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Fiscal illusion, fiscal consolidation and government expenditure composition in the OECD: a dynamic panel data approach

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Abstract

Following the present atmosphere of budgetary cuts in the OECD countries we analyze the effects of fiscal consolidation in the composition of government expenditures by functions. We modify a standard median voter demand model to incorporate a form of fiscal illusion based on the idea that voters-taxpayers may not be fully aware of the true composition of government expenditures because all types of expenditures are not equally visible. Then we exploit the panel structure of the dataset – 26 OECD countries over the period 1970-1997- by GMM estimation of a dynamic model taking into account unobserved country effects and possible endogeinity of the explanatory variables. Under the assumption that governments know the relative visibility of each type of expenditure, the pattern of the last three decades indicates that defense and the non-productive economic services are the less visible expenditures. On the other hand, education and housing seem to be the more visible expenditures.

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1. Introduction

As OECD member countries have recently begun to reduce their budgets, governments will be forced to make spending decisions. Fiscal discipline will require cuts in government expenditure leading to trade-off between different functions and affecting government expenditure composition. Through its impact on the composition of public expenditures, fiscal consolidation can also affect economic growth. Some endogenous growth models incorporate the composition of government spending, among other fiscal variables, which are capable of yielding steady state effects (Devarajan et al., 1996, Kneller et al, 1999). Moreover Davoodi and Zou (1998) show that there is an optimal composition of government expenditures in which the optimal shares of each component equal its growth elasticity relative to all the function's growth elasticities. Therefore, the reduction of government expenditures can modify the composition of government expenditures approaching or deviating from its optimal structure.

Now, in this article we explore how functions of the government expenditures has been affected by government size. The pattern of the manner government expenditures size, either in expansions or contractions, have affected its allocation could shed some light on how fiscal discipline might influence public spending composition in the future. For this purpose, we will modify a standard median voter model incorporating a type of fiscal illusion based on the idea that voters may not be aware of the true composition of government expenditures because all types of expenditures are not equally visible.

In order to investigate all these aspects, in section 2 we review the existing literature on the effects of fiscal consolidation on the composition of government

expenditures. In section 3, we go on to modify the standard median voter model including a form of fiscal illusion that allows us to analyze how governments may deviate the composition of government expenditure from that demanded by the median voter. However, varying government size may be a process requiring a slow adjustment in the public expenditure allocation. Thus, in section 4, we analyze the determinants of government expenditure composition in a dynamic model framework. For this purpose we will use the Generalized Method of Moments (GMM) suggested by Arellano and Bond (1991) which, besides specific country effects, also takes account of endogeneity of the lagged dependent variable and of other explanatory variables. Finally, in section 5, we draw the most significant conclusions.

2. Fiscal consolidation and the composition of government expenditures by functions

The composition of the adjustment matters in determining the success of a stabilization plan. Zaghini (2001) and Ardagna (2001) show that fiscal consolidations that concentrate on the expenditure side are more effective at achieving household's welfare increases and long-lasting reduction of public liabilities than tax-based adjustments. Indeed, Zaghini (2001) shows that policymakers have recently shifted their priorities from a past policy of deficit financing to one of expenditure reduction policy. Furthermore, Alesina and Perotti (1995) show that adjustments among expenditures are also relevant: those based on social transfers and the wage component of public consumption are more persistent than the ones based on investments reduction and earned income tax increases. However, some articles argue that fiscal adjustments take place reducing investments because, as pointed out by Roubini and Sachs (1989) and Oxley and Martin (1991), political reasons make it easier to diminish this type of expenditure. Thus, Henrekson (1988) in the case of Sweden and Haan et al.

(1996) and Sturm (1998) for the OECD member states show that fiscal adjustment affects investments particularly.

Nevertheless, effects of fiscal consolidation on the structure of government expenditures by functions have received limited attention unlike its impact on the distribution of expenditures by economic type. Only some articles have analyzed the effect of the reduction of government expenditures in individual functions. Thus, Cashin et al. (2001) and Baqir (2002) show for a sample of developing and developed countries during 1985-1998 that when governments are faced with the need to cut overall expenditures, education and health are relatively more protected. Hicks and Kubisch (1984) also find that social spending may be more resilient to cuts in real government expenditures than defence, and that productive and infrastructure expenditures are the most vulnerable. In fact, Looney (1997) suggests that military expenditure face hard budgetary constraints.

On the other hand, Ravallion (2002) finds that fiscal consolidation in Argentina in the decade of the 80's and the 90's led to more than proportionate cuts in education, health and social security spending. Along these lines, Jonakin and Stephens (1999) reveal that countries of Central America have changed their composition of government expenditures after entering into formal agreements of adjustments and stabilization policies with international organizations. In particular these countries have reduced the shares devoted to human and physical infrastructure while at the same time increased the shares allocated to defence, transfers and interest payments.

3. Theoretical model

The base model under which the fiscal consolidation and other demographic determinants of public spending by functions are considered is the median voter model, developed from the studies of Borcherding and Deacon (1972) and Bergstrom and Goodman (1973). We will also incorporate demographic factors affecting the utility function of the median voter. To be specific, we assume that the age structure of the population and population density of the country in which the median voter lives reflects to some extent characteristics of the median voter. Therefore, we assume that the median voter maximises a utility function which not only depends on public good and services (G_i) and consumption of a composite private good (X_i) but also on the age and distance to the public services of the median voter reflected by demographic factors of the country in which he lives (Z_i), subject to a budget constraint such:

$$\max_{G_i} U(G_i, X_i, Z_i) \qquad s.t. \qquad P_{gi}G_i + X_i = Y_i \tag{1}$$

The inclusion of demographic factors in the utility function of the median voter still makes that the problem has the form of an ordinary two-good consumer problem where the price for G_i is P_{gi} and Y_i is the median income[1]. The demand for G_i will be of the form:

$$G_i = f(Y_i, P_{gi}, N_j, L); \quad j = 1, 2, 3. \tag{2}$$

where:

N_1, N_2, N_3: population in the median voter's country in the age interval of 0-15 years, 16-

[1] Note that the standard median voter model includes also per capita central government grants to median voter's municipality in the right hand side of the budget constraint equation (1). However, as this model will be used for explaining consolidated government expenditures, including all levels of administration spending, transfers between all levels of administration offset each other. Nevertheless, results should be taken with some caution since the median voter model perform less adequately in explaining public spending for higher levels of administration than for lowest level governments (Turnbull and Mitias, 1999).

64 years and over 64, respectively.

L: land area of the country where the median voter lives.

If we suppose constant elasticities, then we could express the demand as:

$$G_i = aY_i^a P_{gi}^b \left(\prod_{j=1}^{3} (N_j)^{f_j} \right) L^{f_l}; \quad \text{i} = 1,..,\text{N}. \tag{3}$$

where:

α, β, ϕ_j and ϕ_l: income, price, age and land area elasticities.

We assume non-discrimination in taxation, as Bocherding and Deacon (1972) and enable the public/private sector price ratio to be modified in the course of time (Gemmell et al., 1999). Considering that $G_i = G\, N^{-h}$, where N is total population and η the degree of congestion of public goods and services, the demand function for the total government expenditure is:

$$G = aY_i^{\,a} P_r^{\,b} N^f \prod_{j=1}^{3} N_j^{\,f_j} L^{f_l} \tag{4}$$

where:

P_r:reflects the relative prices between the public and private sector.

$f = (b+1)(h-1) + h$

To apply the median voter model to the composition of government expenditures it will be useful to assume that the demand for each of the functions of government expenditures is also decided in a median voter model framework. In fact, the median voter may have different demand functions for each of the types of spending, according to its income, price perception and demographic factors. Voters choose by majority rule the allocation of government expenditures between these different functions. That means that total government size is decided simultaneously, since it is the sum of each of the functions. In this set up, median tastes dominate if the number of voters is large relative to the number of issues and the preference peaks of the citizenry are normally distributed

over the issue space (Tullock, 1967). In addition, Turnbull and Djoundourian (1994) show that median voter demand model performs stronger when issues are multi-dimensional than in single-dimensional settings:

$$G_f = a_f Y_i^{a_f} P_{r_f}^{b_f} N^{f_f} \left(\prod_{j=1}^{3} N_j^{f_{j,f}} \right) L^{f_{j,f}}; \quad f = 1,...F. \quad \sum_{1}^{F} G_f = G$$

and

$$P_{r_f} = \left(\frac{C_f}{Px} \right); \quad C = \left(\sum_{f=1}^{8} \frac{G_f}{G} C_f \right) \tag{5}$$

where:

G_f: quantity of public goods and services devoted to function *f* demanded by the median voter-taxpayer i.

C_f: cost of a unit of public goods and services of function *f*.

$P_{f,r}$: public prices for the function *f* relative to private prices.

f : functions;

$a_f, b_f, f_f, f_{j,f}, and\ f_{l,f}$: income, price, population, age structure and land area elasticities of function *f*.

$$f_f = (b_f + 1)(h_f - 1) + h_f$$

h_f: degree of congestion of public goods and services allocated to function *f*.

We also consider that voter-taxpayers may not be aware of the true government expenditure because public spending is not totally visible. Further all types of spending are not equally visible. Hence, the perceived composition of government expenditure ($\hat{G}_f$) is a function of the actual composition (G_f) and a perception parameter (ω_f):

$$\hat{G}_f = G_f^{1+w_f} \qquad f = 1,...F; \qquad \sum_{1}^{F} G_f = G \qquad \sum_{1}^{F} \hat{G}_f = \hat{G} \tag{6}$$

Where ω_f measures the degree visibility of function *f*. A negative value of ω_f will

indicate that the perceived expenditure in function *f* is lower than the true expenditure. For these functions where the median voter perceives the true total government expenditures of this function w_f will take a value 0, i.e. is totally visible. The percentage of the expenditure in function *f* perceived by the median voter $\hat{G}_f/G_f$, is decreasing in this type of public expenditure G_f. This misperception on the true expenditure on some functions will also lead to a mismatch between total government expenditures perceived by the median voter $\hat{G}$ and true total public spending G, as long as total perception parameter *w* is negative:

$$\sum_{f=1}^{F} \hat{G}_f = \sum_{f=1}^{F} G_f^{1+w_f} = \hat{G} = G^{1+w}; \qquad (7)$$

We do not know which characteristics may be lagging behind the visibility of function *f*. However we hypothesise that governments are fully aware of the different visibility of each type of spending as well as the total perception parameter and benefit from this asymmetric information. Governments devoting more resources to more visible expenditures may be seen as offering more public services than those allocating public expenditures to less visible type of spending, even when having the same total government expenditure. Moreover, governments facing the need for budgetary cuts will reduce the less visible expenditures. For example, Roubini and Sachs (1989) and Oxley and Martin (1991), Haan et al. (1996) and Sturm (1998) claim that public investment is less visible than public consumption or transfers. Hence, when fiscal consolidation take place, this reduces investments because political reasons make it easier to diminish this less visible expenditure. Those expenditures related to long-term projects or with higher degree of pure public good nature such as defence or transport and communications may have lower visibility than social security, education, health or general public services. We do not know the total perception parameter but we will hypothesise that governments reveal the relative visibility of each type of expenditure

when expanding or contracting total government expenditure.

If we want to focus on the composition of government expenditures rather that in absolute terms, from (6) and (7) we get:

$$\frac{G_f}{G} = \left(\frac{\hat{G}_f}{\hat{G}} \right)^{\frac{1}{1+w_f}} G^{\frac{w-w_f}{1+w_f}}; \qquad f = 1,2....., F; \qquad \sum_{f=1}^{F} \frac{G_f}{G} = 1; \qquad (8)$$

That is, the residual of the variance of government expenditures devoted to a type of spending G_f/G that can not be explained by the demand of the median voter $\hat{G}_f/\hat{G}$ is expected to give indications of how governments benefit from this asymmetric information. This will be a sort of fiscal illusion affecting the structure of expenditures.

Finally, we assume that public deflator is the same across functions so that $C_f=C$ $"f$ and hence $P_{r,f}=P_r$ $"f$. Thus G_f will reflect the opportunity cost of not having assigned those resources to another function. We also assume that Y_i equals the mean income per capita in every country $\bar{Y}$ [2]. Taking into account these assumptions and replacing G by $\hat{G}$ in (4) and G_f by $\hat{G}_f$ in (5) we get:

$$\frac{G_f}{G} = \left(a_f / a\right)^{\frac{1}{1+w_f}} \bar{Y}^{\frac{a_f - a}{1+w_f}} P_r^{\frac{b_f - b}{1+w_f}} N^{\frac{f_f - f}{1+w_f}} \prod_{j=1}^{3} \left(N_j^{\frac{f_{j,f} - f_j}{1+w_f}} \right) L^{\frac{f_{l,f} - f_l}{1+w_f}} G^{\frac{w-w_f}{1+w_f}}; \quad f = 1,2....,F; \quad (9)$$

Hence, observed elasticity of each factor is affected by visibility of each type of spending[3]. In addition, elasticities in equation (9) are relative to that of the total

[2] Ideally we would specify a cost unit C_f for each type of expenditure and the median income. However, these data are not available for every country of the OECD and on yearly basis.

[3] It can be argued that population age structure and land area may not be relevant for some functions, i.e. $f_{j,f}=0$ or $f_{l,f}=0$ for some *f*. However, as long as, these variables are relevant for some any other function *f*,

government expenditure. A zero value should not be interpreted as that the determinant does not affect the demand for the public good, but that it does not do so in a way significantly different from the rest of government expenditure. Functions with low visibility will have a positive coefficient associated with total government expenditure (w-w_f) and therefore when total government expenditure decreases (increases), function f contracts (expands) more than demanded by the median voter. For these functions with higher visibility, (w-w_f) will be negative indicating that this type of spending will be protected either in contractions or expansions of government expenditures. Finally, expressing it in logarithmic form, rearranging terms and considering that the sample is estimated for a panel structure of 26 OECD countries over the period 1970-1997, we get:

$$\ln\left(\frac{G_{f,t,k}}{G_{t,k}}\right) = d_{1,f}\ln\left(\frac{a_f}{a}\right)_k + d_{2,f}\ln(\overline{Y_{t,k}}) + d_{3,f}\ln(P_{r,t,k}) + d_{4,f}\ln(N_{t,k}) + d_{5,f}\ln\left(\frac{N_{1,t,k}}{N_{t,k}}\right) + d_{6,f}\ln\left(\frac{N_{3,t,k}}{N_{t,k}}\right) + d_{7,f}\ln(L_k) + d_{8,f}\ln\left(\frac{G_{t,k}}{Y_{t,k}}\right) + \sum_{k=1}^{K} u_{k,f} + e_{t,k,f};$$

$$k: 1,2 \ldots 26 \qquad t: 1970, 1971 \ldots 1997 \qquad (10)$$

where, $d_{1,f}$=1/(1+ω_f), $d_{2,f}$=[(α_f-α)+(ω_f-ω)]/(1+ω_f), $d_{3,f}$=(β_f-β)/(1+ω_f), $d_{4,f}$=[(q_f-q)+(ω_f-ω)+($q_{1,f}$-q)+($q_{3,f}$ -q)]/(1+ω_f), $d_{5,f}$=($q_{1,f}$ -q_1)]/(1+ω_f), $d_{6,f}$=($q_{3,f}$ -q_3)]/(1+ω_f), $d_{7,f}$=($q_{l,f}$ -q_l)]/(1+ω_f), $d_{8,f}$=(ω_f-ω)/(1+ω_f), k is the country, t is the year, u_k is a dummy than takes value 1 for country k and 0 otherwise and $\varepsilon_{t,k}$ is the classical disturbance term. Country fixed effects are useful to capture preferences and institutional and historical factors specific to each

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then $f_j \neq 0$ or $f_l \neq 0$, and $(f_{j,f}\text{-}f_j) \neq 0$ or $(f_{l,f}\text{-}f_l) \neq 0$. That is, increased or decreased expenditures needs on other functions may have a significant effect on the share of the rest of the functions.

country and reflecting preferences of the median voter in the determination of the share of each function in total government expenditures. As noted earlier, we would like to take into account the different relative prices for each of the functions and the median income of each country. The actual expression we are estimating differs from the ideal estimation only by the terms $[(1+(b_f q_f)] \ln(C_f/C)$ and $q_f [(a_f-a)+(w_f-w)] \ln(Yi/\overline{Y})$. Thus if C_f were the same for all functions we would not incorporate any bias. Furthermore, the bias will be smaller as the ratio (C_f/C) approaches unity. Moreover if the ratio (C_f/C) is constant across time the omitted term would only affect to the intercept. Alternatively, under the assumption that price-elasticity $[(1+(b_f q_f)]$ is close to one for all functions we will incorporate a small bias in the estimation. On the other hand, if Yi is close to Y_i there will be small bias in the estimation, which would be zero if the assumption $Yi= Y_i$ were true. Further, if this ratio is constant over time, the bias will influence only the intercept. In fact, Gemmell et al. (1998) find that using median and mean income gives the same outcome in the case of local public spending in England and Wales, both measures are equally valid representations of the decisive voter. However, using the mean income instead of median income, we deviate from the median voter demand model including ad-hoc specifications (Mueller, 1989).

The median voter model is the most widely used in the public choice literature. This model reflects political choices of the composition of public expenditures, since public expenditure is allocated through a political mechanism. Congleton and Shugart (1990) and Congleton and Bennett (1995) show that median voter models are stronger in explaining public spending on social security and highway than interest group models. This does not mean that interest group, or other institutional or redistributive factors are not important but that median voter model hold a slight advantage over

models based on these other factors (Ahmed and Greene, 2001). However, this model is compatible with a number of other analyses of the allocation of public spending using different frameworks other than the median voter. Thus, our analysis does also permit a test of functions for which Wagner's law is particularly applicable, whereas the parameter estimation of relative prices may be also interpreted as the extent to which functions are exposure to Baumol's conjecture[4]. The population, age group and land parameters may also reflect economies of scale in the production of these functions. Finally, the visibility of each type of expenditure is compatible with two other theoretical model frameworks. On the one hand to a separately expenditure component public-choice analysis in which a leadership maximises a welfare function depending on private consumption, a expenditure function, other public expenditures and state variables subject to constraint of resources (Davoodi et al., 1999 and Gupta et al., 2001). On the other, the perception parameter its also compatible with models that adopted a consumer demand framework in which government maximizes a utility function and allocation of public consumption expenditures depend on prices of public services and total expenditures (see Tridimas, 2001, for a survey)

4. Econometric analysis

In order to test the effects of fiscal consolidation on the composition of government expenditures we will use data from the OECD publication *National Accounts. Volume II: Detailed Tables.* This source is chosen inasmuch as it offers

[4] Wagner's law postulates that as per capita income rises in industrializating nations, their public sectors will grow in relative importance, (see Peacock and Scott, 2000 for a survey on Wagner's Law). On the other hand, Baumol (1967) observed that productivity growth was lower in the public sector than in private sector, while wage increases were similar. Hence, the share of government spending in GDP will tend to grow in nominal terms.

information on the consolidated spending of all levels of government and, in addition, it follows the accrual criterion. Data from national agencies, OECD and World Bank country reports, Eurostat: *General Government Accounts and Statistics* and the IMF publication: *Government Finance Statistics*, is used on a supplementary basis so as to obtain longer statistical series and supplement the informative shortcomings of the basic source[5]. In this respect, the functions will be arranged very similar to the Classification of Functions of the Government (COFOG): public services, defense, health, education, housing, transport and communications, social security and other expenditures.

The share of each function among total government expenditures is calculated at current prices, assuming as already mentioned that the deflators across types of expenditure are the same. Relative prices are approximated as in Gemmell et al. (1999) by the ratio of the public sector deflator to the GDP deflator. Public sector deflator is the result of the weighted mean of government investments deflator, public consumption deflator and public transfers, the latter represented by the consumer price index, all obtained from the OECD: Economic Outlook and national sources. The per capita income (in Purchasing Power Parities of the 1995 dollar and in real terms of that year), population series are obtained from the OECD: National Accounts: Volume I. Main Aggregates, while the population age structure is taken from the OECD: Labour Force Statistics. Some countries did not have data prior to 1975 and have had to be completed using domestic sources.

Adapting to changed median voter demand may be a process requiring a slow adjustment in the public expenditure allocation. In fact, inertia in reformulating the budget

[5]Although IMF data covers a longer period of time, it is not as a rule consolidated for all the Public Administrations and uses the cash criterion. (see Easterly and Rebelo, 1993 and Baqir, 2002, for a discussion on the limitations of the data of this publication).

results in composition of expenditure responding very slowly to changes in the demand. Hence, we may analyse the determinants of government expenditure composition in dynamic model framework. In specifying a dynamic model we assume that actual government expenditure does not match the median voter desired level immediately, but by a partial adjustment process. The obstacles in a rapid adjustment may be found in the fact that some of the expenditures are commitments, as those related to social security or interest payments, and most of the public employees and physical stock are also fixed. Along these lines some authors have suggested that particular components of government expenditures tend to change reasonably slowly over time (Marlow and Shiers, 1999 in the case military expenditures, Gerdtham et al., 1994 for health, Fay, 2000 for transport and communications and Heinesen, 2002 for education). The way governments benefit from the different visibility of expenditures may be also obstructed because of the above mentioned reasons, and follow an adjustment process with the same speed of adjustment l:

$$\ln\left(\frac{G_{f,k,t}}{G_{k,t}}\right)=(1-l)\ln\left(\frac{G_{f,k,t-1}}{G_{k,t-1}}\right)+ld_1\ln\left(\frac{a_{f,k}}{a_k}\right)+l\,d_2\ln(\bar{Y}_{k,t})+ld_3\ln(P_{r,k,t})$$

$$+l\,d_4\ln(N_{k,t})+l\,d_5\ln(\frac{N_{1,k,t}}{N_{k,t}})+ld_6\ln(\frac{N_{3,k,t}}{N_{k,t}})+l\,d_7\ln(L_k)+ld_8\ln\left(\frac{G_{k,t}}{Y_{k,t}}\right)+$$

$$l\sum_{k=1}^{K}u_k+l\sum_{k=1}^{K}\sum_{s=1}^{S-1}u_{k,s}+le_{k,t};\qquad t:1970,...1997;\quad k:1,...26 \qquad (11)$$

The speed of adjustment l is assumed to be constant. We will use the GMM estimator suggested by Arellano and Bond (1991), based on taking first differences on (11), dropping unobservable country dummies and land area. However, taking first differences introduced bias because of the correlation between $\Delta\varepsilon_{k,t}$ and $\Delta ln(G_{f,k,t-1}/\ G_{k,t-1})$. Thus we use as instruments for $\Delta ln(G_{f,k,t-1}/G_{k,t-1})$ at least two periods lagged values of

$ln(G_{f,k,t}/ G_{k,t})$. We will also take into account endogeneity of income per capita and public sector size, taking as instruments for $\Delta ln(\bar{Y}_{k,t})$ and $\Delta ln(G_{k,t}/Y_{k,t})$ at least two lagged values of $ln(\bar{Y}_{k,t})$ and $ln(G_{k,t}/Y_{k,t})$. Note that after taking first differences we include negative first order autocorrelation in the transformed model, which would be second order serial correlation if in the original model there was already first order serial correlation. In this latter case we would have to use instruments for $\Delta ln(G_{f,k,t-1}/ G_{k,t-1})$, $\Delta ln(Y_{k,t})$ and $\Delta ln(G_{k,t}/Y_{k,t})$ at least three periods lagged values of $ln(G_{f,k,t-1}/G_{k,t-1})$, $ln(\bar{Y}_{k,t})$ and $ln(G_{k,t}/Y_{k,t})$. As Table 1 shows, there is only first order autocorrelation for most of the functions. Only in the case of other expenditures can the hypothesis of second order autocorrelation not be rejected, and thus we have used as instruments at least three lagged values of $ln(G_{f,k,t-1}/G_{k,t-1})$, $ln(\bar{Y}_{k,t})$ and $ln(G_{k,t}/Y_{k,t})$ in addition to the exogenous explanatory variables. Furthermore, the Sargan test statistic of overidentifying restrictions does not reject the validity of the instruments used. We show the results from the one-step GMM estimates, which do not underestimate standard errors and inferences from this estimates have been proved to be more reliable than inferences from the two-step GMM estimates (Blundell and Bond, 1998).

Results show that cuts in total government expenditure may fall on defence and other expenditures if it follows the same pattern as in the period 1970-1997. The share of military and other expenditures decreases in response to cuts in overall government spending. The former finding is in line with Gupta et al. (2001) for a sample of 120 developing and developed countries and Hartley and Sandler (1990), who show evidence of a constraining effect of US previous year public deficit on defence spending. However,

Davoodi et al. (1999)[6] for a sample of 130 developed and developing countries and Jonakin and Stephens (1999) for developing countries in Central America find that defence expenditures is more protected when fiscal discipline is implemented. The positive elasticity of other expenditures (interest payments and other economic services) may be suggesting that cuts in government expenditure reduce future interest payments, decreasing in turn the need for further fiscal adjustments affecting other functions (Mongelli, 1997). In fact, governments have already decreased defence expenditure during the '80s and interest payments during the '90s preserving other expenditures (Sanz and Velazquez, 2001). It may be inferred that OECD governments may have first cut defence spending and subsequently benefit from the reduction in interest payments reducing the share devoted to other expenditures.

On the other hand education shows a negative and significant relationship, suggesting that it reacts less than one-to-one to changes in government spending. Therefore reductions in public spending are associated with increases in the share of education and conversely increases in government expenditure reduce the participation of this function. These results corroborate the findings of Cashin et al.(2001) and Baqir (2002). That is, education is typically more stable than spending on other functions. In fact, Sanz and Velázquez (2001) find this function is more stable and similar in the OECD countries during the period 1970-1997. Housing also shows a negative relationship with the public sector size. We also find a negative coefficient for health as Cashin et al.(2001) and Baqir (2002), though not at a significant level. However, this result may be due to the fact that if at the margin health spending are more related to care than cure at a time of fiscal adjustment protection of these spending are not justified (Hitiris, 1999).

[6] These authors only find that cuts in the government spending to GDP ratio led to a more than proportionate reductions in defence expenditures in countries with IMF-supported programs.

The share of rest of the functions, social security, public services, health and transport and communications do not have any significant relationship with government size. Therefore these functions may be reduced proportionally if governments decrease total public spending in the future. This is an important result, since transport and communications expenditures were the main suspect for being affected by government expenditure cuts. In contrast with the studies exploring the effects of fiscal consolidation in the composition of government spending by economic type, we do not find evidence of investment, at least those related to transport and communications, being the least visible expenditure.

For the rest of factors affecting the composition of government, we find results in line with the economic literature. The effect of income changes increases the share of functions such as education, social security, health, public services and transport and communications, though these last two functions only at a 10% significance level. We do not find any significant effect of income on housing, military expenditures and other expenditures. These elasticities confirm that Wagner's law is especially applicable for cultural and welfare services: education, health and social security spending (Sturm, 1998 and Baqir, 2002). Education, health and public services are the less price elastic, which is consistent also with Baumol's conjecture, since wage and salary predominant in less price-elastic functions. Public services, defence and transport and communications are corroborated as the most pure public goods and services, a result already found by Murdoch and Sandler, (1985) and Randolph et al., (1996). These results are also compatible, from a supply economic view, with the production of public services, defence and transport and communications goods and services making it possible to take advantage

of economies of scale. Ageing increases the demand for social spending, health and social security, and reduces the share of public services, housing and other expenditures. These outcomes are also compatible with interest group theory as elderly people receive more benefits from social security and health as other age groups of population (Lindert, 1996). Moreover, we have found a negative elasticity of the share of the population over 64 years on education as Poterba (1997), but not at a significant level. It may be also inferred that production of health services has economies of scale (Luski and Weinblatt, 1998). The share of the young population increases the participation of education and health while reducing defence.

5. Conclusions

This paper explores how fiscal consolidation can affect the composition of government expenditures. Fiscal discipline will require cuts in government spending leading to trade-offs between different functions and affecting government expenditure composition. For this purpose we have used a standard median voter model in which government can affect the size of public sector perceived by the median voter. Thus, government face in the need of budgetary cuts will decrease the less visible expenditures, i.e. those long-term projects or those having long-term profitability. We have also incorporate demographic factors such as density and age structure of the population along with income and tax-price, for capturing state variables affecting the utility of the median voter.

We analyze the determinants of government expenditure composition in a dynamic model framework, since there are obstacles in a rapid adjustment. Some of the

expenditures are government commitments and most of the public employees and physical stock are also fixed. The preferred estimator is the GMM suggested by Arellano and Bond (1991) which takes into account unobserved country specific effects and possible endogeneity of the explanatory variables. Results show that future cuts in OECD government expenditure may fall on defence and other expenditures if it follows the same pattern as in the period 1970-1997. On the other hand education shows a negative and significant relationship, suggesting that react less than one-to-one to changes in government spending. That is education is typically more stable than spending on other functions. Housing also show a negative relationship with the public sector size. This outcome may be suggesting that OECD countries have reduced their needs for further budgetary cuts, decreasing above all the share devoted to defence and subsequently to interest payments. We do not find evidence of investment, at least those related to transport and communications, being the least visible expenditure. About the rest of determinants and though income has been identified as the dominant force, preferences, institutional factors, public sector size, density and age structure of the population are also determinants driven the composition of government expenditures. This is an important result since the inclusion of these variables modifies the composition of government expenditures than would be in the absence of these demographic, institutional and fiscal factors.

Recent models of Devarajan et al. (1996) and Kneller et al. (1999) underline the influence of the structure of government expenditure by functions on economic growth. Thus, fiscal consolidation can enhance growth if the share of defence is greater than its relative elasticity and if the share of education and housing is lower than their relative elasticities.

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Table 1: Results of the Generalised Method of Moments (GMM, Arellano and Bond, 1991)

Determinants	Dependent variable. Share in total government spending of:							
	Public Services	Defence	Health	Education	Housing	Transp & Comm	Other	Social Security
Intercept	0,0246 (1,70)	-0,0025 (-0,62)	-0,0048 (-0,60)	-0,0040 (-(0,77)	-0,0279 (-1,23)	-0,0059 (-0,58)	-0,0027 (-0,83)	-0,0161 (-2,52)
Lagged -1	0,5339 (1,91)	0,7946 (10,98)	0,8400 (11,08)	0,7082 (6,51)	0,7265 (4,56)	0,7476 (8,90)	0,9339 (12,45)	0,8173 (7,82)
Income	0,5440 (1,89)	-0,1426 (-0,95)	0,2520 (1,95)	0,4901 (1,99)	0,7698 (1,32)	0,3390 (1,75)	-0,0035 (-0,03)	0,4828 (2,10)
Relative Prices	0,2543 (2,31)	0,0739 (1,02)	0,3672 2,78	0,4170 (1,89)	-0,5923 (-3,63)	0,1462 (0,78)	-1,0819 (-1,83)	0,4070 (1,24)
Population	-1,2012 (-2,21)	-0.3274 (-2,63)	-0,5091 (-0,79)	-0,0924 (-0,34)	2,4207 (1,59)	-0,7018 (-2,09)	0,3927 (1,02)	0,9100 (1,24)
Government expeditures	0,1104 (0,70)	0,0273 (1,72)	-0,0199 (-0,74)	-0,0604 (-2,36)	-0,2061 (-2,22)	-0,0958 (-1,13)	0,0901 (2,15)	-0,0302 (-0,19)
Population >64 years	-0,8085 (-1,90)	-0,2015 (- 0.75)	0,6974 (2,36)	-0,0127 (-0,05)	-1,9278 (-1,75)	-0,1778 (-0,25)	-0,3230 (-1,90)	0,3136 (1,99)
Population <15 years	0,5296 (1,20)	-0.4343 (-2.08)	0,3428 (1,99)	0,4528 (1.96)	-1,6073 (-1,41)	-0,1903 (-0,72)	-0,1368 (-0,65)	0,1234 (0,54)
M1	-2,048 (26)	-2,779 (26)	-3.187 (26)	-2,155 (26)	-1,904 (26)	-3,325 (26)	-3,084 (26)	-1,274 (26)
M2	-1,281 (26)	-1,019 (26)	-0.424 (26)	-0.864 (26)	-0,440 (26)	-1,364 (26)	-1,943 (26)	-1,088 (26)
Sargant Test	18,734 (26)	37,809 (46)	72,656 (48)	68,51 (46)	33,79 (25)	97,00 (69)	53,73 (47)	20,526 (23)
Hausman Test	46,60 (0,0000)	98,07 (0,0000)	80,05 (0,0000)	-0,0440 (0,0085)	106,18 (0,0000)	115,87 (0,0000)	18,90 (0,0043)	11,78 (0,0671)
Arellano Test	215,16 (0,0000)	14,61 (0,0000)	4,62 (0,5940)	538,00 (0,0000)	23,71 (0,0006)	94,09 (0,0000)	6,80 (0,3395)	57,67 (0,0000)
Breusch-Pagan Test (chi28) 1079,069 p-value:0,0000								