PUBLIC EXPENDITURE DYNAMICS IN SPAIN: A SIMPLIFIED MODEL OF ITS DETERMINANTS

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ABSTRACT

Public expenditure increase is explained by very diverse models. There are very simplified models, even though some have a strong theoretical background (e.g. Wagner's Law or the Displacement Effect), and others based on empirical rather than theoretical aspects. In an intermediate position, there are models of determinants of public expenditure from the demand and supply perspectives. In both cases we base our study on multivariant models that express public expenditure as a variable which depends on many factors. However, while demand models are strongly supported by the theory (model) of the median voter (Borcherding and Deacon, 1972 and Bergstrom and Goodman, 1973), supply models are based on a simple Cobb-Douglas equation.

It would be highly interesting to synthesize both kinds of influence. However, the design of this model and its empirical contrast is most complex due to the high number of variables that should be included which would lead to serious problems of endogeneity and multicollinearity. Also, the existence of very limited statistical data would to lead an important lack of degrees of freedom.

INTRODUCCIÓN

Public expenditure increase is explained by very diverse models. There are very simplified models, even though some have a strong theoretical background (e.g. Wagner's Law or the Displacement Effect), and others based on empirical rather than theoretical aspects. In an intermediate position, there are models of determinants of public expenditure from the demand and supply perspectives. In both cases we base our study on multivariant models that express public expenditure as a variable which depends on many factors. However, while demand models are strongly supported by the theory (model) of the median voter (Borcherding and Deacon, 1972 and Bergstrom and Goodman, 1973), supply models are based on a simple Cobb-Douglas equation.

It would be highly interesting to synthesize both kinds of influence. However, the design of this model and its empirical contrast is most complex due to the high number of variables that should be included which would lead to serious problems of endogeneity and multicollinearity. Also, the existence of very limited statistical data would to lead an important lack of degrees of freedom.

Given these limitations this paper presents two separate, but also complementary, synthetic models in order to analyse the determinants of public expenditure increase from the demand and supply perspectives.

The explanations related to the supply perspective are residual in relation to the demand of public sector growth due to citizens´ demand and they reflect the preferences of the State or the public servants.

1. THE DEMAND PERSPECTIVE

1.1. Introduction

The main body of literature on the increase in public expenditure confirms that the use of bivariant models leads us to contradictory and non realistic results[1]. Traditionally, economists have focused their analysis of secular increase in government size only on the economic dimensions of the problem, while policy experts have focused on its political dimensions. The inferences that have been obtained from these analyses are that the government operates within a political

[1] The complexity related to one-variable explanations is not mainly due to the fact that they are non-valid, but to the fact that they are incomplete. It implies that they include explanatory equations that are not properly specified since they exclude all the other relevant dependent variables. In addition, these theories, which are very simple, have very little empirical support.

or economic emptiness. However, the size of governmental expenditure is not only determined by political or economic factors, but also by the prevalent political and/or economic structures.

There is no single fully accepted or contrasted theory in this field. Indeed, there exists a great variety of theoretical approximations. As Lowery and Berry (1983) point out "the existent literature shows a great number of very simple models that are separated paying very little attention or no attention at all to the theoretical integration". However, a quantitative model that aims to explain the increase in the government size must incorporate elements from different theories within a coherent scheme.

This is our intention in this paper. We formulate our model of determinants of demand following Larkey, Stolp and Winer (1984), Bocherding (1985), Henrekson and Lybeck (1988) and Hackl, Schneider and Withers (1995). In this first section we shall focus our attention on the demand side, introducing the supply side in the next section.

Studies on the demand of public goods are based on the assumption that governments adjust their size in response to the preferences of the citizens, which is called by Buchanan (1977) "responsible" government, in contrast to "excessive" government which operates independently of people and produces effects far from citizens´s demand (Henrekson y Lybeck, 1988). The term responsible government means that the government decides in a neutral manner in relation to the result of their decision. Therefore, the changes in public sector size are considered a function of natural technological and economic processes, and new preferences reflected in governmental institutions. These institutions are not supposed to affect the decisions on government size, but to exactly reflect the demands of the citizens. From an analytical perspective this is equivalent to assuming that the supply of public goods and services is perfectly elastic.

We can distinguish two types of determinants of increase in governmental budgets: institutional and non-institutional. The institutional component corresponds to a political explanation in terms of political practices, groups and behavioural rules (Borcherding, 1985; Hackl, Schneider y Withers, 1995). According to Sorensen (1988), understanding the role of institutions implies answering these questions: Which is the impact of increase in political participation and the equality of political rights on the increase in public expenditure?; Which is the role of legislation and institutional agreements on the evolution of public expenditure? The non-institutional factors refer to structural economic variables which reflect underlying preferences.

This first section is organised as follows: part II defines alternative measures of government size (the dependent variable); part III considers the economic determinants; part IV explains the political determinants; part V presents different models; finally, part VI summarises the section and concludes.

1.2. Choice of the dependent variable

When choosing the proper dependent variable we face three decisions (Tussing and Hewnning, 1974; Larkey, Stolp y Winer, 1984; Abizadeh and Yousefi, 1988; Henrekson and Lybeck, 1988). The first one is the measurement of public expenditure size and its growth. The second one is the inclusion or exclusion of expenditures related to transfers in the total amount of public expenditures. Finally, we face the possibility of using real values (adjusted) or nominal values (non-adjusted).

In relation to the first question, most research works use either public expenditure in absolute value, or the ratio Public Expenditure over GDP. The latter corresponds to Musgrave's definition, which is the most widely accepted measure of government size. Researchers in favour of this measure include Bird (1970), Lewis-Beck and Rice (1985), Abizadeh and Yousefi (1988)[2].

In relation to the second option, the two main components of aggregate expenditure, public consumption (governmental purchases of goods and services) and transfers, have increased at very different rates[3]. From a theoretical perspective, it is not clear that the determinants of both components are identical. The fact that transfers do not deviate resources from the private economy to the government, which is the case for public consumption, may lead us not to consider them as government expenditure. Instead of deviating resources, the government acts as an intermediary, redistributing the income from some individuals to others (Lewis-Beck and Rice, 1985). However, the exclusion of transfer expenditure when computing total public expenditures would change the value of the PE/GDP ratio. This would give us a new measure of the ratio and any conclusions based on it would differ from the conclusions based on analysis that include all governmental expenditure (Abizadeh and Yousefi, 1988). In addition, the taxes needed in order to accomplish transfer payments imply a real charge on the taxpayer. Following Buchanan and Flowers (1975) this is such as real a cost as the purchase of tanks, planes or paper clips. Also, the consumption made possible by transfers is a result of governmental action. It means that the redistribution of income is highly influenced by the government (Lewis-Beck and Rice, 1985).

[2] Some authors argue that the ratio can increase not only if public expenditure grows, but also if GDP decreases. This is not the case in Spain since not only public expenditure, but also the GDP have continuously increased in real terms during the period under study (although it is true that public expenditure has increased more rapidly). Therefore the quotient between these variables reflects the increasing participation of public expenditure in a growth economy.

[3] In Spain, transfer expenditure in real terms has increased 26 fold during the period 1958-1995,while public consumption has increased 13 fold.

In relation to the use of deflated or non deflated measures of public sector size, we find different points of view. Some researchers use real values instead of nominal ones. The main argument is that the public sector inflation rate is usually higher than the overall inflation rate in the economy (Abizadeh and Yousefi, 1988). Thus, the relative size of the public sector may be over-estimated, except if governmental expenditure and GDP are deflected with respective deflectors. For example, Buchanan and Flowers (1980) suggest that the use of non-adjusted values will reflect both changes in prices and changes in the real role of the government in the economy. Therefore, if the studied period is too long, this problem should be avoided using real values. Beck (1981) concludes that in most countries public consumption has not increased at the same rate as GDP in real terms.

On the other hand, Musgrave and Musgrave (1980) argue that the non-adjusted ratio gives more realistic information about the public sector size relative to the value of the total output of the economy, and the proportion of private income that must be spent in taxes. Musgrave (1981) suggests that given the assumption that public services are valued according to their cost, they are preferred. Finally, Lewis-Beck and Rice (1985) suggest that the non-adjusted measure is better than the adjusted one because it gives more realistic information about the importance of the government´ authority. In addition, they argue that when using regression analysis to estimate a model to explain the public sector increase, the use of non-adjusted values does not cause problems since the higher inflation that could exist is controlled by the constant term instead of the perturbation.

Joulfain and Mookerjee (1990) explain that due to the difficulty of identifying an appropriate deflector for public expenditures, nominal values must be used. In addition, the possibility of data perturbation by using a wrong deflector disappears when variables are expressed in current prices. Another reason is the importance of nominal income to account for monetary illusion.

Finally, Imbeau et al (2001), argue that the PE/GDP ratio can increase due to two reasons: 1) the public sector can increase as a result of an upsurge in the amount and kind of goods and services offered; 2) the cost of providing a constant level of goods and services can increase at a different rate in the public sector versus the private sector. Therefore, we can define three drivers of public expenditure growth: 1) increase due to a higher governmental activity or real growth; 2) increase due to higher costs of providing public services and goods, or the deflector effect and 3) the increase in the PE/GDP ratio or nominal growth which is due to the combined impact of both variables.

Based on the singular criteria of Joulfain and Mookerjee (1990) and Imbeau et al (2001) we consider the PE/GDP ratio (both of them in nominal value) as the dependant variable.

1.3. Economic-structural determinants

In order to study the economic-structural determinants we can consider some individual theories about governmental growth which are not mutually exclusive, but let us design a global and simplified model containing all of them (Tussing and Henning, 1974; Lowery and Berry, 1983; Borcherding, 1985; Abizadeh and Yousefi, 1988; Henrekson and Lybeck, 1988; Gemmell, 1990; Hackl, Scheneider and Withers, 1995). The consideration of each theory justifies the use of the different variables of the model. First, we consider Wagner's Law. García Delgado (1995) asserts that spanish society has been undergoing a "wagnerisation process" since the 1950s. This author divides Spanish industrial development into many periods. The last of these is 1950-1995 and is called "the opening and convergence period". During this period, particularly since the 60th's, there has been a greater economic growth than in any previous period. García Delgado considers three processes in order to define the enormous change produced in the Spanish economy and society: (1) the deviation of resources from agriculture to other sectors; (2) opening to foreign markets; and (3) the enlargement of the economic capacity of the public sector.

The first of these processes reflects the important reduction of the active population working in agriculture and the general reduction of the rural population due to the significant emigration flow from rural to urban areas. García Delgado indicates that during the last four decades, the active population of the agricultural sector has decreased by at least four million people, i.e. from 38.7% of the workforce to 9.9% in 1991. The consequence was a significant change not only in the productive structure, but also in the social and territorial structure. Employment change quickly meaning that the industrial sector increased from 30.3% to 31.7% of the workforce, while the services sector increased from 31,0% to 58,4%. The shift of employees from agriculture to other sectors impelled a rapid urbanisation process, a modification of the territorial distribution of population and material resources, and the prevalence of new household structures: core family and the incorporation of women to the labour market. The rapid urbanization process is evidenced by the fact that the number of people in cities of 100,000 inhabitents grew from 1960 to 1980. The rate of growth was more than 4,000,000 of people every ten years. The activity rate of women increased from 22.39% in 1964 to 35.8% in 1994, or, in absolute values, from 2.865.900 to 5.861.100. This means that the number of employed people grew by over 1 million. Industrialisation, urbanisation, emigration and related processes have affected the social structure, thereby leading to the supremacy of the core family. These changes eliminate mechanisms of insurance and mutual protection which are characteristic of rural societies. It, therefore, becomes necessary to replace them with insurance mechanisms managed by public institutions which, within this context, are more effective than traditional mechanisms. The result is

an increase in public expenditure, specifically transfers, but also in other functions, such as health. In addition, income has increased rapidly with average annual rates of increase in relation to per capita GDP of 3.4% per year.

In order to contrast the theoretical aspects with the empirical ones mentioned above, we use the following variables: level of urbanisation[4] and total population refers to the first component and the available real income denotes the second one. In order to represent changes in the industrial structure we use the proportion of industrial employees in relation to total employment (EI), and the proportion of women in relation to the total work force (MUJ)[5] and the proportion of agricultural output over total output (VAAG/GDP). The first two variables are expected to have a positive effect on public sector size. The sign of the "income" variable is undetermined since the size of the government is measured in relation to national income. Therefore, a positive sign is consistent with income elasticity greater than 1 and vice versa. In relation to the proportion of industrial workers, a negative sign is expected, this is also the case for the proportion of agricultural output over total output; on the opposite, it is expected a positive sign in relation to the proportion of women over the total work force[6]

Secondly, we considered the effect of price. As is the case with the other demand functions, there is a price effect on the demand of public goods. These prices are rarely observed since many public goods and services are not purely public goods. Therefore, the price for an individual will be determined by the size of the beneficiary group, the percentage of cost of these goods that will be financed by the median voter, the marginal cost and the degree of publicity (Neck and Schneider,1988). However, even if there is no explicit market price for many public services, there is an explicit tax price that can be compared to the price of private goods. Whether the tax-price is clearly perceived or not will be considered by the Theory of Fiscal Illusion. If we assume this illusion does not exist, a key determinant of relative prices would be Baumol's disparity of costs, which will reflect the increase in productivity, relatively smaller in a public sector which is forced to pay growing wages as determined by the increase in salaries in the private sector. This will lead to an increase in the relative price of public output. Even though Baumol's disparity is usually classified as an explana-

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[4] Since it is impossible to know the level of urbanisation through Spanish census data we have used as "proxy " variable the proportion of agriculture employees over the total level of employment (EAG). The expected sign is negative. This variable is included by Neck and Schneider (1988) among the explicative variables of the groups of interest.

[5] This variable is included in the supply perspective as an explicative variable of the reduction of costs in tax collection.

[6] Following Tussing and Henning (1974), urbanisation and industrialisation and also the rupture of extended families require increasing public expenditure, above all in transfers and health due to the disappearance of the family safety mechanisms which characteristic of traditional societies.

tion related to the supply perspective, it must be connected to an inelastic demand in relation to price and elastic in relation to income[7]. This explanation is, therefore, related to both perspectives: supply and demand (Henrekson and Lybeck, 1988; Hackl, Schneider and Withers, 1995). Empirically, we will consider the ratio of the deflactor of public expenditure over the deflactor of private consumption as an indicator of relative price of public and private goods (DPE/DGDP). The sign is expected to be positive.

1.4. Political-institutional determinants

The political situation in Spain has experienced huge changes over the last few decades. In 1975 there was a transition from dictatorship to democracy. This change provoked an major increase in public expenditure, due not only to political considerations, but also to the demand for income redistribution from different groups of spanish society. This redistribution favoured a greater degree equity in income distribution in relation to three aspects: functional, personal and spatial (Myro, 1985). As regards to functional, the effect of the remuneration of employees on GDP tends to grow due to a gradual wage-earning transformation of the population. With respect to personal distribution, the percentage of income included within the top 10% of the population has decreased from 39.9% in 1972 to 25.4% in 1990. Also, equity has enhanced the space distribution of income. If we measure this improvement with the coefficient of the variation of per capita income among regions, Spain today has a similar distribution to that of Germany which is a country that has not experienced any variation during the last three decades.

In addition to political change, which leads to a re-definition of political and territorial organisation through the creation of Autonomous Regions ("Comunidades Autónomas") and the creation of a welfare state as an instrument in order to achieve social cohesion, we must consider the economic crisis provoked by government intervention through operation and capital subsidies to firms in financial crisis and subsidies to unemployed people.

The unemployment rate of 2.1% in 1964 had increased to 4.7% by 1975. It then increased sharply to 20.8% in 1986. The financial prosperity of the following years made enabled this rate to be reduced 16% in 1990, although it had risen to 23.9% in 1993.

The number of pensioners experienced a significant increase due to demographic factors, such as an aging population and discretionary factors, such as an

[7] If unitary cost of public sector goods grows more rapidly than the unitary cost of private goods, and demand for public goods is inelastic in relation to prize, public expenditure is expected to increase.

increase in the collective of beneficiaries and the use of retirement pensions as a way to mitigate lay-offs in cash-strapped firms. Between 1960 and 1991 the population of those over 65 years old increased from 2.5 to 5.3 million. In other words, those over 65 made up 14% of the population in 1991, as opposed to only 8% in 1960. In addition, those older than 75 make up 5% of the total population, and 41% of the population over 65 years old.

As the number of elderly has increased, the number of young people has decreased. In 1960 young people accounted for 27% of the population, compared to only 19% in 1994.

The influence of these changes on public expenditure growth can be explained through different political-institutional theories. Specifically, the influence on increased expenditure caused by the demand for income redistribution can be explained by the theory developed by Meltzer and Richard (1978, 1981, 1983), while the increase provoked by the influence of pensioners and unemployed people, i.e. non-active population, can be based on the interest groups theory.

Meltzer and Richard argue that the increase in State involvement is promoted by the ability to obtain votes and by income redistribution. When looking for votes, politicians propose many more programs than can really be developed. Each voter compares the benefits that he expects to obtain from the government expansion of programs to the costs that he expects to pay for such benefits. Voters will choose those candidates who promise to act according to their interests and they will re-elect those who really follow through their proposals.

Considering universal suffrage, and given that the median voter has a below-average income, the median voter –and all the voters in this situation– can be favoured if incomes are taxed over the average and the obtained funds are transferred to those with below- average incomes.

Therefore, governments with high public expenditure are a consequence of the differences among voters distributions and income distribution. The government spending increases when suffrage is extended to include more voters below-average the median income (the decisive voter), the increase in income provides additional funds to increase redistribution and when income distribution is less equal. However, high redistribution have also a induced by the reduced incentives to work and save money. This cost will be paid by all members of society and, therefore, it weakly reduces the growth of the government.

The government will increase because there is a decisive difference between the political and market processes. The market generates an income distribution which is less equitable than the votes distribution. Therefore, those with lower income will use the political process in order to obtain favourable programs of income redistribution. Politicians have an incentive to attract voters with incomes closer to the average offering benefits that impose a net cost to those

who have above- average incomes. The offered redistributive program varies according to region and time, when the composition of voters changes. However, the support for redistribution will continue until the reduction of incentives to work, save and invest changes future income in such way as to convert expected gains to losses.

Usually the variable used to contrast this theory is the ratio of median income to average income before taxes and transfers. Since in the case of Spain it is not possible to obtain this variable, we have considered different alternatives as proxy variables. However, none of them properly reflects the redistribution of income so it has not been possible to measure this effect.

Secondly, we take into account the redistribution for key groups: societies are divided into many strata which include groups of people who share common interests in relation to some questions. People form groups on the basis of their relative income or, less frequently, of their position in relation to labour division or other personal or social characteristics. The number of groups and their importance is usually associated to the increasing specialisation of the economy, the level of income, the reduction of information and transaction costs, the amplitude of non-competitive markets and protectionism.

The government can provide private goods to specific groups and divide their cost among the whole population. Those groups lobby to obtain the provision of specific benefits. Given that the population does not have an exact perception of the costs or benefits of a program, costs can be over-distributed without having a direct relationship to the program, and benefits can be overestimated. Therefore, each group can demand lower taxes and higher subsidies for part of the society. The level of satisfaction of each group has a relatively small cost since the increase in taxes is distributed among all the voters, but it produces a high benefit from satisfied voters to the party in government. Aranson and Ordeshook (1977) show that there are many situations in which the government can continue providing private goods even if their costs are higher than their benefits. The result could be modelled as a prisoner dilemma with n people. All the lobbies could prefer that nobody obtained their private good from the government. However, it would not imply that they have no motivation to press to obtain the good they desire.

Even though the existence of lobby groups is not per se a factor of increase in the public sector, there are imperfections in the political market (such as differences in information, transaction and pressure costs for different groups) that allow the development of coalitions to extract resources for their own benefit. Thus, at a specific moment, the size of the government is a product of the ability of groups to obtain governmental funds. One of the factors driving the strength of a group is the number of individuals in the group. Thus, large socio-economic groups, probably have a great influence on public expenditure.

Examples of these groups include those demanding funds and health services for pensioners, or the demand of public policies to improve education, or demands from unemployed. These socio-economic groups influence the size of government through their demand for public policies. In addition, they can change the size of public expenditure over a period of time. For example, an increase in population over 65 years old would cause an increase in the size of the government even if the demand for medical care and pensions is kept constant. This also would happen if there were a relative increase in the young or unemployed population[8].

In order to consider this effect we include the following ratios as independent variables: population under 16 years old over total population (INACT)[9] and unemployed people over total active population (DESEMP). In both cases the expected sign is positive.

The increase in government expenditure can be also determined by the degree of liberalisation of the economy. A high industrial concentration could promote a situation where Trade Unions can grow and have a decisive influence on the government[10]. According to Cameron (1978), countries with a high degree of dependence on exports and foreign capital are exposed to pressure on prices and markets transmitted from other nations through international exchanges. According to Lewis-Beck and Rice (1985), the higher the degree of dependence on the external market, the higher the demands directed to the government to maintain economic stability, eliminating negative effects characteristic of a liberal economy on production, employment and consumption, through strategic expenditure increases. The higher the proportion of GDP related to international commerce, the more sensitive is to international economic shocks the economy of a country. An internationally induced shock will press politicians to develop programs to help people adversely affected by changes in commerce and international markets. The higher the output of the country is, the higher these influences or pressures will be.

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[8] Lowery and Berry (1983) include these variables among those derived from Wagner's Law.

[9] We can consider two independent variables: the proportion of people under 16 years old and the proportion of people over 65 years old, since these groups do not have the same level of political influence. People under 16 cannot vote and they do nor have the common interests and the political organisation senior citizens have. The larger the proportion of young people, the higher demand for education and nurseries, while the higher the proportion of old people, the higher the demand to maintain income (pensions) and health programs focused on senior citizens. Although both are expected to have a positive influence, it is likely that the variable related to citizens senior will have a higher influence on the dependent variable (Abizadeh and Yousefi, 1988; Huang and McDonnell, 1997).

[10] This idea is not very relevant in Spain, where the power of Trade Unions is mainly concentrated on public sector.

Liberalisation is a reasonable measure of the dependence of the country on external exchanges, as it refers to the economic development and diversification in a country and is considered a barometer of the general economic and domestic policy. Any country with a strong reliance on the external market is subject to the distortion provoked by international shocks. If governmental policies try to protect the domestic economy from the different fluctuations originated in foreign countries, a relatively large foreign sector requires a high level of governmental participation, so the ratio of expenditure will increase accordingly in the same direction. In order to contrast this effect we consider the degree of openness or liberalisation, represented by the ratio of exports plus imports over GDP (APERT). The expected sign is positive. This variable can also be considered as a proxy for the effect of Trade Unions on the government, since open economies tend to present large industrial concentrations that favour stronger Trade Unions. (Neck and Schneider, 1988).

A third factor driving increase in public expenditure is the degree of fiscal illusion[11]. Pommerehne and Schneider (1978) define fiscal illusion as "the erroneous and systematic perception of individuals about the volume of their tax burden they support, and about the benefits they obtain from public expenditure and their effect on decisions relative to public expenditure according to the different institutions collectively chosen".

This erroneous perception underestimates the real cost of public goods and services and induces inefficiently high demand.

The fiscal illusion is interpreted in the literature as a systematic underestimation of the charge over the individual caused by the limited visibility of the different taxes and other public incomes. In general, we can distinguish three causes of the restricted visibility of fiscal charge (Wagner, 1976; Pommerehne and Schneider, 1978):

a) The cost of information due to assessment methods and public income distribution. Direct taxes, such as those on individual income, are more visible for individuals than indirect ones. In addition, the perception of the real tax burden decreases when taxes are paid as wage-retention.

b) The cost of information due to the temporal distribution of taxes assessment. Taxpayers consider it costlier to pay taxes at once than to pay them in smaller amounts on a regular basis. If expenditure is financed by selling public properties or incurring debts (which implies paying taxes in the future), the individual does not perceive any fiscal charge.

[11] This explanation is included by Lowery and Berry (1983) among those that cause an excess of public expenditure which are those on which institutions operate in order to expand the percentage of governmental expenditure in the economy, above the size demanded by the public.

c) The cost of information based on the complexity of the income system. A complex structure based on income from taxes makes difficult to taxpayers to assess their fiscal cost.

These three causes are observed in Spain during the period of study. Before the reform started in 1977, the Spanish tax system was considered a Latin system based on taxes affecting the product of some objects, such as rustic or urban goods, real estate, business activities, which combine capital and labour and the rendering of services. These taxes are complemented with income taxes. During the long period of predominance of this system –from 1845– there were two interesting reforms (Tamames, 1993). The reform of 1957 established a voluntary regime of agreements with groups of taxpayers that allowed the individual distribution of the global sum that the administration allocated to a specific industry or activity in the case of variable tax base. Through this "distribution" system the government collected taxes on business activities, on the wages of liberal professionals (physicians, lawyers, etc.). The new distribution system was also an instrument to fix the corporation tax. The main disadvantage of this fiscal system was that it implied a transaction between taxpayers and the Administration. In fact, the Administration renounced knowing the real tax base and delegated its power over taxes these groups which could influence prices through taxes (inflationary effect) and obtain important additional profit by avoiding the retained taxes (fiscal incomes).

The second reform, in 1964, has two virtues, the individualization of direct taxes and the arrangement of indirect taxes. The main disadvantages of the reform include the reaffirmation of the global assessment principle introduced in 1957 and the persistence of an excessive emphasis on indirect taxes.

In general terms, the main defects of the Latin System are originated by the inadequate correspondence between the fiscal structure and any modern economic and social structure (Albi et al, 2000). The income elasticity of these systems is not enough to adapt tax-collection and support the increase in public expenditure. Its collection capacity is little and insufficient to satisfy the current needs and goals of states. At the same time, the requirements of equity of tax systems demanded at present cannot be achieved without individual income tax.

The European tax system does not accept taxes on products since they are considered non-effective and unfair. On the contrary, it adopts individual income taxes and companies. Among indirect taxes the volume of sales is the subject charged, mainly, through added value tax.

Before the 1977 reform prevailed indirect taxes over direct taxes. In 1958 direct taxes were 71,7% of indirect taxes falling to 55% in 1963 and in 1964 when the reform increased the importance of indirect taxes, even more 47.5%. However, the 1978 reform changed the situation. In 1979 the percentage was

92.5% which represented an important increase in tax collection due to direct taxes. This trend continued and in 1993 the percentage had reached 124.2%.

Since 1979, public budgets presented deficit. Before 1984 the Spanish Central Bank was used to finance the deficit. Afterwards, it was financed through the emission of public debt.

The characteristics of the tax system described above make possible the existence of fiscal illusion. Thus, during the first period, there was a predominance of indirect taxes over direct taxes or tax-collection provided by direct taxes on wages. During the second period, the retention was due to individual income taxes, fractionated tax payments or finance through other resources than taxes. In addition, given the complexity of the tax system, it is difficult for taxpayers to assess their fiscal burden.

In order to contrast the three mentioned effects we include the following explicative variables: the proportion of direct taxes over the total amount of taxes (IMPDIR), the deficit of the government (DEF) and a Herfindahl index (HERF) (Wagner, 1976) which reflects the complexity of the tax system and is defined as follows:

$$HERF = \sum (TP_i)^2$$

where TP_i is the proportion of the category of income i over the total of public receipt. The smaller this index, the greater the complexity of the tax system. A positive sign is expected for the first (IMPDIR) and the third ones (HERF) and a negative sign is expected for the governmental deficit.

Inflation makes that a progressive tax on rent with non-indexed tax-brackets increases tax collection. When inflation pushes the taxpayer to higher marginal sections, it produces a real increase in public taxes, which is followed by expenditure. This explanation known as bracket creep is, according Larkey, Stolp and Winer (1984), a brilliant idea instead of an explicative theory of public expenditure increase.

However, in order to contrast this effect we include the consumer price index as an explicative variable (IPC)[12]. The expected sign is positive.

1.5. Formulation and empirical contrast of the model

The theoretical model we use is based on Borcherding and Deacon (1972) and Bergstrom and Goodman (1973). We start from the demand equation of an median voter:

$$LnQ = \alpha + \beta LnT + \gamma LnV + \sum \lambda_i Lnm_i \qquad (5.1)$$

[12] However, it is true, that in Spain during the period we study, indexes have not been used frequently.

Where Q is the quantity of governmental services consumed by the median voter, T is the tax price perceived by the voter, V is his/her income, m_i are variables measuring political changes and β and γ are income and price elasticities.

Even though the variable Q is not directly observable, this is not the case for the total amount of goods and services produced by the public sector. The relation among them is given by $Q = G/C.1/N^{\theta}$ where G is total public expenditure, C is the unit cost of governmental services and N is the total population. The coefficient θ represents the level of privacy or publicity of public services. $\theta = 0$ implies that goods are purely public goods; $\theta = 1$ if their cost is proportional to population (quasi-private goods) and $\theta > 1$ if there is an exclusion effect in relation to the unit cost of the services provided by the government. Substituting Q by $G = QCN^{\theta}$ we obtain:

$$LnG = \alpha + \beta LnT + \gamma LnV + \theta LnN + \sum \lambda_i Lnm_i \qquad (5.2)$$

And given that T = C*F where C is the unit cost of governmental services and F is the tax participation of governmental services paid by median tax payer, i.e., the total fraction of public expenditures paid by the median taxpayer through her taxes I. It implies that F = (I/G).(1/N). Therefore we obtain:

$$LnG = \alpha + \beta Ln(I/G) + (1+\beta)LnC + \gamma LnV + (1-\beta+\theta)lnN + \sum \lambda_i Lnm_i \quad (5.3)$$

We call the income level of the median voter Y, and the ratio median income to average income. We obtain the equation we want to contrast multiplying by Y/Y.

$$LnG = \alpha + \beta Ln(I/G) + (1+\beta)LnC + \gamma LnY + Lnk + (1-\beta+\theta)LnN + \sum \lambda_i Lnm_i \quad (5.4)$$

As we have pointed out, the use of temporal series variables introduces spurious regression problems if the variables have a different order of integration and there is no co-integration among them. To address this problem, the analysis will include the following steps: first, we will establish the order of integration of the variables using the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Secondly, we apply the co-integration test of Engle and Granger and the Maximum Likelihood procedure of Johansen. These two procedures enable us to establish the co-integration vectors among the variables. These co-integration vectors represent the long-term relations among variables, and they allow us to establish the long-term determinants of public expenditure.

We can consider separately two kinds of explanation. First, we can study the co-integration relations among the dependent variable and the so-called economic-structural determinants. Second, we can consider the effect of the political-institutional variables.

Table 1.1

UNIT ROOTS TEST

Series	PGD	Number of lags	ADF statistic	PP statistic	Conclusions
LnGPPIB	Drift/Trend	0	-0.8868	-1.2365	I(1) with drift
LnMUJ	Drift/Trend	1	-2.832	-2.141	I(1) with drift
LnDGPDPIB	Drift/Trend	0	-1.67	-1.56	I(1) with drift
LnEAG	Drift/Trend	5	-3.544	-1.5333	I(1) with drift
LNPRODAG	Drift/Trend	1	-3.096	-2.89	I(1) with drift
LnEI	Drift/Trend	1	0.30	0.38	I(1) with drift
LnPOB	Drift/Trend	2	-0.88	0.8	I(1) with drift
Critical Values			-3.5731	-3.5614	

We observe that all the series are I(1) which allows us to consider the original series for the accomplishment of the co-integration tests.

In order to apply the procedure of Engle and Granger we develop a unitary roots test of the residuals of the equation estimated by OLS.

In order to use Johansen´s procedure we must take into account that the series have a trend so we include a constant not only in the CE but also in the VAR. In order to choose the number of lags we consider the unconstrained VAR. That number is chosen through information criteria (AIC and SBC). Two lags are selected in relation to VAR, and only one lag in relation to the co-integration equation. Through the trace statistic we would have 5 co-integration relations maximum (at 5%) and 4 (at 1%), while the contrast of eigenvalues represent only one vector of co-integration. The normalised equation is the following:

$$\underset{}{\text{LnGPPIB}} = \underset{(0.08)}{-1.92\text{LnEI}} + \underset{(0.03)}{0.25\text{LnEA}} + \underset{(0.04)}{0.29\text{LnPRODAG}} +$$

$$\underset{(0.17)}{5.42\text{LnPOB}} + \underset{(0.1)}{0.709\text{LnDGPDPIB}} + \underset{(0.07)}{0.34\text{LMUJ}}$$

All the variables, except for the LPRODAGRAR variable have the expected sign. The relation implies a positive elasticity (exclusion effect) of population over the level of public expenditure. The increase in the level of urbanisation, given by the proxy variable LnEAG, implies an increase in public expenditure and also changes in the industrial structure represented by LnEI and LnMUJ. However, we do not find any influence due to per capita income.

In order to develop the analysis through political-institutional determinants we would have the following table:

Table 1.2

UNIT ROOTS TEST

Series	DGP	Number of lags	ADF statistic	PP statistic	Conclusions
LnGPPIB	Drift/Trend	0	-0.8868	-1.2365	I(1) with drift
LnINACT	Drift/Trend	2	-2.76	-1.19	I(1) with drift
LnDESEMP	Drift/Trend	2	-1.68	-1.93	I(1) with drift
LnAPERT	Drift/Trend	1	-2.78	-2.49	I(1) with drift
LnIMPDIR	Drift/Trend	4	-1.77	-1.28	I(1) with drift
LnHERF	Drift/Trend	1	-1.64	-1.57	I(1) with drift
LnIPC	Drift/Trend	4	-1.06	-0.92	I(1) with drift
Critical Values			-3.58	-3.56	I(1) with drift

Given that all the variables are I(1) we can consider the original series to develop the co-integration tests.

The Engle and Granger test considers the OLS estimation and the ADF contrast of the perturbation term. The perturbation term is not stationary so this test does not provide any vector of co-integration.

Using the Johansen-Juselius method we obtain 5 vectors of co-integration using the trace test and 4 of them using the test of eigenvalues The first vector of co-integration gives us the relation among the variables of the model:

$$\underset{}{\text{LnGPPIB}} = \underset{(0.8)}{-3.16\text{LnINACT}} + \underset{(0.23)}{0.34\text{LnAPERT}} + \underset{(0.31)}{5.33\text{LnIMPDIR}} -$$
$$\underset{(0.55)}{3.2\text{LnHERF}} + \underset{(0.1)}{0.5\text{LnIPC}} + \underset{(0.04)}{0.16\text{LnDESEMP}}$$

where the standard errors are written in parenthesis. Based on the likelihood ratios obtained, we cannot accept the null hypothesis (coefficients equal 0).

1.6. Conclusions

In this part we have contrasted two different equations that allow us to consider the influence of different variables on the increase in public expenditure.

Through the first equation we have contrasted a very augmented version of Wagner's Law.

In relation to the political-institutional components most of the variables have the expected sign. The empirical results provide evidence of the existence of non-economic variables that influence the increase in public expenditure.

2. SUPPLY PERSPECTIVE: A MODEL OF DETERMINANTS

2.1. Introduction

It is difficult to argue that the evolution of public expenditure is only determined by demand. As in other markets, the political market is characterised by the fact that there are suppliers and buyers and there is no reason to believe that suppliers of public goods are merely awaiting the decisions of consumers. Instead, they are interested in the determination of public expenditure and it is likely that they participate in the decision-making process (Tarchys, 1975).

The explanations from the supply perspective give us the factors that represent the part of increase in the public sector which cannot be explained by an answer to demand of citizens for goods and services. This explanation is based on a conceptualisation of the state focused on the idea that the preferences of the state or the preferences of individuals in the government expenditure are decisive to determine the size of the public sector.

From this point of view, the increase in the Government can be explained by factors such as changes in production technology and in the composition of the work force which cause reductions in the cost of tax collection, differences in productivity between private and public sectors, intervention of officials in the design of budgets, policies of stabilisation, centralisation or decentralisation of power, etc.

This chapter addresses these and other questions. In part two we consider the different factors that influence the evolution of expenditure from the supply perspective. Part three explains the empirical evidence and part four summarises and concludes this chapter.

2.2. The determinants of public expenditure supply

In order to study the different formulations of the dependent variable we will base our exposition on the analysis developed in the previous section. Therefore, we will consider the different theories and the associated explicative variables from the supply perspective. In contrast with the demand determinants, there is not a strong theoretical basis in this case.

We classify the different arguments according to their long or short-term effects. Long-term factors include the Baumol's disparity of costs. Baumol asserted that due to the inherent technical characteristics of public services, they will tend to have lower productivity increases than services. Secularly, this will lead to a continuous growth of the relative price of the output of the public sector and, therefore, to an increase in the public sector. The variable we

must consider to test this hypothesis is the relative price of public sector output with respect to the private sector (LnDPE/DGDP). The expected sign is positive.

The second group of theories we consider is referred to civil servants or bureaucrats as budget maximizers and voters. The pioneer in relation to this analysis is Niskanen (1971). According to Niskanen, public servants prefer large budgets and monopolistic power to public production, and the control of information for legislators allow him to accomplish their goals. These preferences are explained by the fact that levels of power, salary and prestige increase with budgets.

The close relation between bureaucracy and public sector increase is expressed by Mueller (1987): “the possibility of error is likely to depend on the size and the complexity of the budget at the same time. The larger the bureaucracy is, the more difficult is to control its activity and the higher the number of people inner which will try to increase the size of bureaucracy”.

Romer and Rosenthal (1978, 1979) argue that bureaucrats can inform erroneously about the real prices and quantities of offered public goods. This depends on the size and complexity of the budget. The larger the bureaucracy, the greater the difficulties to control its activity and there will be a higher number of people who work to increase its size. Therefore, the rate of increase in bureaucracy is likely to depend on its absolute size.

Borcherding (1985) argues that it is not clear why bureaucrats have this redistributive power and politicians seem to be unable to prevent an excessive expansion of the budget. Borcherding, Bush and Spann (1977) try to rescue the original proposition of Niskanen, arguing that bureaucrats are a simple interest group, although especially effective. They lobby in order to provoke an expansion of the budget because their functions related to labour supply are less than perfectly elastic when the budget increases.

In Niskanen's model there is no waste. In other words, it supposes that public goods are produced at a minimum cost, but the quantity produced is too large. However, waste is a transfer in the form of non-monetary benefits for bureaucrats since there is a reduction of effort intensity, wages are below the competitive level, there is weak supervision, etc. Following Borcherding, Pommerehne and Schenider (1982), these transfers can be considered as a waste but also as redistributions of the effective cost of transaction.

It is well established that public employees are favourable voters to the maintenance and growth of the public sector. They will vote for politicians and parties which are favourable to the public sector. According Bush and Denzau (1977), when private sector employees become public sector employees, their desired level of public expenditure increases since their wages and the benefits they receive from public services are dependent upon public expenditure. Ac-

cording to the economic cycle, the amount of public expenditure approved will increase along with the number of voters hired as bureaucrats to execute the new activities derived from the growth of public expenditure. Over time, there will be an equilibrium characterised by high and small increase in the number of employees, who will benefit from higher wages. However, once stabilisation is reached, the level of expenditure will be much higher than the optimal which was initially preferred by median voters.

The explanatory variable used to test this theory empirically is the ratio of public employees over total number of employees (LnEMPUB). If the variable is weakly exogenous it means that the size of the bureaucracy is not restricted by economic conditions or total public expenditure. An alternative variable is the proportion of public employees´s salaries over GDP. A significantly positive impact of bureaucracy would provide evidence of the bureaucratic power to increase the public sector, which leads us to the notion of Brennan and Buchanan (1977): excessive government.

In Spain there has been an increase in the number of public employees in the direction predicted by the theory. Thus, during the period under analysis, there was an increase from 741,000 to 1,711,600 public employees. In other words, the ratio of public employees to total employment rose from 6.6 to 14.6%.

Third, we consider the influence of decentralisation on expenditure growth. This argument can be seen from both the income and expenditure points of view. Brennan and Buchanan (1977; 1980) suggest that a strong central government is more inclined to reach an internal agreement in order to obtain higher taxes from citizens; fiscal decentralisation is seen, itself, as an effective brake on the government.

Oates (1985) suggests that decentralisation can provoke losses of scale economies which can increase the cost of offering public goods, and therefore, the public sector size. Also, if governments do not intend to maximize their revenue but to satisfy “median voters”, a decentralised system of government can induce that regional median voters demand more implication from the government than central median voters. In addition, Oates argues that a decentralised government can accomplish more easily policies related to small groups of citizens. In this way, citizens would desire to greater public sector involvement through a wider range of functions and responsibilities.

A third possibility implies that cannot exist a systematic change in the relative size of the public sector when the level of centralisation changes. This leads to the hypothesis that political competition during electoral periods will ensure that governments behave in a responsible manner.

Worthintong and Dollery (1999) analyse the so-called fly paper effect, which refers to the tendency of categorical lump-sum subsidies from federal governments to state and local governments to increase public expenditure

proportionally more than the increase in income from other sources, which seems to represent an irrational behaviour on the part of the beneficiary government. The absence of fiscal responsibility of local governments when financing their expenditure through transfers from the central government has the effect of leading to excessive local expenditure through the fly paper effect.

According to Tarchys (1975), fiscal decisions made by independent entities (local regional government) below the level of central government stimulates total public expenditure. Rizzo (1985) and Legrenzi and Milas (2002) share the same argument and they find empirical evidence that fiscal decentralisation in Italy is one of the main forces that influence the increase in public expenditure in that country.

From the expenditure perspective, it is true that the establishment of autonomous political institutions in the regional and local sectors increases the visibility of public goods. Therefore, the degree of local and regional autogovernment and the decentralisation of public activities can contribute to the political legitimization and to increasing public expenditures. Following Tarchys (1975), when the decisions related to expenditures and income depend on different entities, the global volume of governmental activities tends to increase. Therefore, the division of political and fiscal responsibilities affects the growth of expenditure.

This is the scenario in Spain, where the Constitution of 1978 established the system of autonomous regions, which has been characterised by a decentralisation of expenditures. However, most of the income has been collected by the central administration. In our opinion, the decentralisation of expenditure has contributed to its increase. To support this hypothesis we will use the ratio of local entities and autonomous regions' expenditure over total expenditure (LnCAUT). The expected sign is positive.

In addition, we will study the influence of decreasing tax-collection costs on expenditure growth. Kau and Rubin (1981) consider that the reduction of taxation costs due to structural and technological changes in society have led to higher income tax. Ward (1982) explains that tax-collection costs have substantially decreased during this century because of the following reasons: 1) the industrialisation, urbanisation and desagrarization process have led to the transfer of more functions to the market with the corresponding increase in the possibilities of imposing taxes; 2) the increasing specialisation and division of labour have reduced the percentage of autonomous workers and, since employees' incomes imply costs for the employers, the employer will inform properly about those payments; 3) witholding of tax (withholding at source) and the use of information technology have increased the possibility of collecting taxes at a lower cost. In short, it can be said that the costs of tax-collection have decreased and

the number of taxpayers has increased. This effect is measured using the percentage of women participation in the labour market as an explanatory variable (LnMUJ). The expected sign is positive.

The establishment of democracy can be an important determinant of expenditure increase, since a state with sovereignty and where citizens consider parliamentarians as legitimate representatives will have better ability to collect taxes than states without these characteristics. Therefore, the introduction of democracy can be considered an important variable to explain public sector size. The variable used is a dummy variable that represents the structural change on the political system (DEMO).

The short-term factor includes, those referred to contra-cyclic policies or stabilisation policies. Governments usually respond to recessions by increasing expenditure. The stabilisation procedures refer to both monetary and fiscal policies which are expected to have effects on expenditure increase in the long-term. The most important goals of the short-term stabilisation policies are total employment and prices stability. Public expenditure is expected to be positively related to changes in unemployement rates (LnDESEMP) and negatively related to changes in inflation rates (LnIPC).

The main goal of the Moncloa agreements (Pactos de la Moncloa, 1978), was to start a policy of stabilisation in global terms, including agreements among the different political parties. Some stability policies, especially in the monetary sector, were carried out during the socialist period, after an initial period of adjustment that affected the overall industrial sector. Since the participation of Spain in the European Union these initiatives have been developed more intensively.

Secondly, we consider the ideology of the party in government. Many authors argue that social-democratic governments might tend to increase public expenditure more rapidly than conservative governments. However, there is no clear evidence of this, since less conservative governments might target only some types of expenditure (e.g. transfers and health expenditure), but not others. This effect is measured by including a dummy variable that takes the value 1 for the years 1982-1995, when Spain had a socialist government, and 0 otherwise.

Third, we consider the possibility that the budget keeps increasing due to incremental growth. Wildavsky (1964, 1985) argues that the most important determining factor of budget size and content is last year budget. Even if the budgetary process allowed all public expenditures to be revised annually, it would be highly complex to examine the functioning programs in an effective way. Thus, incremental growth would be the easiest way to proceed. This implies that the revision of budgets would be accomplished only when there is a large accumulated experience. The adopted policies will probably be considered

valid during a long period of time and they will only be affected by significant changes in information and the environment. This argument is not without its critics. Sorensen (1988) says that there are many way to explain an incremental development. First, marginal changes in the budget can be due to marginal increases in income, inflation or marginal changes in the demand for public sector goods. Second, even though the incremental model can explain marginal adjustments in relation to an existent budgetary basis, it cannot explain the size of these increments nor the basis itself. It is also difficult to separate the changes that can be considered incremental from those that are not. Finally, it seems the model depicts the budget preparation as a harmonious process highly determined by internal routines and rational calculations of legislators and officials. The explanatory variable used to study the persistence of government expenditure is the dependent variable lagged one period.

The last theory to consider is the one that relates electoral periods to expenditure increase. According to the models of political business cycles, dates of general elections influence governmental expenditure as the government tries to buy votes by increasing expenditure targeted at certain groups of voters. Lowery and Berry (1985), suggest that the proximity of elections and a high level of competition among parties will push government growth, and result in greater total governmental activity. The variable computed to consider this effect is a dummy variable with value 1 for the electoral years and 0 otherwise(ELECC)[13].

2.3. Empirical analysis of the model

In contrast with the demand model, in which the theoretical background was firmly based on the median voter theory, from the supply perspective there is not a specific model to explain properly the effect on public expenditure. Thus, the analysis is made by using an ad-hoc supply equation of Cobb-Douglas:

$$G = \sum \varphi_i \mathrm{Ln} X_i$$

where X_i are the explanatory variables that represent the determinants mentioned above.

Once again previously, we use the unit roots and co-integration theory.

In relation to the long-term model, we analyse the nature of series. We use the sequential procedure of Holden and Perman (1994) with the simplification of Elder and Kennedy (2001) in order to study the stationarity of the series. We obtain the result observed below:

[13] Given the low number of elections celebrated and the high number of variables, we have not included it in order to not decrease the degrees of freedom of the model.

Table 2.1

UNIT ROOTS TEST

Series	PGD	Number of lags	ADF Estatistic	PP Statistic	Conclusions
LnGPPIB	Drift/Trend	0	-0.8868	-1.2365	I(1) with drift
LnMUJ	Drift/Trend	1	-2.832	-2.141	I(1) with drift
LnDGPDPIB	Drift/Trend	0	-1.67	-1.56	I(1) with drift
LnEMPPUB	Drift/Trend	1	-0.721734	-0.15	I(1) with drift
LnCAUT	Drift/Trend	1	-2.6998	-1.818	I(1) with drift
DEMO		0	-1.5853	-1.26	I(1)
Critical Values			-3.5731	-3.5614	

We observe that all the series are I(1) which allows us to consider the original series to develop the co-integration contrasts.

Applying Engle and Granger's procedure we run a unit roots test of the residuals from the estimated OLS equation. We obtain an R^2 of 0.9932 and the value of the DW statistics is 1.1 which implies a spurious correlation among variables. The non-stationarity of the residuals is confirmed by a DF statistic of –3.21 in relation to a VC value of –5.35. Therefore we cannot reject the hypothesis that residuals are not stationary and the series are not co-integrated.

Following Johansen's procedure we must take into account that the series present a tendency, so we include a constant term in CE and in VAR. In order to choose the number of lags we consider an unconstrained VAR, and that number is selected through information criteria (AIC and SBC). Two lags are selected in relation to VAR and, therefore, only one lag is selected in relation to the co-integration equation. By using the trace statistic we could have four relations of co-integration (at 5%) and two (at 1%), while the contrast of the eigenvalues indicates just one vector of co-integration. The normalised equation is the following:

$$\underset{}{\text{LnGPPIB}} = \underset{(0.73)}{-5.23\,\text{LnDGPDPIB}} + \underset{(0.52)}{0.88\,\text{LnEMPPUB}} - \underset{(0.196)}{0.44\,\text{LnCAUT}} + \underset{(0.47)}{1.4\,\text{LMUJ}} + \underset{(0.17)}{0.416\,\text{DEMO}}$$

Where standard errors are in parentheses.

The hypothesis that the coefficients are equal to zero is rejected for all but the LnEMPUB variable, where we obtain a test statistic equal to 3.25 in relation to a VC of 3.85 (chi-square with 1 degree of freedom).

When re-estimating we find the same problem since in this case the non- significant variable is DEMO (the value of the statistic is 2.09).

Finally, we obtain one co-integration relation among the other four variables:

$$\underset{}{\text{LnGPPIB}} = \underset{(0.786)}{7.285\,\text{LnDGPDPIB}} + \underset{(0.16)}{1.15\,\text{LnCAUT}} + \underset{(0.64)}{2.65\,\text{LnMUJ}}$$

Where all the variables are significant and they have the expected sign.

From the long-term analysis, and using the co-integration equation, we can formulate the model to correct the error to obtain the short-term dynamics. This model incorporates the variables that influence long-term expenditure: unemployment rate, inflation, dependent variable retarded 1 period and electoral years, although given the low number of observations of the latter we have dropped it due to the lack of degrees of freedom.

We obtain the following equation:

$$\begin{aligned}\text{DLnGPPIB} = {} & 0.02 - \underset{(1.4)}{0.0048\,\text{COINT}} - \underset{(-1.4)}{0.32\,\text{DLnGGPAPAPIB}(-1)} + \underset{(-1.59)}{0.085\,\text{DLnCAUT}(-1)} + \\ & \underset{(1.31)}{0.085\,\text{DLnCAUT}} + \underset{(1.02)}{0.216\,\text{DLnDGPDPIB}(-1)} - \underset{(-2.95)}{0.7767\,\text{DLnMUJ}} - \\ & \underset{(-2.79)}{0.29\,\text{DLnIPC}} - \underset{(-0.22)}{0.001604\,\text{LnDESEMP}}\end{aligned}$$

The variable DLnIPC has the expected sign, unlike the DLnTASAPAR variable which is non- significant.

2.4. Conclusions

The determinants of public expenditure from the supply perspective are related to public authorities´ decision-making process.

Due to data limitations, in this chapter the dependent variable considered is public expenditure as a percentage of GDP in nominal terms. For other variables we had reliable and detailed data.

In the final equations we obtain a long-term relationship between public expenditure and a) relative prices, b) autonomous expenditure and c) decreasing costs in tax collection. The high value of the coefficients of these variables is quite surprising. These results provide evidence that the decentralisation of power, the Baumol effect and the reduction in tax-collection costs have a direct influence on expenditure growth. In addition, the high coefficient of the percentage of women in labour markets represents influences from the demand perspective, particularly, changes in industrial structure.

In relation to the short-term factors, only the variation in inflation rates will have a significant effect on expenditure increase.

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