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The electoral budget cycle on municipal police expenditure

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Abstract This paper analyzes the effects of electoral cycles on municipal police expenditure. We use a database with information on Spanish municipalities with more than 20,000 inhabitants for the period 2001–2008. Our data show that incumbents increase police spending 1 year before the elections, thus we confirm an electoral budget cycle on police expenditure in Spain. We also find that conservative parties are associated with increased spending on public safety. Population has a positive and significant impact on police expenditures per capita, which indicates diseconomies of scale. The theory on sub-national government spending shows that intergovernmental transfers per capita and taxes per capita are believed to impact local expenditures. Our model fits this assumption, showing a significant and positive influence of both variables on police expenditures. Finally, our model reports a positive impact of both immigration and economic level on police spending.

Keywords Police expenditure · Political budget cycles · Local government · Budgetary manipulation · GMM

JEL Classification H72

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1 Introduction

The research literature provides two general explanations for variations in the extent to which municipalities provide crime control services (Chamlin 1990). On the one hand, the *public choice perspective* assumes that aggregate demand for police services primarily determines governmental spending and manpower levels. Therefore, an enlightened electorate, conscious of the relative costs and benefits associated with marginal changes in the size of the crime control bureaucracy, exercises its voting power to secure the optimal level of policing (Becker 1968; Borcherding and Deacon 1972). On the other hand, the *conflict perspective* also focuses on the relationship between political processes and policing, but unlike *public choice theory*, it posits that the ability to influence government officials is not equally distributed among citizens. It claims that the most powerful groups primarily determine the level of resources devoted to policing.

According to Blais and Nadeu (1992) electoral cycle thesis, governments will attempt to introduce the most "popular" measures immediately before an election. Accordingly, the most "unpopular" measures will be implemented immediately after an election. Therefore, governments will increase their expenditures before and their taxes after an election. If we connect this assumption with police expenditures, an increase in this kind of spending is a "popular" measure before the elections, which will provide electoral benefits to the incumbents.

Most empirical research on political budget cycles has used per capita total expenditures, per capita current expenditures, per capita capital expenditures and per capita total taxes. However, few works have studied categories of expenditures in detail. Furthermore, police as spending category has been scarcely examined so far, and our work is the first in this regard in Spain.

According to Veiga and Veiga (2007), research should focus on specific municipal spending, since voters try to assess efficiency in production of municipal services like fire protection, education and public safety. The latter category has a high impact on citizens, since public safety and criminality are among the major concerns of citizens (García-Sánchez et al. 2011). In fact, historically according to opinion polls,[1] lack of safety in the streets ranges among the five most important concerns in Spain. Regarding governments, public safety is an issue of great concern to elected officials (Dyke 2007). Putting together both ideas, Levitt (1997) suggests a link between elections and the timing of changes in the size of city police forces, since crime is a critical political issue in the cities.

Regarding pattern of police spending in Spanish municipalities, according to the article 25 of the Spanish Local Government Act (SLGA), all municipalities must provide safety in public areas and traffic control. In fact, competencies on police depend mainly on the central government and municipalities in Spain, since only 2 regional governments, of the 17 that exist in Spain, have their own police. Duties on police cannot be outsourced by municipalities, but must be provided by sworn municipal civil servants (article 85 SLGA). Though there is a national law

[1] Source: Perception of the main problems in Spain, published monthly by the Spanish Centre of Social Research.

regulating police in Spain, municipalities have the ability to set regulations about police service in certain aspects such as fine amounts, traffic regulation, etc. (article 5 Municipal Services Decree).

Following the Veiga and Veiga (2007) claim, this paper analyzes the effects of electoral cycles on municipal police expenditure. We use a database with information on Spanish local governments with more than 20,000 inhabitants during 2001–2008.

The paper is organized as follows. Firstly we review the literature on municipal police expenditure. Then, we provide a description on municipal political budget cycles and on the methodology. After, the empirical results are shown and discussed. Finally, the conclusions are summarized.

2 Literature on municipal police expenditure

Zhao et al. (2010) sum up three approaches to explain the share set aside for municipal police spending: budget incrementalism, local political culture and socioeconomic factors. First, the incremental approach argues that last year's expenditures are good predictors of this year's expenditures for almost all government functions.

Second, traditional municipalities are more likely to allocate large shares of funds to police than reformed municipalities. The reason is that traditional governments are more sensitive to the articulated demands of organized interests, political parties, and local residents.

Third, socioeconomic features also influence the level of police spending. Specifically, they highlight factors such as income, unemployment rates and the presence of racial and ethnic minorities.

In line with Brazer (1959), Weicher (1970) and Zhao et al. (2010), we consider three groups of factors deemed to determine police spending (see Table 1).

The determination of the factors that affect municipal expenditures has important policy implications. Thus, we think it is interesting to study the determinants of each expenditure category in depth. The next sections review the literature on municipal police spending, according to the categories depicted in Table 1.

2.1 Incrementalism

The literature shows that budget figures usually follow the incremental approach (see Dezhbakhsh et al. 2003). This means that as far as budgets are concerned, a particular year t expense depends to some extent on year t−1 expense. This incrementalism is also true for budget spending on public safety. Thus, previous research concerning police force suggests that the current level of police expenditures is strongly affected by previous levels (Chamlin 1990). According to Zhao et al. (2010) the incremental approach predicts stability in budgetary allocations to police due to the nature of human decision making processes in complex, political settings. For that reason we introduce in our model the lagged dependent variable ($securityh_{it-1}$).

Table 1 Determinants of police spending

Literature	Hypothesized impact factor	Explanatory variables in our model
Chamlin (1990), Zhao et al. (2010)	Incrementalism	Spending on police in previous year ($securityh_{it-1}$)
Brazer (1959), Zhao et al. (2010)	Politics	Pre-electoral, electoral and post-electoral years ($prevyear_{it}$, $electionyear_{it}$ and $nextyear_{it}$)
		Municipal ruling party's political ideology ($ideology_{it}$)
		Coalition in the municipal government ($coalition_{it}$)
Brazer (1959), Weicher (1970), Zhao et al. (2010)	Socioeconomic	Population of the municipality ($lnpopulation_{it}$)
		Population density ($popdens_{it}$)
		Intergovernmental transfers per capita ($transferh_{it}$)
		Per capita taxes ($cityrevenuesh_{it}$)
		Ratio of unemployment ($unemployment_{it}$)
		Ratio of immigrants ($immigrants_{it}$)
		Municipal economic level ($income_{it}$)

2.2 Politics

2.2.1 Budget cycles on municipal police expenditure

The *public choice perspective* states that policies result from political processes that aggregate the preferences of citizens. This way, voters choose their reelection strategies after observing how the incumbent politicians performed in the previous period (Saha 2011). Specifically, Merlo (2003) shows that expenditures on police to apprehend criminals are determined through majority voting.

Economists have long recognized the possibility that the principal-agent relationship between an electorate and its elected politicians can result in the manipulation of expenditures causing political budget cycles to enhance politicians' probability of re-election. Therefore, if elections occur at regular, fixed intervals, then informational asymmetries between politicians and voters, or politicians facing uncertainty about their re-election, can create regular political budget cycles that coincide with the electoral cycle (Dyke 2007).

Most empirical research on political budgets cycles has used national level data. However, some authors suggest that the sub-national level is the most appropriate rank in order to analyse the theory of political budget cycles considering different arguments. For example, Baleiras and Costa (2004) think that local governments have more economic and political conditions to have electoral budget cycles than central governments. For these authors, incumbents make their fiscal policy decisions taking into account the possibility of getting a job outside the public sector, since if they are not re-elected, the uncertainty regarding future political appointments is greater for local than for higher government levels.

Most empirical literature has analysed the electoral budget cycles on total expenditures, for example Baleiras and Costa (2004) and Naruhiko and Aquino (2008).

Veiga and Veiga (2007) prove that in pre-electoral periods, Portuguese local governments not only increase total expenditures but also change their composition favouring items that are highly visible to the electorate (their period was 1979–2000). In that respect, some authors have highlighted the visibility of some kinds of expenditures, such as police expenditure, showing the interest of local governments to manipulate them. In fact, new public budget cycle theories showing incumbents sometimes do not change the total budget but they just modify its composition (Rogoff 1990; Drazen and Eslava 2010). Our paper is in line with this reasoning, since we go more deeply into the municipal budget composition and focus on one of the most visible kind of expenditures, as it is the case of public safety.

Levitt (1997) points out several reasons to suspect a link between elections and the timing of change in the size of city police forces. On the one hand, crime ranks among the most important issues in opinion surveys, and is frequently the most critical issue when the economy is performing well (García-Sánchez et al. 2011), and hence, is an issue of great concern to elected officials (Dyke 2007). Therefore, incumbents will have incentives to increase the police force in advance of elections or simply to demonstrate that they are "tough on crime". On the other hand, police are an ideal target for political manipulation since police departments are organized at the city level, as it is also the case in Spain.

Thus Levitt, examining a panel of 59 large US cities over the period 1970–1992, finds empirically that mayoral election years are associated with a greater than one percent increase in per capita sworn police officers. McCrary (2002) replicates Levitt's estimations with some corrections suggesting that the electoral cycle in police hiring may be somewhat stronger than originally reported by Levitt.

Dyke (2007) presents evidence for the existence of cycles in criminal case outcomes. He shows that defendants face a higher probability of conviction and a lower probability of having all charges dismissed in an election year. Furthermore, his estimated effects are more pronounced in districts with more electoral competition.

Walker and Waterman (2010) demonstrate that upcoming elections have a direct and positive impact on public evaluations of the police. While gubernatorial candidates hope to win additional votes and ultimately election to the governorship by stressing law and order themes, they show that the police also benefit from this effect.

Saha (2011) explains that governance is a significant determinant of public goods provision. First, governments are able to deliver benefits to special interest groups through municipal expenditure. Second, the provision of such public goods as police protection can be plagued by pork-barrel politics. Finally, the asymmetry of information between voters (principals) and elected officials (agents) facilitates spending manipulation on the part of the latter.

2.2.2 *Partisan politics and political strength*

The political literature has shown that both partisan politics and political strength influence municipal financial situation.

According to *partisan politics theory*, governments' ideology shapes policies and outcomes. It is commonly assumed that left-wing parties favor public spending increases while right-wing parties aim at budget reductions (Seitz 2000; Tellier 2006). Cusack (1997) defines this idea as the "partisan politics matters" (PPM) theory.

However, partisan politics depends on the spending category. In this way, Gerber and Hopkins (2011) state that, in the absence of constraints, mayors from different parties would prefer to enact different policies. Specifically, the influence of partisanship on local policy will be stronger in areas like public safety. Thus, they find that republicans (conservatives in the European context) are associated with increased spending on public safety.

Nevertheless, though a majority of the literature supports the partisan politics theory, empirical findings are not totally conclusive. For instance, Bosch and Suarez-Pandiello (1995), Galli and Rossi (2002), Seitz (2000), Hagen and Vabo (2005) and Bastida et al. (2009) fail to prove it at the municipal level.

With respect to political fragmentation, there are two approaches in the theoretical debate over the influence of divided governments on the fiscal situation of public entities (Alt and Lowry 1994).

On the one hand, Roubini and Sachs (1989a, b) posit that large coalition governments face higher deficits and spending levels than one-party incumbents governing with majority. They suggest that coordination problems in divided governments can impose noteworthy costs. This theory is known in the literature as Roubini and Sachs' *weak government hypothesis* (RSH).

On the other hand, Alesina and Rosenthal (1994) think that divided governments have a moderating influence on fiscal policy. Jones et al. (1997) investigate political strength from the point of view of budget volatility. They consider that discrepancy politics lead to small budget changes. Bastida et al. (2009) find that the lower the political fragmentation, the higher the spending. Consequently, municipal incumbents use their majority power to implement their policies by means of more spending.

2.3 Socioeconomic

2.3.1 *Population*

The theoretical and empirical literature has investigated the impact of population on public expenditures, specifically focusing on economies of scale in the public sector (Walzer 1972). To accept the hypothesis of economies of scale, there must be a statistically significant negative relationship between population and expenditures per capita.

Hirsch (1959) and Brazer (1959) present two of the earliest studies using per capita police expenditures and population. Some papers have examined this

relationship more recently. This literature shows mixed results. Hirsch (1959) concludes that per capita police expenditures do not appear to have varied significantly with the size of the population, which agrees with Kushner et al. (1996). However, Brazer (1959) finds that there is a significant positive relationship between municipal police expenditures per capita and the population of the city, a result that was confirmed by Jackson and Carroll (1981) and more recently by Saha (2011). Gerber and Hopkins (2011) report a negative impact of population on the share of city spending on police out of the total budget.

Bodkin and Conklin (1971) investigate whether economies or diseconomies of scale exist in the production of municipal services. They do not find an overwhelming preponderance of economies of scale in the production of municipal goods. In fact, they suggest that quite small municipalities can provide police protection as cheaply, or even more cheaply, than larger municipalities. Finally, they find that mergers of municipalities, with the aim of achieving economies of scale, may not be justified.

Walzer (1972) analyses economies of scale in police protection using two measures: an index of service for police departments based on activities performed and population. He shows different results with both measures. On the one hand, there is a significant negative relationship between the index of service and the cost. On the other hand, there is not a significant relationship between per capita expenditures and population.

The literature has studied the service provision conditions, that is, the factors which facilitate or inhibit governments from providing a specific quality or quantity of services, such as city population density. In this way, the early work of Fabricant (1952) includes population density to explain municipal fiscal behaviour.

Bodkin and Conklin (1971) find that the significance of the impact of the number of residents per acre depends on the category of expenditure. They show that population density does appear to exert a negative impact on all categories of municipal expenditures but this result is not significant for police protection. Saha (2011) shows the same result.

Walzer (1972) investigates the relationship between population density and police per capita expenditures for 2 years. He gets different results for each year: the coefficient of population density is positive but not significant in the first year (1958) but is significant in the second year (1960).

Brazer (1959), Jackson and Carroll (1981) and Kushner et al. (1996) show that population density of a city influences positively its level of policing expenditures.

However, Carruthers and Ulfarsson (2003, 2008) find the opposite conclusion: the more population density the less municipal police expenditures.

Therefore, as shown above, the empirical results on the relationship between population density and municipal police expenditures are mixed. Two explanations are possible here. On the one hand, a dense population may increase the marginal benefits of spending if it creates unique public goods problems: this means a positive relationship between density and per capita expenditure (Ladd 1992).

On the other hand, population density may lead to economies of scale in the provision of local government services. In this latter case, we expect a negative relationship between these two variables. However, some authors indicate that once

the municipal population grows beyond its capacity, economies of scale disappear and thus cost per capita increases.

2.3.2 *Intergovernmental transfers and fiscal capacity*

According to the traditional theory on sub-national government spending, intergovernmental transfers per capita and taxes per capita are believed to impact local expenditures (Jackson and Carroll 1981; Bails and Tieslau 2000). In this way, intergovernmental transfers and fiscal capacity variables have typically been included in police expenditures models.

The literature has paid attention to the interaction between income and grants at the sub-national level. It is possible to set a theoretical prediction of the effect of grants on spending, which has been empirically investigated. The empirical evidence shows that spending is stimulated by much more than theory predicts. For unrestricted grants, the estimated effects are often closer to 100%. This result was dubbed the *flypaper effect* by Okun (1981), since the money the government sends out "sticks where it hits" (Hines and Richard 1995).

There are two explanations for the *flypaper effect* that rely on public choice reasoning. One explanation is that, due to *fiscal illusion*, certain revenue sources of the government are not fully internalized by citizens, because of information asymmetry (Courant et al. 1980; Oates 1979). Spending those resources would increase the popularity of the government.

The other explanation of the *flypaper effect* emphasizes the motivation of government bureaucrats who seek to maximize the size of their budgets (Niskanen 1971). Here, the information asymmetry appears in the opposition, who miss information that is used by the ruling incumbents who have it.

Tovmo and Falch (2002) developed municipal behaviour models that predict equal effects of private income and unconditional federal grants on local government expenditures. However, empirical studies find that the effect of grants is larger than the income effect (*flypaper effect*).

Brazer (1959) and Carruthers and Ulfarsson (2003, 2007) find that police expenditures per capita tend to increase as the intergovernmental transfers per capita rises. Bodkin and Conklin (1971) indicate that grants raise municipal police expenditures above the level they would otherwise achieve.

Regarding municipal tax revenues, it is another classical variable used to analyse local government police expenditures. Jackson and Carroll (1981) hypothesize that police expenditures are positively affected by municipal tax revenues per capita. Their results confirm, as they expect, that city revenues per capita are a statistically significant predictor to explain municipal policing expenditures. Chamlin (1990) shows that city revenues exert a dominant influence on police expenditures: specifically a $1 per capita increase yields an increase of approximately $.27 in police expenditures.

Carruthers and Ulfarsson (2003) find that local tax revenue per capita influences positively the level of police protection. Sever and McSkimming (2004) indicate that localities with more revenues spend more on police and probably employ more

police officers. They find that the revenue of a municipality is a strong determinant of the police budget.

2.3.3 Unemployment, ethnic fragmentation and income

Demographic features have to do with the "interest groups problem", i.e., groups of population that pressure politicians to meet their needs. This fact is related to the "common pool problem". This latter problem stems from combination of two key features of public budgets: firstly, government programs generate concentrated benefits, but are financed from common pool of resources; secondly, the budget is the result of a collective decision-making process, involving incumbents, opposition, interest groups, upper levels of government, etc. Since most of them represent their own interests, this may lead to surpass the common pool, thus to excessive spending or deficits.

The literature has used many demographic variables to account for these interest groups, among them, unemployment rate and the percentage of blacks/immigrants (Brazer 1959; Hirsch 1959; Chamlin 1990; Bails and Tieslau 2000; Carruthers and Ulfarsson 2008).

The unemployment rate measures the citizens that demand certain social services. Inasmuch as social services are mainly provided to unemployed people, a municipality with a higher unemployment rate will spend more in providing the same level of these services, compared to a municipality with less unemployment rate. Therefore, the coefficient of this variable is expected to affect local public spending positively, as Bails and Tieslau (2000) show.

Brazer (1959) hypothesizes that the higher the employment ratio, the higher the city expenditures per capita. Actually, he finds that municipal police expenditures per capita increase as the unemployment rate decreases. Similarly, Carruthers and Ulfarsson (2008) show empirically a positive relationship between employment and police expenditures.

Chamlin (1990) shows that the relationship between unemployment and police expenditures is positive but not significant.

Chiricos (1987) analyses the conditional nature of the unemployment-crime relationship. He finds evidence on the existence of a positive, frequently significant unemployment/crime rate relationship. Similarly, Marlow and Shiers (1999) hypothesize that unemployment is positively related to crime rates because, in those states with relatively fewer jobs, there may be a greater incentive for criminal activity. This greater activity is connected with a higher expenditure on security per capita.

Regarding immigration, Grob and Wolter (2007) assert that its impact on spending is a complex issue. The literature has used different measures of this variable: per cent of non-white population (Hirsch 1959), percentage of black people (Jackson and Carroll 1981; Chamlin 1990) and percentage of white people (Carruthers and Ulfarsson 2008).

Chamlin (1990) finds that the percentage of black people positively affects public safety spending. Specifically, he shows that 1% increase in the percentage of black people yields an increase of approximately $16,500 in police expenditures. Jackson

and Carroll (1981) introduce the percent of black population in their models and show that the higher the economic gap between races, the higher the police spending. Carruthers and Ulfarsson (2008) find that the percentage of white people negatively impacts on police expenditures.

In the same way, Alesina et al. (1999) find that the share of expenditure on police increases with ethnic fragmentation. They consider that cities with higher crime rates may be associated with greater ethnic heterogeneity and smaller spending shares on others expenditures because of greater spending on police. Saha (2011) uses the same variable than Alesina et al. (1999) but she does not report a significant impact.

Income level is a "classical variable" used for example by Fabricant (1952) to evaluate municipal financial situation. Furthermore, *Wagner's Law* shows that income explains government growth in the states, and even more, in the local authorities (Wagner 1958).

Brazer (1959) indicates that the relationship between median family income and police per capita expenditures is positive and statistically significant. Similarly, Alesina et al. (1999) show that income has a positive effect on the share of spending on police.

Jackson and Carroll (1981) posit that a large poor population reduces the tax base and creates a demand for other city-provided services. They expect that police expenditures are negatively influenced by the relative size of its poor population. Carruthers and Ulfarsson (2008) and Saha (2011) find that the relationship between per capita income and police expenditures is positive but not significant.

Table 2 provides a summary of the police spending literature at the sub-national level.

3 Econometric procedure

3.1 Sample

The sample consists of a panel of 322 Spanish local governments, with data for 2001–2008. These municipalities represent all Spanish local governments with more than 20,000 inhabitants. There are two reasons for eliminating local governments with less than 20,000 inhabitants. On the one hand, the reliability of the financial data is doubtful for small local governments. On the other hand, some variables were not available for municipalities below 20,000 inhabitants.

Municipal elections took place in Spain in 1999, 2003 and 2007. Therefore, our sample presents several changes in local governments' political composition, thus containing information about the possible impact of the electoral budget cycle, political strength and partisan politics.

According to Pettersson-Lidbom (2001), municipal datasets have generally two main advantages over cross-country, namely, homogeneity and amplitude.

First, heterogeneity (different legal structures and socioeconomic framework in cross-country samples) needs to be controlled (Tellier 2006). This feature is overcome in the municipal level within a country. For example, in our sample,

Table 2 Summary of literature on police spending determinants

Variables	Authors	Findings
Incrementalism		
$Security h_{t-1}$	Chamlin (1990)	Thus, previous research concerning police force suggests that the current level of police expenditures is strongly affected by previous levels
	Zhao et al. (2010)	The incremental approach predicts stability in budgetary allocations to police due to the nature of municipal decision-making processes.
Politics		
Electionyear	Levitt (1997)	Election years are associated with a greater than one percent increase in per capita sworn officers.
	McCrary (2002)	The electoral cycle in police hiring may be somewhat stronger than originally reported by Levitt.
	Walker and Waterman (2010)	Upcoming elections have a direct and positive impact on public evaluations of the police.
Ideology	Seitz (2000); Tellier (2006)	Left-wing parties favor public spending increases while right-wing parties aim at budget reductions.
	Cusack (1997)	Coins the idea "partisan politics matters" (PPM) theory.
	Bosch and Suarez-Pandiello (1995); Seitz (2000); Galli and Rossi (2002); Hagen and Vabo (2005) and Bastida et al. (2009)	Fail to prove an impact of ideology at the municipal level.
	Gerber and Hopkins (2011)	Republicans are associated with increased spending on public safety.
Coalition	Roubini and Sachs (1989a, 1989b)	Large coalition governments face higher deficits and spending levels than one party governing with majority
	Alesina and Rosenthal (1994); Jones et al. (1997)	Divided governments have a moderating influence on fiscal policy.
	Bastida et al. (2009)	Lower political fragmentation is related to higher spending.

Table 2 continued

Variables	Authors	Findings
Socioeconomic		
Population	Hirsch (1959)	Police expenditure per capita decreases with population. As size of population increased, expenditures per capita did not vary significantly. Economies of scale were not indicated.
	Schmandt and Stephens (1960)	Population is not significantly related to per capita expenditures, but a high correlation was found. Economies of scale were possible.
	Walzer (1972); Kushner et al. (1996)	Population impacts positively but not significantly police expenditure per capita. Economies of scale were not found.
	Brazer (1959); Bodkin and Conklin (1971); Jackson and Carroll (1981)	Police expenditure per capita significantly increases with population.
Popdens	Walzer (1972)	The coefficient of population density is positive but not significant in 1958 (It was significant in 1960).
	Brazer (1959); Jackson and Carroll (1981); Kushner et al. (1996)	The impact of population density on police expenditures per capita is positive and significant.
	Carruthers and Ulfarsson (2003, 2008)	The impact of population density on police expenditures per capita is negative and significant.
	Bodkin and Conklin (1971); Saha (2011)	The impact of population density on police expenditure per capita is negative and insignificant.
Transferh	Brazer (1959); Bodkin and Conklin (1971); Carruthers and Ulfarsson (2003, 2008)	Positive relationship between police expenditures and intergovernmental transfers per capita.
Cityrevenueh	Jackson and Carroll (1981); Chamlin (1990); Carruthers and Ulfarsson (2003); Sever and McSkimming (2004)	Positive and significant relationship between police expenditures and per capita total city revenues.
Unemployment	Chamlin (1990); Bails and Tieslau (2000)	Positive but not significant relationship between unemployment and police expenditures.
	Brazer (1959); Carruthers and Ulfarsson (2008)	The relationship between employment and police expenditures is positive.

Table 2 continued

Variables	Authors	Findings
Immigrants	Jackson and Carroll (1981); Chamlin (1990); Carruthers and Ulfarsson (2008)	The percentage of blacks positively affects expenditures.
	Alesina et al. (1999)	The share of expenditure on police increases with ethnic fragmentation.
	Saha (2011)	The relationship between ethnic fragmentation and police expenditures is not significant.
Income	Brazer (1959); Alesina et al. (1999)	The relationship between income and police per capita expenditures is positive and statistically significant.
	Jackson and Carroll (1981)	Police expenditures are negatively influenced by the relative size of its poor population.
	Carruthers and Ulfarsson (2008); Saha (2011)	The relationship between per capita income and police expenditures is positive but is not significant.

election dates are fixed exogenously, and all municipalities have elections on the same day.

Second, sub-national datasets are considerably larger than cross-country samples. Besides, following Poterba (1995), international comparisons of budget rules and public spending are problematic. The many non-budgetary differences between countries make it difficult to attribute differences in spending patterns only to fiscal institutions.

Finally, according to Veiga and Veiga (2007), data on municipal expenditures are very wide, allowing for tests to political budget cycles in particular expenditure categories, such as police expenditures.

3.2 Variables

The aim of this paper is to analyze the effects of electoral cycles on municipal police spending. Therefore, the dependent variable for this study is municipal per capita security spending (*securityh*). It has been calculated on a per capita basis, to allow comparisons among municipalities. This variable includes the total spending on municipal police, i.e., both current (wages, fuel, etc.) and capital (cars, facilities, etc.). The share of police expenditures in the overall municipal budget accounted for 7.5%, considering all the years of our sample.

Section 2 provided an insight into the three groups of factors that, according to the literature, impact on municipal police spending.

Regarding the first group, Sect. 3.3 explains how we tackle incrementalism, since it is connected with the econometric specification of our model.

The second group, politics, includes three factors. First, we adopt a model that indentifies four phases in the electoral cycle (Golden and Poterba 1980; Alesina 1988 and Blais and Nadeau 1992): the election year, the post-election year, the pre-election year and the middle of the term year. Therefore, we define three dummy variables: *prevyear* that takes the value 1 for the year before election year and 0 otherwise, *electionyear* which takes the value 1 in municipal election year and 0 otherwise and *nextyear* that takes the value 1 for the year after the election year and 0 otherwise. These variables will test whether the level of spending is influenced by the electoral schedule. Some recent papers applying this procedure are Veiga and Veiga (2007) and Foucault et al. (2008). Second, political ideology (*ideology*) to control for the PPM theory. *Ideology* is a dummy variable taking value 1 when the mayor of municipality belongs to a right-wing party and 0 when left-wing party. Third, political strength (*coalition*) to account for RSH approach. *Coalition* is a dummy variable that takes the value of 1 if only one party forms the government and 0 where a coalition of 2 or more political parties exists.

In turn, the third group of factors, socioeconomic, is divided into three categories. First, population issues account for both population (*lnpopulation*) and population density (*popdens*). The former is used to test the hypothesis of economies of scale. To accept this hypothesis, it is necessary to find a statistically significant negative relationship between population and security expenditures per capita (*securityh*). The latter controls for the impact of the urban development of the city. The second category is made up of resources for the local government since, according to the

traditional theory on sub-national government, per capita intergovernmental transfers (*transferh*) and per capita taxes (*cityrevenuesh*) are believed to impact security expenditures per capita. The third category contains demographic characteristics, such as the percentage of immigrants (*immigrants*), the unemployment rate (*unemployment*) and economic level of the municipality (*income*).

Table 3 depicts variables' descriptive statistics. It also shows our hypotheses in the form of expected signs.

3.3 Specification of the model

Following the theoretical framework, we analyze the determinants of municipal police expenditures by estimating this panel data model:

$$y_{it} = \alpha y_{it-1} + \sum \beta_j x_{jit} + c_i + \varepsilon_{it}$$

Where y_{it} is the dependent variable and y_{it-1} is the lagged value of the dependent variable. x_{jit} is the vector of explanatory variables, β is a vector of parameters to be estimated and c_i (unobservable heterogeneity) is designed to measure unobservable characteristics of the local governments that have a significant impact on local governments' police expenditures. They vary across municipalities but are assumed to be constant for each municipality. ε_{it} represents random disturbances.

The full model, in agreement with Brazer (1959), Weicher (1970) and Zhao et al. (2010), is:

$$securityh = \alpha\, incrementalism + \beta_1\, politics + \beta_2\, socieconomic + c_i + \varepsilon_{it}$$

where:

incrementalism: $securityh_{it-1}$
politics: $prevyear_{it}$;·$electionyear_{it}$;·$nextyear_{it}$;·$ideology_{it}$;·$coalition_{it}$
socioeconomic: $lnpopulation_{it}$; $transferh_{it}$; $cityrevenuesh_{it}$;·$unemployment_{it}$; $immigrants_{it}$;·$income_{it}$;·$popdens_{it}$

We use a panel data model because it presents important benefits. On the one hand, panel data give more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency (Baltagi 2001). On the other hand, panel data model controls for individual heterogeneity since panel data suggest that local governments, regions or countries are heterogeneous.

Estimating models from panel data requires researchers to determine whether there is a correlation between the unobservable heterogeneity c_i of each municipality and the explanatory variables of the model. In this way, they can be estimated assuming fixed effects, if there is a correlation, or random effects, otherwise. Nevertheless, both estimators are biased when endogenous variables are included in the model (in our case, the lagged dependent variable is clearly endogenous). Therefore, in order to account for the possible endogeneity problems we estimate the model using the generalized method of moments (GMM), which uses instrument variables to tackle endogeneity. This approach allows us to control the possible endogeneity García-Sánchez et al. (2011) posit between police activity and two municipal features: population and economic level.

Table 3 Definition of variables and descriptive statistics

Variable (expected sign)	Description	Calculation	Min	Max	Mean	SD
Dep variable						
Securityh$_t$	Year t security spending per capita (€)	Taken from Spanish Ministry of Treasury	1.24	306.45	60.28	30.05
Lagged dep. variable						
Securityh$_{t-1}$ (+)	Year t-1 security spending per capita (€)	Taken from Spanish Ministry of Treasury	1.24	306.45	59.01	29.73
Politics						
Prevyear (+)	Dummy pre-election year	Takes value 1: previous election year; 0 otherwise	.00	1.00	.26	.44
Electionyear (+)	Dummy election year	Takes value 1: election year (2003, 2007); 0 otherwise	.00	1.00	.25	.43
Nextyear (?)	Dummy post-election year	Takes value 1: next election year; 0 otherwise	.00	1.00	.23	.42
Ideology (+)	Political ideology of the municipal ruling party	Political ideology of the municipal government: progressive/left=0; conservative/right=1	.00	1.00	.46	.50
Coalition (?)	Political strength of the municipal government	Value 0: local government is made of a coalition of 2 or more political parties. Value 1: 1-party government	.00	1.00	.53	.50
Socioeconomic						
*Inpopulation** (?)	Municipal population of (natural logarithm)	Taken from the Spanish National Statistics Institute	20,001.00	$3.3 \cdot 10^6$	90,205.02	216,369.20
Popdens (?)	Population density of the municipality	Taken from the Spanish National Statistics Institute	27.91	21,233.01	1,915.56	3,115.27
Transferh (+)	Regional and central transfers per capita (€)	Taken from Spanish Ministry of Treasury	115.97	1,042.25	310.13	119.96
Cityrevenuesh (+)	Taxes per capita (€)	Taken from Spanish Ministry of Treasury	83.1	1,756.35	319.63	130.25
Unemployment (+)	Municipal unemploy-ment rate	Taken from "Anuario Económico La Caixa"	.00	.16	.04	.02
Immigrants (+)	Municipal rate of immigrants	Taken from the Spanish National Statistics Institute	.00	.63	.08	.08
Income (+)	Municipal economic level	Taken from "Lawrence R. Klein" Economic Institute. It ranges from 1 until 10 depending on the municipal disposable personal income	1.00	10.00	6.17	2.15

* The descriptive statistics have been calculated without logs

All € variables are 2001 real values

Specifically, we follow the estimation strategy proposed by Arellano and Bond (1991), which consists of using all the right-hand side variables lagged twice or more as instruments. This GMM estimation is not only consistent but also more efficient than other consistent estimators, such as the one proposed by Anderson and Hsiao (1982).

This methodology assumes that there is no second-order serial correlation in the errors in first differences. For this reason, in order to test the consistency of the estimations, we show the test for the absence of second-order serial correlation proposed by Arellano and Bond (1991). Likewise, we present the Sargan test for over-identifying restrictions, which tests for the absence of correlation between the instruments and the error term.GMM is consistent but does not tackle another bias due to the potential correlation of the explanatory variable with the fixed effects when its first-differences is not. According to Arellano and Bover (1995), lagged values of the first-differences can be used as instruments in the equation in levels. If this is the case, system-GMM may be preferable to the GMM that only includes the first-differenced equations. We also report the system-GMM coefficients to check the robustness of the model. Sargan tests for both GMM and system-GMM check the validity of both estimations.

4 Results

Table 4 shows the estimation of the regressions, as well as the tests applied. Sargan tests confirm that both regressions are valid. Furthermore, significant coefficients do not change its sign, and there are just three significance modifications.

5 Discussion

5.1 Incrementalism

As the literature predicts, there is inertia in police expenditures (variable $securityh_{t-1}$ is significant). This is usual in budget variables, since many governments set next-year budgets by modifying current budgets. Thus, our result is in line with Chamlin (1990), Dezhbakhsh et al. (2003) and Zhao et al. (2010) who find that the current level of police expenditures is affected by previous levels. The mean value for $securityh_{t-1}$ is 59.01 €. Since all fraction variables are in a "per unit basis", a 10% year t−1 police spending would increase year t police spending in 3.5 € per capita (.10 × 59.01 × .592), according to the GMM model. In turn, the system-GMM model predicts an increase of 4.6 € per capita (.10 × 59.01 × .777).

5.2 Politics

The literature has investigated the impact of the electoral cycle on several types of expenditures. However, police as spending category has been scarcely examined so far. As Levitt (1997) indicates, crime is a critical political issue, ranking among the

Table 4 Results of the regression

Dependent variable	*Securityh*	
	GMM	*System GMM*
$Securityh_{t-1}$	.592 (20.73)***	.777 (71.05)***
Prevyear	.981 (2.61)***	.620 (2.18)**
Electionyear	.347 (.75)	−.267 (−.93)
Nextyear	300 (.73)	−.043 (−.16)
Ideology	399 (0.61)	.933 (2.78)***
Coalition	591 (1.34)	.464 (1.75)*
Lnpopulation	13.513 (2.69)***	1.851 (3.76)***
Popdens	−.002 (−.79)	−.000 (−2.53)**
Transferh	.008 (2.08)**	.013 (6.96)***
Cityrevenuesh	.019 (4.03)***	.020 (9.73)***
Unemployment	37.867 (.87)	17.114 (1.37)
Immigrants	32.582 (2.16)**	5.941 (2.35)**
Income	.417 (1.89)*	.287 (2.73)***
Observations	2,422	2,422
m_2	1.32	1.48
Sargan test	101.24 (85)	157.21 (131)

All estimations have been carried out using the two-step GMM estimator. All variables are treated as endogenous and the lagged independent variables are used as instrument. Z statistic in brackets

m_2 is test statistic for second order autocorrelations in residuals, distributed as standard normal N (0,1) under the null hypothesis of no serial correlation. Sargan test of overidentifying restrictions, distributed as Chi-square under the null of instrument validity. Degrees of freedom in brackets

*** significant at 1%, ** significant at 5%, * significant at 10% level

most important citizens' concerns. Thus, incumbents have incentives to increase the police force in advance of elections to show they are curbing crime.

Our coefficients show an incumbents' opportunistic behaviour, which is in line with Levitt (1997), who finds that election years are associated with a greater than one percent increase in per capita sworn police officers. However, in our data, the effect appears 1 year before Levitt's prediction, since it is 1 year before the elections when police spending increases. The adjustment of the spending appears in the most distant year to elections, i.e., election ±2 years (that is, the dropped dummy variable). Figure 1 shows the values of the coefficients concerning the electoral cycle (GMM specification). We can see that the lowest police spending occurs in the most distant year to elections, which in our time window means 2001 and 2005. Municipal elections take place on the first half of the year (13 June 1999, 25 May 2003 and 27 May 2007). Maybe this fact has made incumbents signalize a higher police spending the year before the election, to increase the impact on voters. If police expenditures increased in the election year, voters would only have 4–5 months to perceive it, while rising spending the year before allows 7–8 months more of signalling.

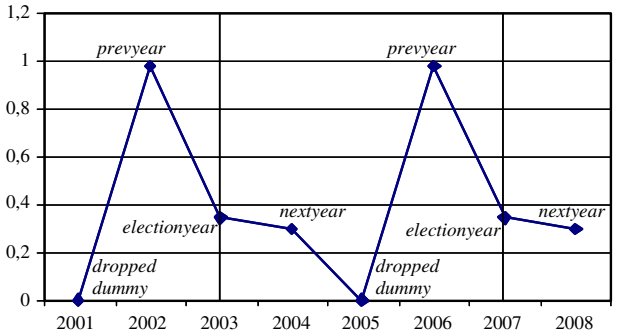

Fig. 1 Electoral cycle

Furthermore, Walker and Waterman (2010) demonstrate that upcoming elections have a direct and positive impact on public evaluations of the police. Therefore, increasing the public safety level before the elections could favor gubernatorial candidates to win additional votes and ultimately election.

Regarding political ideology, we find that conservative parties are associated with increased spending on public safety. Both GMM and system-GMM coefficients are positive, but only significant in the latter. This result supports Gerber and Hopkins (2011) who defend that mayors from different parties prefer to enact different policies. Specifically, democratic mayoral candidates should be associated with increased social spending and higher, more progressive taxation while republicans should be associated with increased spending on "defense-like" policies such as public safety, and lower, more regressive taxation. In this way, our results show that partisan politics depends on the spending category.

The expected sign of political strength was uncertain, since there is mixed evidence in the literature (see Table 2). Indeed, our coefficients do not show the existence of a considerable influence of political strength (*coalition*) on municipal police spending. Only the system GMM model indicates, with low significance, that the lower the political fragmentation, the higher the spending. Therefore, our coefficients confirm to some extent the second weak government approach: discrepancy politics lead to small budget changes (Alesina and Rosenthal 1994; Jones et al. 1997).

5.3 Socioeconomic

Population (*lnpopulation*) has a positive and significant impact on police expenditures per capita. The aim of this variable was to check the existence of economies of scale. The literature has found mixed results regarding this variable, and accordingly, its expected sign was uncertain. According to our results, a positive and significant coefficient both in GMM and system-GMM, we must reject the hypothesis of economies of scale. In fact, our result indicates diseconomies of scale, which agrees with Brazer (1959), Bodkin and Conklin (1971) and Jackson and Carroll (1981). It seems that population increases lead to more than proportional

increases in crime rates and therefore the police spending must be higher in per capita terms.

With respect to population density (*popdens*), the findings so far have been mixed in the literature. Our data show that there is a negative relationship between population density and the level of spending on police. High population density requires less police patrolling than small communities spread all over the territory. However, the significance is low. In this way, this result would be between Carruthers and Ulfarsson (2003, 2008), who find a negative and significant relationship, and Bodkin and Conklin (1971) and Saha (2011) with a negative but no significant impact.

The theory on sub-national government spending shows that intergovernmental transfers per capita and taxes per capita are believed to impact local expenditures (Jackson and Carroll 1981; Bails and Tieslau 2000). In agreement with the literature, our model shows that both variables (*transferh* and *cityrevenuesh*) have a significant and positive influence on police expenditures. Regarding transfers, we confirm the results of Brazer (1959), Bodkin and Conklin (1971) and Carruthers and Ulfarsson (2003, 2007). With respect to taxes, our results agree with the findings of Jackson and Carroll (1981), Chamlin (1990), Carruthers and Ulfarsson (2003) and Sever and McSkimming (2004).

Furthermore, the coefficient of income (*income* = .417) is clearly higher than the coefficient of transfers (*transferh* = .008), thus we cannot confirm a *flypaper effect* on municipal police expenditures in Spain. The problem is that municipalities receive transfers to spend in all categories while our dependent variable is just one of the categories, police.

The level of unemployment (*unemployment*) has no impact on police expenditures. Therefore, our result does not agree with part of the literature, which predicts a positive relationship (Brazer 1959 and Carruthers and Ulfarsson 2008). Our not significant, positive coefficient, however, coincides with the empirical findings of Chamlin (1990) and Bails and Tieslau (2000).

Regarding immigration, our model predicts a positive impact of this variable (*immigrants*) on police spending. Specifically, considering the GMM model, a 10% immigration increase of the total population would rise police spending in 3.26€ per capita (.10 × 32.582€). There are some works with a similar finding: Chamlin (1990), Jackson and Carroll (1981), Alesina et al. (1999) and Carruthers and Ulfarsson (2008).

The municipal economic level (*income*) has also a positive impact on police spending. Therefore, our models show the same result than Brazer (1959), Jackson and Carroll (1981) and Alesina et al. (1999). Our data indicate that the wealthier the citizens, the higher their concern about property felonies. This effect adds to the general pattern that the higher the economic level of Spanish municipalities, the higher the municipal spending per capita (Bastida et al. 2009).

6 Conclusions

This paper analyzes the effects of electoral cycles on municipal police expenditure. We use a database with information on Spanish local governments with more than 20,000 inhabitants for the period 2001–2008.

Our data show that incumbents increase police spending 1 year before the elections. The adjustment (reduction) of the spending appears in the most distant year to elections, i.e., election ±2 years. Therefore, we confirm the existence of an electoral budget cycle on police expenditure in Spain.

Regarding political ideology, we find that conservative parties are associated with increased spending on public safety. In respect of political strength, our data confirm to some extent the second weak government approach: discrepancy politics lead to small budget changes. In other words, coalition governments lack enough ability to increase strategically police spending to increase electoral chances.

Population has a positive and significant impact on police expenditures per capita. This result indicates diseconomies of scale. With respect to population density, the findings so far have been mixed in the literature. Our data fit this unclear pattern, since do not allow us to unambiguously confirm a clear relationship between population density and police expenditures. We can just provide some evidence of a negative impact.

The theory on sub-national government spending shows that intergovernmental transfers per capita and taxes per capita are believed to impact local expenditures. Our model fits this assumption, showing a significant and positive influence of both variables on police expenditures.

Finally, our model reports a positive impact of both immigration and economic level on police spending, as a wide literature predicts.

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