 and 1995). The evidence favors the *Partisan* hypothesis over the *Leviathan* one.

Key words: Political competition, local government, spending, deficit.
JEL Classification: H71, H73.

RESUMEN: El trabajo investiga la relación entre diversas variables presupuestarias locales y el grado de competencia entre partidos, cuantificada a partir del margen electoral obtenido en las pasadas elecciones por el/los partidos en el gobierno local (i.e., la diferencia entre el porcentaje de votos y el 50%). El papel contrasta dos hipótesis alternativas. En primer lugar, la hipótesis del gobierno *Leviatán*, que sugiere que un menor grado de competencia entre partidos facilita el incremento en el tamaño del sector público local, con independencia de la ideología del partido en el poder. En segundo lugar, la hipótesis del gobierno *Partidista*, que sugiere que un menor grado de competencia entre partidos facilita la aplicación del programa electoral del gobierno (i.e., los partidos de izquierdas/derechas incrementarán/disminuirán el tamaño del sector público cuando la posibilidad de ser reemplazados por la oposición es reducida). Estas hipótesis son contrastadas con datos de gasto, ingresos propios y déficit de más de 500 gobiernos locales españoles durante 8 años (1992-1999), e información sobre los resultados de dos elecciones locales (1995 y 1999). La evidencia sugiere que la hipótesis *Partidista* es preferida a la hipótesis de gobierno *Leviatán*.

Palabras clave: Competencia política, gobierno local, gasto, déficit.
Clasificación JEL: H71, H73.

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1. Introduction

Party competition is central to guaranteeing the efficient working of representative democracies. When competition is strong, then the incumbent party is fearful of losing office and will deliver policies closer to the ones preferred by the electorate. Stronger competition will also force the challenger to modify its platform in the direction of voters' desires. This is, in fact, the prediction of Downs (1957) regarding party behavior in a representative democracy: the battle for electoral support will lead the parties to adopt policies that reflect the preferences of the median voter.

Not all the public choice literature, however, is equally optimistic about the ability of elections to constrain politicians' choices. On the one hand, the *Leviathan* hypothesis (Brennan and Buchanan, 1980) assumes that politicians are politically unconstrained agents aiming at maximizing power. On the other hand, Wittman (1989, 1995) argues that electoral competition is an effective way of ensuring that politicians' choices coincide with voters' preferences. However, formal research into political economy, incorporating the imperfections of the electoral process, suggests that neither of these two positions is wholly correct, since politicians always have some latitude for deviation from citizens' interests. This conclusion is based on both the results of electoral competition models analyzing the ex-ante incentives of politicians to propose platforms that are close to those preferred by the voters (Wittman 1983; Calvert, 1985; Myerson, 1993; Polo, 1998; Persson and Tabellini, 2000; Caplan, 2001), and political agency models focusing on the ex-post incentives of politicians (Barro, 1970; Ferejhon, 1986; Rogoff, 1990).

A good way of throwing some light on this debate is to measure the degree of party competition in real situations, to examine its effects on actual policy choices, and to identify those institutions that contribute most to enhancing it[1]. However, there is not a lot of accumulated empirical evidence to suggest that the intensity of party competition is important in practice. The first study to test the link between competition and sub-

[1] There are some recent political economy papers analyzing the effect of various institutions on accountability. See, for example, Besley and Case (1995) on the effect of term limits of state governors in the US, Persson and Tabellini (1997) on the effect of the separation of powers on political accountability, and Persson and Tabellini (2004) on the effects of different types of political systems on public finance.

national policy variation was by Dawson and Robinson (1963), who found only a weak effect of competition on welfare policies in the USA states. Other similar studies at the state level in the USA (Carmines, 1974; Jennings, 1979) and at the local level in the UK (Alt, 1971; Hoggart, 1985; and Boyne, 1994) had mixed results. Recently, some papers on the USA found that competition had effects on state spending, revenues and deficit (Rogers and Rogers, 2000; Caplan, 2001; Besley and Case, 2003).

This disparity of results may be due to the quality of data and econometric methods used, but also to the many difficulties that blur the effective implementation of this approach (Boyne, 1994). First of all, an appropriate concept of party competition is required. Then, measurements that are operative but strongly related to the concepts used are needed. Following Elkins (1974, p. 682), this paper takes the view that party competition implies that governments "will not be self perpetuating and that elections can, and in some cases do, lead to the replacement of one set of officials with another set. The chance, or probability, of turnover is perhaps the most salient feature of this system of accountability". Most of the empirical papers dealing with this issue use variables that try to measure this "probability of turnover". The percentage of votes or seats obtained by the incumbent in the most recent electoral contest (Rogers and Rogers, 2000; Besley and Case, 2003) or the incumbents' electoral margin of victory (Boyne, 1994; Caplan, 2001) are the most commonly used variables[2].

Second, one must have a model in mind in order to identify the proper hypothesis to test. For example, when discussing the positive link between spending growth and competition found in Rogers and Rogers (2000), Besley and Case (2003) point out that "there is no necessary theoretical link between the growth in the size of the government and intensity of competition – it seems just as likely that there would be tax cuts as expenditure increases". The theoretically-founded empirical analysis demanded by these authors has only been carried out by a few authors. The paper by Caplan (2001), who uses the insights provided by a *Leviathan* model with electoral constraints to develop his main hypothesis, is worth mentioning. According to this model, increased competition forces the government to reduce the size of the public sector. The political

[2] However, as various authors have noted, other dimensions of competition may be important, such as the volatility of party strength (Riley, 1971; Boyne, 1994).

science literature on this topic (see Boyne, 1994) is based on a *Partisan*–type model – although rarely formalized –, in which two parties with different ideologies compete for office. The hypothesis in this case is that increased competition does not have a direct effect on the size of the public sector, but only a mediatory effect. This means that left governments, which prefer a bigger public sector, increase spending and taxes in response to less competition, while right governments do the opposite. As we show below, this hypothesis can also be derived from a simple model of electoral competition between two parties that care about policy outcomes.

The purpose of this paper is to provide a new test of these two hypotheses, taking into account previous experience in the field and introducing some improvements. First, we use the insights of a simple model of probabilistic voting (Lindbeck and Weibull, 1987; Dixit and Londregan, 1998) to illustrate the effect of stiffer competition on spending, both in *Leviathan* and *Partisan*-type models. Second, we try to compute competition measurements in a meaningful way, justifying their relationship with the predictions of the theoretical model. Although the main results we provide use the incumbent's electoral margin as the main indicator of political competition, we also discuss results that use other indicators. Third, we provide a test for the two models mentioned in the previous paragraph, *Leviathan* and *Partisan*, and not just for one of them.

Fourth, we analyze the effects of electoral competition with a new data set. We use information from 8 years (1992-1999) on spending, own revenues and deficit for more than 500 Spanish local governments with over 5,000 inhabitants and information on the results of two local electoral contests (1991 and 1995). To our knowledge, this is the first test of this kind performed with data on local governments outside the USA or the UK. Moreover, most USA papers work with state data, and only the UK studies focus on local government. In addition, there are many particular features of Spanish local politics that make the analysis a little different to the USA one. For example, the numerous parties standing in local elections and the proportional representation system used mean that many local governments are coalitions. As we will explain in the next section, there are reasons for believing that coalitions and one-party governments react in different ways to competition. We take this into account in the empirical analysis, providing evidence on the link between competition and fiscal choices separately for one-party and coalition governments. The analysis of the link between political factors

and local budgeting is entirely new in Spain, where only a few papers have studied previously the effects of economic variables on local spending (see Bosch and Suárez, 1993; Solé-Ollé, 2001; and Bosch and Solé-Ollé, 2003). Of these, only the paper by Solé-Ollé (2001) included political factors in the equation. The author found little effect of ideology and government fragmentation on spending levels, due, probably, to the use of a single cross-section of data.

This paper is organized as follows. In the next section we sketch a theoretical framework that will help us work out the hypotheses to be tested in the empirical analysis. The third section puts forward the equations used to test these different hypotheses, provides a brief description of the local public sector and electoral system in Spain, describes the data set and the econometric procedure used to perform the empirical analysis, and gives the results obtained. The last section sets out the main conclusions of the paper.

2. Theoretical framework

In this section we sketch a simple theoretical framework that will help us to develop some testable hypotheses. We deal first with the predictions of the *Leviathan* model, and then with those of the *Partisan* model. In both cases, we use an electoral competition model to illustrate the effects of increased electoral competition on the size of the public sector. The model is a stylized version of the probabilistic voting model developed by Lindbeck and Weibull (1987) and Dixit and Londregan (1998). Similar models have been applied to the analysis of the determination of political rents by Polo (1998), Persson and Tabellini (2000) and Caplan (2001)[3]. Both in the *Leviathan* and *Partisan* models we have two parties competing for office in a plurality (winner-takes-all) election by making binding commitments in their platforms regarding the size of the public sector. We assume all the voters are identical and have preferences on the size of the public sector. Voters also have intrinsic preferences for one party: they vote for this party unless the difference between platforms is larger than their partisan bias. The

[3] Probabilistic voting models are user-friendly, in the sense that equilibrium conditions are well established. Similar conclusions regarding the effect of the degree of electoral competition on policy outcomes can be derived from more classical spatial voting models (Wittman, 1983; Calvert, 1985). But, as Roemer (1994, 1997) has shown, in this kind of model it is more difficult to prove that there is a single, stable equilibrium.

difference between the *Leviathan* and the *Partisan* model depends on the objective function of the parties: in the *Leviathan* case the parties maximize expected rents, whereas in the *Partisan* model they care about the policy implemented and thus maximize the expected value of the mandate.

We end this section with the discussion of some extensions of the basic *Leviathan* and *Partisan* models developed before. First, we discuss the possible extension of the hypothe-sis developed for the level of spending to the levels of taxation and deficit. Although the models developed assume that spending is financed entirely by taxes, in practice local governments in our sample also used deficit financing. Second, we discuss informally the effect of coalition governments on the link between political competition and budget outcomes. This extension is necessary, as nearly half the governments in our sample are coalitions.

2.1.Leviathan model

The basic *Leviathan* hypothesis (Brennan and Buchanan, 1980) assumes that politicians are power-maximizing agents and, as power and the size of the public sector are correla-ted, then their only purpose is to maximize the size of the public sector. In any case, the only limit on this behavior is the amount of revenue they can raise from the public. But both the political agency literature (Barro, 1970; Ferejhon, 1986; Rogoff, 1990; Besley and Case, 1995) and the literature on political competition (Caplan, 2001; Polo, 1998; Persson and Tabellini, 2000) suggest that electoral constraints may place an upper boundary on the activities of the *Leviathan*-type government. In this kind of model, politicians are still budget-maximizers but, as they also care about remaining in power, they must moderate spending and tax increase proposals in order to reap the benefits of being in power. In this section, we put forward a simple model of electoral competition between two parties, *R* and *L*, whose only aim is to win the elections in order to gain control of the rents associated with holding office. However, to maintain the original flavor of *Leviathan* models, we assume that these rents are related to the size of the public sector.

We model the voters as a continuum distributed along real numbers (with a mass of unity): a voter located at ε has an innate preference ε for party *R* over party *L*. To

simplify, we assume that the voters only differ in this aspect and otherwise have identical preferences and income. With quasi-linear preferences and assuming that public spending is financed entirely with taxes, we have:

(1) $$v(e) = \upsilon(y - e) + \mu(e)$$

where u denotes utility, y is income and e is spending on public services. Voters' optimum level of spending is defined by $v_e(e) = \mu_e - \upsilon_y = 0$. This optimal level of spending will serve us as the benchmark for comparing the spending level set by each party.

The two parties, *R* and *L*, compete for office in a plurality (winner-takes-all) election by making simultaneous binding commitments to electoral platforms e^R and e^L. Voters' utility will depend in the end on who prevails at the polls. A voter weighs the increased utility of consumption offered by party *L* against the innate preference for party *R*, voting for party *L* if the utility increase is enough: $v(e^L) - v(e^R) > \varepsilon$. Define the critical value or "cut-off point" by $\varepsilon_i = v(e^L) - v(e^R)$. Then all the voters with values ε lower than ε_i will vote for party *L*, and the rest for party *R*. We denote by $F(\bullet)$ the cumulative frequency distribution of voters over the range of ε, and by $f(\bullet)$ the density of this distribution. We assume that this distribution is symmetric and single-peaked with mean $\bar{\varepsilon}$; this mean should be understood as the average voters' preference for party *R*. Therefore, the proportion to the left of ε_i is $F(\varepsilon_i)$ and the proportion of votes for party *L* is:

(5) $$F\left(v(e^L) - v(e^R) - \bar{\varepsilon}\right)$$

Each of the parties derives utility from the rents obtained in office, composed of "ego" rents and *Leviathan* rents. Ego rents *r* are obtained by being in office and is not related to the size of the public sector; *Leviathan* rents $\gamma.e$ are modeled as depending on the size of the budget, with γ as an exogenous parameter. This assumption is consistent with the traditional *Leviathan* view that the power enjoyed by politicians is related to

the size of the budget. We assume that each of the parties maximizes expected rents, computed as the product of the proportion of the vote and rents. The objectives of parties *L* and *R* are:

(6a) $$F\left(v(e^L) - v(e^R) - \bar{\varepsilon}\right)(r + \gamma.e^L)$$

(6b) $$\left(1 - F\left(v(e^L) - v(e^R) - \bar{\varepsilon}\right)\right)(r + \gamma.e^R)$$

Each party chooses its strategy on the basis of its own budget constraint and taking the other party's strategy as given. It can be demonstrated that, whenever the distribution function satisfies certain properties, the simultaneous solution of this problem by the two parties forms a Nash equilibrium in which the platforms of the two parties have to be the same (Lindbeck and Weibull, 1987; Dixit and Londregan, 1998). The F.O.C. allows us to analyze the influence of the degree of political competition on the spending decisions taken by the parties. In the case of party *L* we have:

(7) $$f.v_e(e^L).(r + \gamma.e^L) + F.\gamma = 0$$

This expression states that the party trades off the possible loss in votes when raising taxes to finance spending (the first term) against the additional rents obtained in office (the second term). Votes lost when raising taxes are, in turn, the product of three terms. The first term is the proportion of voters that are indifferent at equilibrium, measured by the density of the distribution at this point. Since in equilibrium the platforms of both parties converge (i.e. $e^L = e^R$ and $v(e^L) = v(e^R)$), this density is just $f(-\bar{\varepsilon})$). The second term is the marginal utility of public spending in equilibrium $v_e(e^L)$; the third term is the value of rents if the party on the left wins office $(r + \gamma.e^L)$.

The first conclusion that can be derived from expression (7) is that, in equilibrium, the level of spending is too high. Note that if $\gamma = 0$, $v_e(e^L)$ must be zero for this condition to hold, which means that electoral competition ensures voter welfare is maximized.

However, if $\gamma > 0$ then $v_e(e_L)$ must be negative for this condition to hold, which means that the level of spending is higher than the voters' optimum.

The second conclusion that can be derived from (7) and that provides the basis for the hypothesis we aim to test in this paper is that an increase in the degree of electoral competition reduces the level of spending. This can be seen by that an increase in $f(-\bar{\varepsilon})$ reduces the level of spending chosen by the parties. This is because a higher $f(-\bar{\varepsilon})$ means that there are more voters who will change their vote in favor of party *R* after an additional increase in spending. A higher $f(-\bar{\varepsilon})$ increases the electoral costs of raising spending too much.

2.2.Partisan model

As in the *Leviathan* model we have two parties, *R* (right) and *L* (left), competing for office. We assume that the parties are directly motivated by policy outcomes, not by revenue. We assume that party *L* prefers a larger public sector than party *R*. Thus, the utility derived by the two parties can be written as:

(8a) $$v^L(e) = \upsilon(y - e) + \mu((1 + \alpha).e)$$

(8b) $$v^R(e) = \upsilon(y - e) + \mu((1 - \alpha).e)$$

where α is a positive parameter lower than one. Expression (8) indicates that the marginal utility of public spending is higher (lower) for the party on the left (right) than for the voters, since $v_e^L = \mu_e(1+\alpha) - \upsilon_c$ and $v_e^R = \mu_e(1-\alpha) - \upsilon_c$, and ensures that the level of spending preferred by the party on the left (right) is higher (lower) than the one preferred by the voters: $e^L > e > e^R$. Moreover, the specification in (8) guarantees that the position of the parties with respect to the voter is symmetrical: $e^L - e = e - e^R$.

The behavior of voters is the same as in the *Leviathan* model: they vote for the party that promises the spending level closest to its preferred level, provided that they do not have very strong ideological preferences for the other party. Parties also compete in a plurality election by making binding commitments to platforms. In this case, we assume that the objective of both parties is to maximize the expected utility derived from the policies enacted. The objectives of parties *L* and *R* can be expressed, respectively, by:

(9a) $$F(v(e^L) - v(e^R) - \bar{\varepsilon}).v^L(e^L) + (1 - F(v(e^L) - v(e^R) - \bar{\varepsilon})).v^L(e^R)$$

(9b) $$(1 - F(v(e^L) - v(e^R) - \bar{\varepsilon})).v^R(e^R) + F(v(e^L) - v(e^R) - \bar{\varepsilon}).v^R(e^L)$$

The parties maximize the utility of the preferred platform (weighted by how probable victory is) plus the utility of the alternative (weighted by how likely it is that the opposing party wins). The F.O.C of this problem are, for parties *L* and *R*, respectively:

(10a) $$f.v_e.(v^L(e^L) - v^L(e^R)) + F.v_e^L = 0$$

(10b) $$f.v_e.(v^R(e^R) - v^R(e^L)) + (1 - F).v_e^R = 0$$

In this case, the party trades off the probability of losing office due to an increase in the level of spending above the voter's optimum (first term, weighted by the difference in the platforms of both parties) against the utility that this increase provides to the party (second term). The second term is positive, so the first one should be negative. In the case of the party on the left (*L*) this happens if $e^L > e^R$ and $v_e < 0$. In the case of the party on the right (*R*) this happens if $e^L > e^R$ and $v_e > 0$. Therefore, in this case there is equilibrium with policy divergence, and the level of spending provided by the party on the left (right) is higher (lower) than the voter's optimum. Although in equilibrium the platforms of both parties are no longer the same (i.e. $e^L \neq e^R$), $v(e^L) = v(e^R)$ still holds due to the symmetry in the position of the parties, and the density in equilibrium is $f(-\bar{\varepsilon})$, as well.

Now look at the effect of an increase in $f(-\bar{\varepsilon})$ on the level of spending of each party. In the case of the left party, the only way to restore equilibrium in the F.O.C. when $f(-\bar{\varepsilon})$ is increased is by reducing the level of spending, in order to reduce the term $v(e^L) - v(e^R)$ in expression (10). In the case of the right party, when $f(-\bar{\varepsilon})$ is increased spending should also be increased, in order to reduce the term $v(e^R) - v(e^L)$. Therefore, an increase in the degree of electoral competition, measured by the proportion of voters that are indifferent between the two parties (i.e. by the density of voters in equilibrium), reduces (increases) the level of spending proposed by the party on the left (right). That is, when electoral competition increases, each party moves the level of spending away from its preferred level, approaching the spending level preferred by voters.

A final comment on the *Partisan* model: the partial convergence/divergence predic-tion of this model and the hypothesis that the level of spending is related to the level of electoral competition depends on the assumption of binding commitment for the electoral platforms put forward. If a party cannot commit itself to implementing, once in office, a spending level different from its optimum, then it will not gain any additional vote by moving towards the voters' desired level of spending. The conclusion of such a model without commitment (Persson and Tabellini, 2000) is that there will be full divergence: the parties will always implement their preferred levels of spending, irrespective of the degree of electoral competition. This is a variant of the *Partisan* hypothesis that will also be tested in the empirical analysis by looking at whether there are differences between the parties' budget policies that are not related to the level of competition.

2.3.Extensions

The models presented above are useful for our purposes, but are too simple to account for all the relevant features of government budgeting. In this section we briefly discuss the implications of two possible extensions of the analysis. First, we discuss the implications of electoral competition on the mix of taxation and deficit as sources of

finance. Second, we discuss the effect of coalition governments on the link between electoral competition and budget outcomes.

To introduce deficit into the model we need to use a two-period model as in Barro (1970), with spending financed by taxes and deficit in the first period and debt repayment with taxes in the second. To allow a trade-off between deficit and taxes to arise, we should allow for deadweight costs of taxation and introduce a discounting parameter in the model. As shown in Barro (1970), in this setting the voter combines taxes and deficit in order to minimize the excess burden of taxation. It can be shown that the optimal voters' mix of taxes and deficit is not distorted by the workings of electoral competition (Besley and Case, 1995). Therefore, both the *Leviathan* and *Partisan* models suggest that increased electoral competition affects the size of the public sector, but there is no assumption of any influence in the mix of taxes and deficit.

To hypothesize a different effect of competition on taxes and deficit, one needs to move to a different model. Perhaps an agency model with voters uninformed about the future consequences of deficit would suggest a different conclusion. For example, in such a setting one may find that increased competition forces, under a *Leviathan* model, parties to reduce taxes but that the parties continue to finance spending with deficit, i.e. increased competition forces *Leviathan*-model parties to reduce taxes and spending but to increase deficit.

These two models aim to represent political competition in two-party systems with one-party governments. In fact, operative theoretical models of multi-party competition are still to be developed. But, as will become clear in section three, many different parties compete in Spanish local elections and, as a result, nearly 40% of governments are coalitions. Are the predictions derived above equally valid for these coalitions as for one-party governments? Recent empirical work on the effects of coalition governments may help us clarify this issue. There are some papers that show that national coalition governments are less likely to be held accountable for economic performance (Powell and Whitten, 1993; Anderson, 1995). These authors found that vote losses caused by an economic downturn are lower for the members of a coalition than for parties governing alone. They suggest that this result is due to lower "clarity of responsibility"; i.e. the voter finds it difficult to assign concrete responsibility to each of the government

partners. For state tax politics in the United States, Alt *et al.* (1998) found that electoral losses caused by tax increases are lower with divided governments (i.e. when the legislative and the executive bodies are controlled by different parties).

This hypothesis means that, in our case, we could expect coalition governments to pursue the interests of voters less. In the *Leviathan* model, they will enact higher spending, tax and deficit increases than one-party governments at any level of political competition. In the case of the *Partisan* model, left coalitions will also increase the size of the public sector more than one-party left governments, whilst right coalitions will restrain spending, taxes and deficit more than other governments.

3. Empirical analysis

This section reports an empirical test of the hypotheses developed above. The test uses a panel of data for a set of Spanish local governments during the 1990s. We begin the section with a description of the empirical framework used. Then, to set the scene for the analysis, we briefly describe local budgeting and the local political system in Spain. We follow by describing how the political competition indicator operates, the way the other variables are computed, and the data sources and econometric techniques used. Finally, we report the results obtained.

3.1.Empirical framework

The departure point for our framework is the assumption that the party in government has a target level for each of the three fiscal variables analyzed: spending e^T, own revenues r^T and deficit d^T, all of them measured in per capita terms. The different models used to compute these targets give rise to each of the specifications presented below. We describe, in the first place, our base model, in which perfect political competition obliges the parties to select as its target the level of spending and own revenues preferred by the voter. Therefore, in the case of spending, we have: $e_{i,t}^T = e_{i,t}^V$, where $e_{i,t}^V$ is the target level of spending of the voter for the local government *i* and the year *t*. Following standard practice in local public demand literature (Inman, 1978) and

previous results for Spain (Bosch and Solé-Ollé, 2003), per capita expenditure desired by the voter can be represented as a linear function of its determinants:

$$(11) \qquad e_{i,t}^{V} = \alpha_1 y_{i,t} + \alpha_2 v_{i,t} + \alpha_3 t_{i,t} + \alpha_4 i_{i,t} + \alpha_5 p_{i,t} + \alpha_6 a_{i,t} + \alpha_7 po_{i,t} + \alpha_8 py_{i,t}$$

where $y_{i,t}$ is income per capita, $v_{i,t}$ is the property value per capita, $t_{i,t}$ are transfers per capita, $i_{i,t}$ are debt charges per capita, $p_{i,t}$ is population size, $a_{i,t}$ is land area per capita, and $po_{i,t}$ and $py_{i,t}$ are the proportions of old and young population.

Following the methodology proposed by Børge and Rattsø (1993) and Alt and Lowry (2000), we used a partial adjustment model to represent the dynamic behavior of budgetary decisions. Therefore, we assume that each year the local government increases each fiscal variable in proportion to the difference between the target and the lagged level. For example, the spending increase would be:

$$(12) \quad \Delta e_{i,t} = \alpha_{0,t} + \rho(e_{i,t}^{T} - e_{i,t-1}) + \varepsilon_{i,t} \quad \text{or} \quad e_{i,t} = \alpha_{0,t} + (1-\rho)e_{i,t-1} + \rho e_{i,t}^{T} + \varepsilon_{i,t}$$

where $e_{i,t-1}$ is the previous year's level of spending, ρ is the portion of the imbalance between target and past spending that will be corrected during this year, $\alpha_{0,t}$ is a constant term that we allow to be different in each year of the sample, and $\varepsilon_{i,t}$ is a well-behaved error term. Now, substituting (11) into (12), we obtain:

$$(13) \quad \begin{aligned} e_{i,t} &= \alpha_{0,t} + (1-\rho).e_{i,t-1} + \\ &\rho(\alpha_1 y_{i,t} + \alpha_2 v_{i,t} + \alpha_3 t_{i,t} + \alpha_4 i_{i,t} + \alpha_5 p_{i,t} + \alpha_6 a_{i,t} + \alpha_7 po_{i,t} + \alpha_8 py_{i,t}) + \varepsilon_{i,t} \end{aligned}$$

The estimation of this equation by a non-linear method (further details provided in the next section) will allow us not only to identify all the structural parameters of expression (8) and the adjustment parameter ρ, but also to obtain its standard errors. These structural parameters will tell us about the long-run effect of an increase in one of

these variables on the level of spending. The value of the adjustment parameter will tell us how many years will be needed to close the gap between target and past spending.

The *Leviathan* and *Partisan* models explained in the previous section can be easily embedded in this framework. In the *Leviathan* model, the government selects a target level for the budget variables that is higher than the one preferred by the voter. The distance between the party and the voter target depends on the degree of political competition. In the case of spending we have:

(14) $$e_{i,t}^{T} = e_{i,t}^{V} + \gamma_0 \omega_{i,t}$$

where $\omega_{i,t}$ is an indicator equal to zero when the level of competition is maximal, and positive and growing when the intensity of party competition decreases. The parameter γ_0 is expected to be positive. Expression (14) tells us that, when the level of political competition is maximal ($\omega_{i,t}$=0), the government's target level coincides with the level desired by the voter. However, for lower levels of political competition, the government's target level is higher than the voter's spending target.

In the case of the *Partisan* model, left (right) governments select a target level for these variables that are higher (lower) than the ones preferred by the voter, and this distance depends on the degree of political competition. Therefore, in the case of spending, this can be represented as:

(15) $$e_{i,t}^{T} = e_{i,t}^{V} + \left(\gamma_0 \Gamma_{i,t} + \gamma_1 (1 - \Gamma_{i,t})\right)\omega_{i,t}$$

where $\Gamma_{i,t}$=1 in the case of a left government and zero otherwise, and $(1-\Gamma_{i,t})$=1 in the case of a right government and zero otherwise. The parameters γ_0 and γ_1 are expected to be positive and negative, respectively. Therefore, expression (15) tells us that, when the level of political competition is maximal ($\omega_{i,t}$=0), the government's target level coincides with the level desired by the voter, irrespective of the party's ideology. However, for lower levels of political competition, the government's target level is

higher than the voter's spending target in the case of a left government and lower in the case of a right government.

The equations to be estimated to test the *Leviathan* and *Partisan* models are obtained after substituting into (12) expressions (14) and (15), respectively. In the *Leviathan* case, the equation is equivalent to (13) but with the competition indicator added. In the *Partisan* case, we add to (13) the competition indicator interacting with the left and right dummies. Recall from the previous section that this specification corresponds to a partisan model with commitment. When parties are not able to commit, there is complete platform divergence irrespective of the degree of political competition. In this case, the target level of the party is simply $e_{i,t}^{T} = e_{i,t}^{V} + \lambda_0 \Gamma_{i,t} + \lambda_1 (1 - \Gamma_{i,t})$, with λ_0>0 and λ_1<0. This hypothesis will be tested by adding the dummy $\Gamma_{i,t}$ in equation (12).

Up to now, we identify political competition with a situation in which the replacement of the party in government is quite possible. This will probably happen when the election is expected to be highly contested. As we explain in the next section, there are many ways to quantify this concept. We can advance that the main measurement of the degree of political competition is the electoral margin of the incumbent in the last election held. In this case, $\omega_{i,t}$ goes from zero (maximal competition) to 0.5 (no competition). However, in the real world, there may be some situations in which a contested election is not enough to make the incumbent feel that its fiscal policy may have electoral consequences. The efficacy of this connection requires also that the voters are able to determine who is ultimately responsible for the policy. As we explained in the previous section, this may be especially difficult in the case of a coalition government.

To account for "clarity of responsibility" in the *Leviathan* model, we amend expression (14) in the following way:

$$e_{i,t}^{T} = e_{i,t}^{V} + \left(\gamma_0 \mathrm{C}_{i,t} + \gamma_1 \mathrm{C}_{i,t} \omega_{i,t} + \gamma_2 (1 - \mathrm{C}_{i,t}) \omega_{i,t}\right) \tag{16}$$

where $C_{i,t} = 1$ in the case of a coalition and 0 in the case of a one-party government, and $(1 - C_{i,t}) = 1$ in the case of one-party government and 0 in the case of a coalition[4]. In the case of the *Partisan* model, we amend expression (15) in the following way[5]:

$$e_{i,t}^{T} = e_{i,t}^{V} + \left(\gamma_0 \mathrm{C}_{i,t} + \gamma_1 \Gamma_{i,t} \mathrm{C}_{i,t} \omega_{i,t} + \gamma_2 (1 - \Gamma_{i,t}) \mathrm{C}_{i,t} \omega_{i,t} + \right. \\ \left. + \gamma_3 \Gamma_{i,t} (1 - \mathrm{C}_{i,t}) \omega_{i,t} + \gamma_4 (1 - \Gamma_{i,t})(1 - \mathrm{C}_{i,t}) \omega_{i,t} \right) \tag{17}$$

3.2.Local budgeting and politics in Spain

Spain has over eight thousand local governments. Most are quite small (90% have less than 5,000 inhabitants and account for no more than 5% of the population). Local governments are multi-purpose governments, with major expenditure categories corresponding to the traditional responsibilities assigned to the local public sector (environmental services, urban planning, transport, welfare etc.), with the exception of education, which is a responsibility of the regional government. Local responsibilities increase with population size, which is recognized by the financing system in the form of higher per capita transfers and greater tax autonomy.

Own revenues account for nearly 60% of local non-financial revenues, current transfers – most of them unconditional – account for 30%, and the remaining 10% is covered by specific capital transfers. Two-thirds of own revenues come from five main taxes and the remaining one-third from various user charges. The main taxes are the property tax, the local business tax and the local motor vehicle tax, which account for 50%, 20% and 15% of tax revenues, respectively[6]. In the early years of the post-1977 democracy,

[4] According to the "clarity of responsibility" hypothesis we expect $\gamma_1 \geq \gamma_2 \geq 0$ and $\gamma_0 \geq 0$ to hold. When $\gamma_1 = \gamma_2$ and $\gamma_0 = 0$, expressions (14) and (16) are equivalent, and coalitions do not behave differently from one-party governments. When $\gamma_1 > \gamma_2$ and $\gamma_0 = 0$, a decrease in the level of political competition has a higher impact on the spending target in the case of a coalition. If $\gamma_0 > 0$ and $\gamma_1 = \gamma_2 = 0$, a coalition's effect on spending would not depend on the degree of political competition.

[5] In this case, the expectations are similar: $\gamma_0 \geq 0$, $\gamma_1 \geq \gamma_3 \geq 0$ and $\gamma_2 \leq \gamma_4 \leq 0$. That is, left (right) coalitions tend to spend more (less) than one-party left (right) governments and the impact of a decrease in competition is also higher for coalitions than for parties governing alone.

[6] The remaining tax revenues come from a tax on land value improvements, a tax on building activities and other minor taxes.

Spanish local governments did not have tax autonomy over these revenue sources. However, in the second half of the 1980s they were granted the power to set the tax rates of the various local taxes up to and above a threshold, and over completely harmonized tax bases. Minimum tax rates are the same for all local governments, but maximum tax rates increase with population size. The tax-setting capacity of Spanish local governments is considerable, since the bottom-top tax rate distance allows wide differences in taxes among local governments (from 200 to 300%, depending on the tax and population size). Spanish local governments also have autonomy in borrowing, subject to formal limits (e.g. debt charges lower than one quarter of current revenues) and, in some cases, authorization from higher layers of government. Deficit financing is not high on average, but varies enormously between local governments. It has fallen during the 1990s (see Table 1.A).

In Spain, local elections are held simultaneously in all local governments at regular periods (4 years). There is a single local district, closed lists, and the electoral system is a proportional one, using a D'Hondt formula with a minimum vote share of 5%. As Colomer (1995) states: "these rules provide incentives for sincere voting and promote a high degree of pluralism in city councils". There is a high proportion of coalition governments: 30.3% of the local governments in the sample were coalition governments during the period 1992-95, and this number increased to 43.3% in 1996-99 (see Table 1.B). There is concern in Spain about the problems, ranging from increased government instability to reduced accountability, caused by local coalition governments. In addition, most candidates are aligned along national party lines. The local political system is seen as a first step in the process of recruitment into the regional and national political elite (Magre, 1999). Therefore, with few exceptions, incumbents can be classified according to ideology. This becomes, in fact, more difficult in the case of small local governments, both because the proportion of independent candidates increases a lot and because even party labels are not meaningful in this context.

3.3.Data and econometrics

Sample and period

The link between political competition and budget outcomes is analyzed using information on more than 500 Spanish local governments with more than 5,000

inhabitants during the period 1992-99. More concretely, we work with data on 505 local governments, 45% of the Spanish local governments of this size. Of these, 250 local governments have more than 20,000 inhabitants, 91% of the local governments of this size. The remaining 255 local governments have less than 20,000 inhabitants and represent 30% of local governments in this group. This sample has been selected randomly by the Ministry of Finance and is, therefore, representative of the entire population. The budgetary data base of the Ministry of Finance (described below) provides us with further observations. The information on 104 localities was discarded because of problems in getting or analyzing their political data[7].

We chose the period 1992-1999 because of availability of data, since sound budgetary information for previous periods was not available. Nevertheless, this is probably the best period for analyzing budgetary behavior in Spain, since it was not until 1992 that the reforms introduced in the 1980s were completed by the introduction of the reformed local business tax.

Budgetary data

All budgetary data used in the analysis (i.e. spending, own revenues and deficit) come from a data base updated yearly by the Ministry of Finance by survey responses from all the big local governments and a selected sample of the smaller ones. The mean and standard deviation of these and the other economic variables used in the analysis are shown in Table1.A. Spending is computed as current and capital expenditure outlays, with the exception of interest payments. Own revenues are the sum of local taxes and user charges collected by the locality. Deficit is total spending (including interest payments) less own revenues and grants. The three dependent variables analyzed are computed in per capita terms, using annual population figures from the INE (National Institute of Statistics). These variables are expressed in real amounts, using a regional price index from the INE. This budgetary data base also provides us with the information needed to compute grant and debt charge variables.

[Tables 1.A and 1.B]

[7] Our database also provides information on a representative sample of local governmentslocal governments with a population under 5,000 inhabitants. We decided not to use this information because of the greater difficulty of assigning party labels to these local governments.

Political variables

To implement our testing methodology, we classify our local governments as left vs. right and coalition vs. one-party and then compute various indicators of political competition ($\omega_{i,t}$) in a meaningful way. The information on all the political variables used in the empirical analysis is shown in Table 1.B.

To classify our local governments by these characteristics, we used a data base provided by the Spanish Ministry of Public Administration, which gives information about the party of the mayor and the other parties in the local governments formed after the local elections of 1991 and 1995. The results of the 1991 election are used for the years 1992 to 1995 and the results of the 1995 election are used for 1996 to 1999. Then, using previous studies on the ideological positions of parties (Sotillos, 1996; Molas and Bartomeus, 1998), we give a ideological score that goes from -1 (left) to 1 (right) to each of the parties belonging to the local government[8]. The ideological score for the government team is the sum of the party scores, weighted by the seat share of this party in the government team, computed with information from the Spanish Ministry of Interior on the results of the local elections of 1991 and 1995. Then, a government is classified as leftist if the score is negative and as a rightist if the score is positive[9]. A government is classified as one-party if there is only one party in the local government, even if this party is governing as a minority[10], and as a coalition if there is more than one party in the government team.

[8] There are two different sets of parties standing in Spanish local elections. The first set contains the parties with a national scope: IU (former communists), PSOE (socialists), PP (rightists). The second set consists of the regional parties, which obviously differ from region to region. The national parties can easily be classified solely on the basis of ideology, and the scores used were: IU= -0.75, PSOE= -0.5 and PP= 0.5. In the case of regional parties, there is also a regional dimension, but we only took the ideological dimension into consideration. For example, in the region of Catalonia, there are two of these parties, CiU (right, with a score of 0.25) and ERC (left, with a score of -0.25). Information on other regions is available from the author.

[9] We also ran some estimations with a more detailed breakdown (leftist, moderately leftist, moderately rightist and rightist), but the results did not change qualitatively.

[10] We also did some additional analyses to check whether the behavior of minority governments resembles most that of one-party or coalition governments. We find they behaved virtually the same as majority governments. The results are available from the author.

There are various ways to measure the concept of political competition ($\omega_{i,t}$). One common measurement of competition is the electoral margin obtained by the incumbent at the previous election (Tucker, 1982; Boyne, 1994). This measurement is consistent with the way used to account for electoral competition in the theoretical models of section two. In fact, if the density function f is symmetric and single-peaked, it can be shown that the density at the "cut-off point" $f(-\bar{\varepsilon})$ increases as the margin of victory decreases[11]. This margin can be computed as the difference in absolute value between the incumbents' vote or seat share and 50%. We computed this with the results of the local elections of 1991 and 1995 and with vote and seat information. It is not totally clear which of the two measurements, votes or seats, is better. In proportional representation systems both correlate closely, but in plurality systems there might be a substantial gap between the two (Strom, 1989). In our case, although the electoral system is not entirely proportional, both measurements are practically identical (the correlation coefficient is 0.985) and the results obtained are virtually the same. Therefore, we will only report one set of results, those using the electoral margin computed with vote information.

However, as Riley (1971) and Boyne (1994) argue, the electoral margin or closeness of the preceding election may not always correlate with the probability of change in party control. Occasionally, a narrow electoral margin (e.g. 5%) may make the incumbent feel very safe, if he/she knows that vote shifts from one party to the other are not common. In other situations, however, a higher margin (e.g. 20%) may not be enough to feel safe if there is a high proportion of voters that swing easily from one party to the other. Therefore, we computed a second measurement of political competition: the standard deviation of the incumbents' vote share in the four elections for which we have the data required: 1987, 1991, 1995 and 1999. The data on the 1987 and 1999 elections come from the same source as the others. Unfortunately, as this second measurement correlates closely with the electoral margin, the calculation of the equation including both variables at the same time becomes difficult. To overcome this problem, we follow Ansolabehere and Snyder (2003) and use a third indicator of political competition, the ratio between the standard deviation and electoral margin. This composite indicator is

[11] This argument has also been used to select the electoral margin as the appropriate variable in tests of the probabilistic voting model applied to the distribution of funds across districts (Case, 2001; and Dalhberg and Johanssen, 2003).

related positively to party competition: competition increases when there is more volatility in voter patterns and decreases when the preceding election was closer.

Control variables

As is clear from expression (13), we include many control variables in the calculation of the effects of political competition. First, we include a measurement of income per capita ($y_{i,t}$), obtained from a study made by a financial institution ("Anuario Económico de España", La Caixa).[12] Second, we include property value per capita as a measurement of local capacity to raise revenue through the property tax ($v_{i,t}$). This is the main local tax in Spain, accounting for nearly half of tax revenue. Previous empirical analyses have shown that assessed property value per head is useful in explaining the variation in local spending per head (Solé-Ollé, 2001; Bosch and Solé-Ollé, 2003)[13].

Assessed property value per head is, because of property reassessment delays, a rough proxy of property tax revenue capacity[14]. This means that assessed values per head in two local governments will only be strictly comparable if reassessment has been carried out the same year[15]. Therefore, two local governments, one with a reassessment delay

[12] Local income is an estimate made from basic economic activity indicators, such as the number of telephones, number of bank offices, number of cars, etc.. This estimate is the so-called *market-share* ("Cuota de Mercado") and is presented as a share over the Spanish total. For ease of comparison with the other variables, we multiplied this share by Spanish real GDP and then we divided this number by the population of the locality.

[13] The inclusion of this variable in our equation can also be justified theoretically. For example, Solé-Ollé (2001) obtains a specification in which the size of local tax bases corrects for tax-exporting effects.

[14] In Spain, property tax assessments are the responsibility of a central agency ("Centro de Gestión Catastral y Cooperación Tributaria"), so in principle reassessment delays do not occur because of lack of coordination among local governments. However, because of the huge number of local governmentslocal governments (nearly 8,000) and popular opposition to generalised reassessment campaigns at the beginning of the 90's, delays in some local governmentslocal governments can reach ten years or more. In addition to this, even without differential delays, as reassessments are not carried out the same year in all local governmentslocal governments, assessed values for reassessed and non-reassessed local governmentslocal governments are never strictly comparable.

[15] In fact, casual observation reveals that nominal property tax rates tend to drop suddenly after a reassessment (although effective rates tend to rise) and then are raised again to keep revenue growing. After some time it becomes difficult to raise the tax rates again and a new reassessment is needed. There have been many attempts to explain this in the literature. Some authors consider that an explanation can be found in voter fiscal illusion (Bloom and Ladd, 1982), whereas others (Strumpf, 2001) have argued that voter behavior may be purely rational. In this paper, however, we are less interested in the theoretical foundations of the approach than in its ability to fit the data.

and the other recently reassessed, could raise the same revenue: one with a high base and a low rate, and the other with a low base and a high rate. To control this, we added to the regression interactions between the property value per head a set of dummies indicating the number of years since the last reassessment. We used three of these dummies, which take the value of one in a reassessment year ($A0_{i,t}$), if the assessment lag is longer than five years ($A5_{i,t}$), and if it is longer than ten years ($A10_{i,t}$). Assessed property and number of years since reassessment come from a publication by the central assessment office ("Impuesto sobre Bienes Inmuebles. Bienes de Naturaleza Urbana").

Third, we included two variables that measure the amount of inter-governmental transfers received from the central government. The first variable is the level of current transfers per head ($gc_{i,t}$), which includes the main unconditional transfer received from the central government ("Participación en los Ingresos del Estado") and other minor transfers, and the second one is the level of capital transfers per head ($gk_{i,t}$). As capital grants usually require the addition of local resources, we expect this kind of transfer to have a higher impact on spending than the first one. Fourth, we include a measurement of the debt charges per capita of the locality ($i_{i,t}$), computed as the sum of annual interest payments on debt. This variable aims to capture the effects on budgeting of a high previous debt level. Due to concerns about the possible endogeneity of this variable, we experimented both with its current and lagged values. As the results were virtually interchangeable, we opted for the current value estimation. The information on transfers and debt charges comes from the Ministry of Finance data base mentioned at the beginning of the section.

Fifth, we included a set of dummies to account for the effects of population size. These dummies take the value of one if population is higher than 10,000 inhabitants ($p10_{i,t}$), higher than 20,000 ($p20_{i,t}$) or higher than 50,000 ($p50_{i,t}$). The coefficients of these variables measure the impact on spending of passing each threshold. These dummies are supposed to account for both scale economies and/or congestion costs, as well as (and mainly) the spending responsibilities and tax autonomy of Spanish local governments (Bosch and Solé-Ollé, 2003), which jump precisely at these thresholds. We experimented with population introduced alone, with the inverse of population and with

population and population squared, but the dummies fitted the data better. Sixth, we included some other variables to measure need and/or cost differences across local governments: urban land area per capita ($a_{i,t}$), and the shares of old ($po_{i,t}$) and young ($py_{i,t}$) population. The first variable comes from the same data base as property values, and the other ones, such as population divisions, from the INE data base.

Econometric issues

Several econometric aspects merit further attention before calculating the equations. First, equation (13) can be estimated by Ordinary Least Squares. Here, the long-run parameters are identified by dividing the estimated coefficients by the adjustment parameter, equal to one less the coefficient on the lagged dependent variable. However, it would be better to calculate each equation by a non-linear method, in order to obtain the standard errors of the long-run coefficients of the model. Therefore, we estimated each equation by Non-Linear Least Squares. We used as starting values the long-run parameters identified from the Ordinary Least Squares calculation. The values of the long-run parameters obtained from the two methods are virtually the same; the conclusions regarding the validity of the hypothesis we test are also the same. The only advantage of the non-linear method is that long-run parameters can be shown with their standard errors.

Second, because of budget constraint, the error terms of the three equations (spending, own revenues and deficit) correlate, making simultaneous calculation of the three equations more efficient. Therefore, we also calculated the three equations as a system by Full Information Maximum Likelihood (see Alt and Lowry, 2000; Børge and Rattsø, 1993, for similar procedures)[16]. The results (size and sign of the main coefficients of interest) were qualitatively similar to those obtained equation by equation, although the standard errors were lower. As we appraised the validity of the different hypotheses with the simpler procedure, we decided not to give these other results in the paper. They are available from the authors on request.

[16] We repeated the procedure three times, treating as the residual category the deficit, spending and own revenues, respectively. The equation of the residual category is determined by the budget constraint and the equations of the other two categories. The three calculations produce very similar results.

Third, note that our specification includes time effects but not individual effects. The reason why individual effects were excluded from the panel calculation is the reduced variance range of the political competition variables. For example, note that the margin of victory was computed with data from the preceding election. This means that its value does not change until the following election. A dynamic model with individual effect should have been estimated by GMM methods (Arellano and Bond, 1991) after first-differencing all the series. This would have implied that the only source of variation in political variables would have been the change occurring between the final year of a mandate and the first year of the following one. We consider that it is not very appropriate to rely only on this source of variation to identify the effects of political competition. Moreover, the other measurement of political competition, the standard deviation of the vote share, shows no time series variation, so it could not be used in a model with individual effects. Nevertheless, omitted heterogeneity may be a problem in our equation. This is why we included a large number of controls in the equation; results show that they reproduce the budgetary behavior of Spanish local governments well. Moreover, the coefficients of income, grants, property value and population are very similar to those obtained previously by other authors using fixed-effects techniques (Bosch and Solé-Ollé, 2003). We also experimented with different sets of regional effects (i.e. 50 provinces and 17 regions), but none of them had explanatory power once we introduced all the control variables.

3.4.Results

The basic results of the equations for spending, own revenues and deficit are given in Tables 2, 3 and 4. The results obtained when allowing for the different responses of coalition and one-party governments are shown in Table 5. All these results used the variable electoral margin ($\omega_{i,t}$) as a measurement of the intensity of party competition. In Tables 2, 3 and 4, column *a* gives the results of the *Leviathan* model and column *b* the results of the *Partisan* model with platform commitment. The only difference between the two specifications can be appreciated in the top panel of the tables: in the first case, the variable electoral margin interacts with the left and right dummies, whereas in the second case the electoral margin enters the equation alone, without interaction. Column *c* shows the results of the *Partisan* model without commitment,

including only a left dummy[17]; and column *d*, the results of a mixed specification, including both electoral margin and the left dummy. This latter specification does not derive directly from the models introduced in section two, but is given to provide results comparable to previous analyses (Caplan, 2001). We will discuss first the results of the political variables, and then we will summarize the main results of control variables.

Political variables

The results of Tables 2, 3 and 4 confirm the superiority of the *Partisan* model (with commitment) over the *Leviathan* one. The results of the *Leviathan* model (column *a*) suggest that increased electoral margin facilitates tax increases, and that the new revenues raised will be used to reduce the deficit and raise expenditure. However, the electoral margin is statistically significant at 95% only in the own revenue equation; its coefficient in the deficit equation is statistically significant at 90%; the coefficient is not significant in the spending equation. These results do not coincide with the predictions we made for the *Leviathan* model in section two.

[Tables 2 and 3]

Although we could try to find a rationale to justify this inconsistency with the *Leviathan* model, an inspection of results suggests that the *Partisan* model performs much better. When the electoral margin is allowed to interact with the left and right dummies, all the coefficients become statistically significant and the explanatory capacity of the model rises. Moreover, the size of the coefficients increases enormously, and the electoral margin has a positive effect on spending, own revenues and deficit only in the case of left governments. Conversely, right governments tend to decrease these three budget items when the electoral margin increases. The size of the responses of right and left governments is fairly similar in absolute value. For example, the values of the coefficients obtained mean that, when the electoral margin increases to 10%, a left government increases its target spending ($e^{T}_{i,t}$) by roughly 17-18 Euros. On average sample spending, this means an increase of about 2%. This spending increase is

[17] Remember that in the *Partisan* model with commitment, the effect of ideology interacts with the degree of electoral competition, while in the model without commitment the effect of ideology is independent of electoral competition.

financed by an increase in own revenues and deficit of about 16-17 Euros and 1.5-2 Euros, respectively. Using average sample own revenues and deficit, this means increases of about 6-7% and 50%-60% in own revenues and deficit, respectively.[18]

Note that the results of Tables 2, 3 and 4 suggest that the *Partisan* model with commitment is also preferable to the Partisan model without commitment (column *c*). The results of this latter model are also consistent: parties on the left spend, tax and use deficit financing more than parties on the right. However, when we allow the ideological dummies to interact with the electoral margin, the model gains in explanatory capacity and the standard errors of the political variables decrease. The reason for this is that the pure ideological difference between parties (in column *c*) captures quite well part of the variance captured by the interactions between ideology and margin (in column *b*). Therefore, the conclusion is that, although the model in column *c* is able to explain part of the story, the model in column *b* offers a better explanation. Therefore, at least in our sample, governments are *Partisan*, in the sense that they pursue different platforms, but are conditioned by voter preferences, at least when the electoral margin is narrow[19].

As the results of Table 5 also favor the *Partisan* over the *Leviathan* model, we only discuss here the results of the *Partisan* model (columns *a*, *c* and *e*). The results of Table 5 suggest that coalitions tend to spend and tax more than one-party governments, and also tend to use more deficit financing. For example, a left one-party government will raise spending by 16 Euros in response to a 10% increase in electoral margin, while a left coalition would increase spending by 23 Euros in the same situation. The different reactions of one-party governments and coalitions to an increase in electoral margin are also true for own revenues and deficits. Another interesting result of Table 5 is that coalition governments tend to spend, to tax and to use deficit more than one-party

[18] Note that these are long-run effects. Since the adjustment to the target is slow, the party may need various years to implement these increases.

[19] The results of column *d* do not alter this conclusion; the left dummy is still statistically significant here, and the results of the electoral margin are similar to those in column *a*.

governments even when the electoral margin is zero. If this is the case, a coalition will spend 20 Euros more, tax 14 Euros more and incur 4-5 Euros more deficit[20].

Although these results employed the electoral margin as a measurement of electoral competition, they are robust to the use of the other measurements of competition. The results are virtually unchanged when electoral margin is computed with seat shares instead of vote shares. The results obtained when using the ratio between the standard deviation of the vote share in all elections and the electoral margin in the most recent election is also very similar. In this case too the *Partisan* model is favored over the *Leviathan* one, and left (right) governments spend, tax and use more deficit financing when party competition decreases (increases).

Control variables

Confidence in these results increases after checks show that the explanatory capacity of the model is quite high, with an R^2 of around 0.8-0.9 in the spending and own revenues equations and around 0.4 in the deficit equation. The signs and size of the coefficients of the control variables are also as expected, and most of them are statistically significant.

An increase in current grants has a positive effect on spending and a negative effect on taxes and deficit. However, the size of the coefficient in the spending equation is very high (and the one in the own revenues equation is very low) and much higher than the size of the income or property value variables. This means that in the Spanish case grants tend to translate disproportionately to spending, suggesting a persistent "flypaper effect". This result was obtained previously by other authors (Solé-Ollé, 2001; Bosch and Solé-Ollé, 2003), who attribute it to institutional factors such as the existence of minimum compulsory tax rates for all local taxes. An increase in capital grants causes an increase in spending higher than the amount of the transfer, meaning that own revenues and deficit also have to increase. This result can be explained by the additionality requirement that accompanies most capital grants.

[20] These results are also clearly seen in Tables 2, 3 and 4, since we also included a different constant for government coalitions.

Property value per capita has a positive impact on spending and own revenues and a negative effect on deficit. The impact of property values depends on the number of years since the last property assessment. For example, an increase of 100 euros in property value causes an increase of 1.1 euros in own revenues if the assessment delay is less than five years (coefficient of $v_{i,t}$), but the impact is only 0.8 euros in the assessment year itself (coefficient of $v_{i,t}$ + coefficient of $v_{i,t}\times A0_{i,t}$), 0.15 if the assessment delay is between five and ten years (coefficient of $v_{i,t}$ + coefficient of $v_{i,t}\times A5_{i,t}$), and 0.17 if the assessment delay is higher than ten years (coefficient of $v_{i,t}$ + coefficient of $v_{i,t}\times A5_t$ + coefficient of $v_{i,t}\times A10_{i,t}$). These results were as expected and are in line with those of Bosch and Solé-Ollé (2003).

Of the remaining variables, lagged debt charges are also as expected: they reduce the level of spending and increase own revenues and deficit. The population dummies indicate that spending jumps 17 euros at the 10,000-inhabitant threshold, and 21 euros at the 20,000 threshold (Table 2, column 2.b), and that the first jump is financed half by own revenues and half by deficit, while the second jump is financed only by own revenues. There seems also to be a little jump at the 50,000 threshold, but the coefficients are not statistically significant at conventional levels. These results are consistent with those of Bosch and Solé-Ollé (2003), who found sharp growth in per capita spending between local governments of 5,000 and 20,000 inhabitants. Finally, land area and old and young population shares were as expected, but only the coefficient of the old population share is statistically significant: an increase in old population implies lower spending and taxes and higher deficits.

4. Conclusions

This paper analyzes the link between the intensity of party competition and several budget outcomes (i.e. spending, own revenues and deficit). Two different models for explaining this link were tested: the *Leviathan* model, which predicts that increased competition will reduce spending, taxes and deficit, and the *Partisan* model, which predicts that increased competition will reduce these items for left governments and increase them for right governments. The empirical results favored the *Partisan* as the model that explains better the phenomenon under study. We found that when the

electoral margin of the incumbent at the preceding election increased, left governments increased substantially the level of spending, own revenues and deficit, and right governments decreased these items. We also found that coalitions react more to increased electoral margins than one-party governments and tend to have higher levels of spending, taxes and deficit than one-party majorities even when competition is extreme (i.e. when the electoral margin is zero). This confirms the "clarity of responsibility" hypothesis advanced in section two: coalitions can pursue their own interest with a lower level of electoral risk because voters are less able to hold each partner in the coalition accountable.

These results suggest that the effectiveness of fiscal control through the ballot box is far from complete and varies enormously across local governments. The incentives to keep spending, taxes and deficit at the levels desired by the voters depend ultimately on the electoral margin facing the incumbent, which varies substantially across local governments. Therefore, one cannot be entirely optimistic about the workings of a representative democracy such as the one analyzed in this paper.

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Table 1.A. *Descriptive statistics. Economic variables, periods* 1992-95 *to* 1996-99.

Variable	1992-95		1996-99	
	Mean	*St. Dev.*	*Mean*	*St. Dev.*
Spending: $e_{i,t}$	372.71	141.23	482.49	190.56
Own revenues: $r_{i,t}$	240.92	162.05	292.09	162.05
Deficit: $d_{i,t}$	4.08	25.01	1.88	13.54
Current grants per capita: $gc_{i,t}$	117.63	36.69	151.14	151.14
Capital grants per capita: $gk_{i,t}$	39.70	41.30	51.52	51.52
Property value per capita: $v_{i,t}$	11,739	9,671	14,321	14,321
Property value × *assess. year*: $v_{i,t} \times \mathrm{A0}_t$	17,670	15,263	19,925	19,925
Property value × *5-year assess.*: $v_{i,t} \times \mathrm{A5}_t$	10,626	8,210	12,184	12,184
Property value × 10*-year assess.*: $v_{i,t} \times \mathrm{A10}_t$	7,055	6,364	11,581	11,581
Income per capita: $y_{i,t}$	11,625	9,671	11,890	2,131
Debt charges: $i_{i,t}$	28.92	32.21	14.04	12.01
Land area per capita: $a_{i,t}$	7.04	6.03	6.57	5.06
Share old population: $po_{i,t}$	13.21	4.32	15.53	4.72
Share young population: $py_{i,t}$	21.90	11.77	17.64	3.05

Notes: budgetary variables, property value and income measured in euros; population shares in %.

Table 1.B. *Descriptive statistics. Political variables, periods* 1992-95 and 1996-99.

Variable	1992-95	1996-99
Sum		
left: $\Gamma_{i,k}$	68.90	54.72
right: $(1-\Gamma_{i,k})$	31.10	45.38
One-party: $(1-C_{i,k})$	69.74	56.75
coalition: $C_{I,k}$	30.36	43.35
Mean		
margin: $\omega_{I,k}$	9.01	11.02
standard deviation : $s_{i,k}$	13.45	13.45
ratio standard deviation- margin: $s_{i,k}/\omega_{i,k}$	1.471	1.376
Standard deviation		
margin: $\omega_{I,k}$	9.15	12.58
standard deviation : $s_{i,k}$	16.79	16.79
ratio standard deviation- margin: $s_{i,k}/\omega_{i,k}$	1.745	1.962

Note: all variables measured in %.

Table 2*:*

Partisan vs. Leviathan models of local politics: Spending

n° obs.= 3,550 (*N* = 550*, T*=7); *Non-Linear Least Squares estimation*

	Leviathan	*Partisan*		*Mixed*
Variable	(2.a)	(2.b)	(2.c)	(2.d)
i) *Political variables* (*long-run coefficients*)				
Margin: $\omega_{i,k}$	0.576 (1.547)	--.--	--.--	0.354 (1.464)
Margin × *left*: $\omega_{i,k} \times \Gamma_{i,k}$	--.--	1.759 (2.698)***	--.--	--.--
Margin × *right*: $\omega_{i,k} \times (1-\Gamma_{i,k})$	--.--	-1.659 (2.465)***	--.--	--.--
left: $\Gamma_{i,k}$	--.--	--.--	0.407 (2.004)**	0.351 (1.854)*
Coalition: $C_{i,k}$	0.149 (2.694)***	0.223 (2.754)***	0.159 (2.510)***	0.185 (2.650)***
ii) *Voter demand variables* (*long-run coefficients*)				
Current grants per capita : $gc_{i,t}$	0.789 (7.665)***	0.756 (7.591)***	0.757 (7.236)***	0.768 (7.341)***
Capital grants per capita : $gk_{i,t}$	1.101 (2.654)***	1.025 (2.698)***	1.014 (2.551)***	1.014 (2.547)***
Property value per capita: $v_{i,t}$	0.011 (8.647)***	0.009 (8.231)***	0.009 (8.220)***	0.010 (9.014)***
Property value × *assess. Year*: $v_{i,t} \times A0_t$	-0.002 (-2.652)***	-0.002 (-2.741)***	-0.002 (-2.714)***	-0.002 (-2.641)***
Property value × *5-year assess.*: $v_{i,t} \times A5_t$	0.003 (3.597)***	0.003 (3.264)***	0.003 (3.364)***	0.003 (3.510)***
Property value × 10-*year assess.*: $v_{i,t} \times A10_t$	0.004 (6.221)***	0.004 (6.201)***	0.004 (6.211)***	0.004 (6.321)***
Income per capita: $y_{i,t}$	0.006 (3.104)***	0.006 (3.124)***	0.006 (3.004)***	0.006 (3.214)***
debt charges: $i_{i,t}$	-0.610 (-4.741)***	-0.622 (-4.289)***	-0.625 (-4.130)***	-0.600 (-5.240)
Population > 10,000 : $p10_{i,t}$	17.114 (4.236)***	17.116 (3.597)***	17.115 (3.697)***	17.100 (4.004)***
Population > 20,000 : $p20_{i,t}$	20.361 (2.659)**	21.200 (3.510)***	21.014 (3.544)***	20.145 (2.746)***
Population > 50,000 : $p50_{i,t}$	3.514 (1.201)	3.136 (1.226)	3.214 (1.200)	3.456 (1.000)
land area per capita: $a_{i,t}$	0.075 (1.604)	0.071 (1.561)	0.071 (1.564)	0.074 (1.541)
Share old population: $po_{i,t}$	-0.025 (-2.264)**	-0.024 (-2.164)**	-0.024 (-2.168)**	-0.024 (-2.251)**
Share young population: $py_{i,t}$	0.068 (1.066)	0.069 (1.528)	0.070 (1.541)	0.065 (0.874)
iii) *Adjustment coefficient*				
Adjustment coefficient: ρ	0.335 (15.221)***	0.312 (14.662)***	0.313 (14.751)***	0.314 (14.254)***
Adjusted R^2	0.762	0.775	0.769	0.766

Notes: (1) *t* statistics are shown in brackets; (2) *, ** & *** = significantly different from zero at the 90%, 95% and 99% levels; (3) Time effects included in all specifications.

Table 3:
Partisan vs. Leviathan models of local politics: Own Revenues
n° obs. = 3,550 (*N* = 550, *T*=7); *Non-Linear Least Squares estimation*

	Leviathan	*Partisan*		*Mixed*
Variable	(3.a)	(3.b)	(3.c)	(3.d)
i) *Political variables* (*long-run coefficients*)				
Margin: $\omega_{i,k}$	0.542 (2.124)*	--.--	--.--	0.422 (2.257)**
Margin × *left*: $\omega_{i,k} \times \Gamma_{i,k}$	--.--	1.689 (2.865)***	--.--	--.--
Margin × *right*: $\omega_{i,k} \times (1-\Gamma_{i,k})$	--.--	-1.564 (2.741)***	--.--	--.--
left: $\Gamma_{i,k}$	--.--	--.--	0.404 (2.219)**	0.412 (2.451)**
Coalition: $C_{i,k}$	0.103 (2.264)**	0.141 (2.502)***	0.133 (2.657)***	0.152 (2.564)***
ii) *Voter demand variables* (*long-run coefficients*)				
Current grants per capita: $gc_{i,t}$	-0.148 (-2.269)**	-0.145 (-2.124)**	-0.143 (-2.687)***	-0.147 (-2.367)***
Capital grants per capita: $gk_{i,t}$	0.066 (2.487)**	0.059 (2.741)**	0.068 (2.334)***	0.067 (2.647)***
Property value per capita: $v_{i,t}$	0.010 (7.556)***	0.013 (6.998)***	0.012 (6.354)***	0.010 (7.521)***
Property value × *assess. year*: $v_{i,t} \times A0_t$	-0.003 (-2.325)**	-0.003 (-2.441)**	-0.003 (-2.110)**	-0.003 (-2.423)**
Property value × *5-year assess.*: $v_{i,t} \times A5_t$	0.005 (3.569)***	0.005 (3.054)***	0.005 (3.374)***	0.005 (3.741)***
Property value × 10-*year assess.*: $v_{i,t} \times A10_t$	0.002 (4.214)***	0.002 (3.569)***	0.002 (3.687)***	0.002 (4.651)***
Income per capita: $y_{i,t}$	0.012 (5.221)***	0.011 (6.015)***	0.012 (5.004)***	0.012 (5.310)***
Debt charges: $i_{i,t}$	0.321 (6.224)***	0.333 (6.874)***	0.314 (6.418)***	0.361 (6.377)***
Population > 10,000 : $p10_{i,t}$	18.514 (5.334)***	17.569 (5.774)***	18.142 (5.212)***	18.334 (5.462)***
Population > 20,000 : $p20_{i,t}$	8.594 (2.23.0)**	8.503 (2.110)**	8.146 (2.142)**	8.461 (2.334)**
Population > 50,000 : $p50_{i,t}$	5.264 (1.273)	5.204 (1.360)	5.167 (1.123)	5.004 (1.059)
Land area per capita: $a_{i,t}$	0.065 (0.954)	0.066 (1.004)	0.065 (0.947)	0.066 (0.841)
Share old population: $po_{i,t}$	-0.031 (-3.694)***	-0.030 (-3.501)***	-0.032 (-3.341)***	-0.030 (-3.742)***
Share young population: $py_{i,t}$	0.027 (0.364)	0.028 (0.554)	0.025 (0.437)	0.026 (0.298)
iii) *Adjustment coefficient*				
Adjustment coefficient: ρ	0.211 (18.556)***	0.205 (17.654)***	0.221 (19.657)***	0.234 (17.412)***
Adjusted R^2	0.854	0.879	0.867	0.858

Notes: (1) *t* statistics are shown in brackets; (2) *, ** & *** = significantly different from zero at the 90%, 95% and 99% levels; (3) Time effects included in all specifications.

Table 4:
Partisan vs. Leviathan models of local politics: Deficit
n° obs. = 3,550 (*N* = 550, *T*=7); *Non-Linear Least Squares estimation*

	Leviathan	*Partisan*		*Mixed*
Variable	(4.a)	(4.b)	(4.c)	(4.d)
i) *Political variables* (*long-run coefficients*)				
Margin: $\omega_{i,k}$	-0.436 (-1.764)*	--.--	--.--	-0.367 (-1.742)*
Margin × *left*: $\omega_{i,k} \times \Gamma_{i,k}$	--.--	2.189 (2.100)**	--.--	--.--
Margin × *right*: $\omega_{i,k} \times (1-\Gamma_{i,k})$	--.--	-2.006 (-2.245)**	--.--	--.--
left: $\Gamma_{i,k}$	--.--	--.--	0.422 (2.136)**	0.403 (2.064)**
Coalition: $C_{i,k}$	0.059 (2.984)***	0.042 (2.755)***	0.054 (2.683)***	0.042 (2.517)***
ii) *Voter demand variables* (*long-run coefficients*)				
Current grants per capita : $gc_{i,t}$	-0.025 (-2.124)**	-0.028 (-2.260)**	-0.026 (-2.361)**	-0.025 (-2.014)**
Capital grants per capita : $gk_{i,t}$	0.035 (2.123)**	0.044 (2.255)**	0.036 (2.264)**	0.035 (2.113)**
Property value per capita: $v_{i,t}$	-0.001 (-3.684)***	-0.001 (-3.611)***	-0.001 (-3.674)***	-0.001 (-3.561)***
Property value × *assess. Year*: $v_{i,t} \times A0_t$	0.001 (3.110)***	0.001 (3.327)***	0.001 (3.210)***	0.001 (3.214)***
Property value × *5-year assess.*: $v_{i,t} \times A5_t$	-0.001 (-3.264)***	-0.001 (-3.222)***	-0.001 (-3.310)***	-0.001 (-3.164)***
Property value × 10-*year assess.*: $v_{i,t} \times A10_t$	0.000 (0.254)	0.000 (0.197)	0.000 (0.216)	0.000 (0.164)
Income per capita: $y_{i,t}$	-0.006 (-4.210)***	-0.006 (-4.362)***	-0.006 (-4.310)***	-0.006 (-4.169)***
Debt charges: $i_{i,t}$	0.039 (3.691)***	0.042 (3.269)***	0.038 (3.597)***	0.039 (3.674)***
Population > 10,000 : $p10_{i,t}$	-1.123 (-1.201)	-1.257 (-1.450)	-1.021 (-1.301)	-1.125 (-1.664)
Population > 20,000 : $p20_{i,t}$	8.541 (2.151)**	7.551 (2.253)**	7.962 (2.321)**	8.124 (2.034)**
Population > 50,000 : $p50_{i,t}$	-1.264 (-0.147)	-1.188 (-0.220)	-1.231 (-0.260)	-1.207 (-0.340)
Land area per capita: $a_{i,t}$	0.068 (1.254)	0.077 (1.440)	0.060 (1.036)	0.065 (1.307)
Share old population: $po_{i,t}$	0.007 (2.844)***	0.008 (2.951)***	0.007 (2.867)***	0.007 (2.746)***
Share young population: $py_{i,t}$	0.058 (0.567)	0.044 (0.756)	0.061 (0.432)	0.056 (0.499)
iii) *Adjustment coefficient*				
Adjustment coefficient: ρ	0.874 (15.641)***	0.895 (15.633)***	0.869 (15.748)***	0.867 (15.361)***
Adjusted R^2	0.407	0.419	0.411	0.408

Notes: (1) *t* statistics are shown in brackets; (2) *, ** & *** = significantly different from zero at the 90%, 95% and 99% levels; (3) Time effects included in all specifications.

Table 5*: Partisan vs. Leviathan models of local politics: one-party vs. coalition. nº obs.*= 3,550 (*N* = 550*, T*=7); *Non-Linear Least Squares estimation*

	Spending ($e_{i,t}$)		*Own revenues* ($r_{i,t}$)		*Deficit* ($d_{i,t}$)	
Variable	(5.a)	(5.b)	(5.c)	(5.d)	(5.e)	(5.f)
i) *Political variables* (*long-run coefficients*)						
margin × *left* × *one-party*: $\omega_{I,k} \times \Gamma_{i,k} \times (1- C_{i,k})$	--.--	1.574 (2.745)***	--.--	1.634 (2.368)**	--.--	1.674 (2.163)**
margin × *right* × *one-party*: $\omega_{i,k} \times (1- \Gamma_{i,k}) \times (1-C_{i,k})$	--.--	-1.476 (-2.264)**	--.--	-1.504 (-2.126)**	--.--	-2.036 (-1.751)*
margin × *left* × *coalition*: $\omega_{I,k} \times \Gamma_{i,k} \times C_{I,k}$	--.--	2.304 (2.144)**	--.--	2.367 (2.005)**	--.--	2.571 (1.659)*
margin × *right* × *coalition*: $\omega_{i,k} \times (1- \Gamma_{i,k}) \times C_{i,k}$	--.--	-2.413 (1.749)*	--.--	-2.367 (-1.701)*	--.--	-2.839 (-1.308)
margin × *one-party*: $\omega_{i,k} \times (1-C_{i,k})$	0.487 (1.214)	--.--	0.491 (1.758)*	--.--	-0.788 (-1.540)	
margin × *coalition*: $\omega_{i,k} \times C_{i,k}$	0.791 (1.456)	--.--	0.804 (1.624)	--.--	-0.954 (-1.380)	
coalition: $C_{i,k}$	0.147 (1.964)*	0.202 (2.236)**	0.104 (1.951)*	0.143 (2.270)**	0.049 (2.141)**	0.046 (2.204)**
ii) *Voter demand variables* (*long-run coefficients*)						
current grants per capita : $gc_{i,t}$	0.778 (7.569)***	0.750 (7.436)***	-0.151 (-2.121)**	-0.148 (-2.102)**	-0.024 (-2.028)**	-0.026 (-2.158)**
capital grants per capita : $gk_{i,t}$	1.059 (2.369)***	1.019 (2.604)***	0.067 (2.029)**	0.058 (2.234)**	0.035 (2.110)**	0.047 (2.056)**
property value per capita: $v_{i,t}$	0.011 (8.219)***	0.010 (7.895)***	0.011 (7.126)***	0.013 (6.905)***	-0.001 (-3.067)***	-0.002 (-3.231)***
property value × *assess. Year*: $v_{i,t} \times A0_t$	-0.002 (-2.560)***	-0.002 (-2.524)***	-0.003 (-2.287)**	-0.003 (-2.369)**	0.001 (3.031)***	0.001 (3.309)***
property value × *5-year assess.*: $v_{i,t} \times A5_t$	0.003 (3.345)***	0.003 (3.007)***	0.004 (3.469)***	0.005 (3.234)***	-0.001 (-3.147)***	-0.001 (-3.347)***
property value × 10-*year assess.*: $v_{i,t} \times A10_t$	0.004 (6.337)***	0.004 (6.334)***	0.003 (4.204)***	0.002 (3.742)***	0.000 (0.198)	0.000 (0.188)
income per capita: $y_{i,t}$	0.006 (3.047)***	0.006 (3.156)***	0.011 (4.857)***	0.011 (5.005)***	-0.006 (-4.361)***	-0.007 (-4.231)***
debt charges: $i_{i,t}$	-0.615 (-4.300)***	-0.618 (-4.204)***	0.308 (5.687)***	0.345 (5.807)***	0.041 (3.517)***	0.045 (3.277)***
population > 10,000 : $p10_{i,t}$	17.087 (3.548)***	17.105 (3.457)***	18.614 (4.799)***	17.508 (5.241)***	-1.098 (-0.875)	-1.249 (-0.947)
population > 20,000 : $p20_{i,t}$	20.269 (2.577)**	21.213 (3.210)***	8.586 (2.360)**	8.499 (2.234)**	8.667 (2.064)**	7.693 (2.287)**
population > 50,000 : $p50_{i,t}$	3.432 (1.200)	3.099 (1.017)	5.119 (1.057)	5.211 (1.222)	-1.397 (-0.041)	-1.239 (-0.090)
land area per capita: $a_{i,t}$	0.074 (1.441)	0.072 (1.460)	0.064 (0.742)	0.067 (1.020)	0.074 (1.062)	0.075 (1.230)
share old population: $po_{i,t}$	-0.026 (-2.037)**	-0.025 (-2.200)**	-0.031 (-2.869)***	-0.030 (-3.107)***	0.008 (2.367)***	0.006 (2.544)***
share young population: $py_{i,t}$	0.068 (0.874)	0.070 (1.016)	0.030 (0.236)	0.028 (0.510)	0.061 (0.446)	0.045 (0.550)
iii) *Adjustment coefficient*						
adjustment coefficient: ρ	0.334 (15.278)***	0.308 (14.760)***	0.226 (18.482)***	0.210 (17.539)***	0.878 (14.621)***	0.883 (15.169)***
Adjusted R^2	0.755	0.768	0.850	0.873	0.401	0.414

Notes: (1) *t* statistics are shown in brackets; (2) *, ** & *** = significantly different from zero at the 90%, 95% and 99% levels; (3) Time effects included in all specifications.

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