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A dynamic panel data approach.

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What do OECD countries cut first at a time of fiscal adjustments?

A dynamic panel data approach.

Abstract

Following the present atmosphere of budgetary cuts we analyze the effects of fiscal consolidation on the composition of government expenditures by functions. Using a dynamic voter group decision model and exploiting the panel structure of the dataset – 26 OECD countries over the period 1970-1997- by GMM estimation we find that fiscal adjustments protect social expenditure. Nevertheless, we find that among social expenditure, those being also productive such as education and health are even more protected than those not being productive as social welfare expenditure. Moreover, fiscal adjustments do not fall primarily over the most productive expenditure, transport and communications, but over defense and economic services.

JEL Classification: H10, H50, C23, D72.

Keywords: Fiscal consolidation, Composition of government expenditure, Dynamic panel data, voter group decision model.

1. Introduction.

As OECD member countries have recently begun to reduce their budgets, countries will be forced to make spending decisions. Fiscal discipline will require cuts in government expenditure leading to trade-off between different components of government expenditure and, therefore, affecting the composition of government expenditure. Now, in this article we explore the relationship between components of the government expenditure and government size during the period 1970-1997 for a sample of 26 OECD countries to shed light on how fiscal discipline might influence public spending composition in the future.

Many authors have underscore the surprisingly little research devoted to the determinants of the composition of government expenditure (Dunne et al. 1984, Borge and Rattsø 1995, Sturm, 1998 and Tridimas, 2001). Moreover, Baqir (2002) claims that most of the studies analyzing the effects of aggregate government expenditure on its composition have focused on the economic classification of government spending. Furthermore, those few examining the functional disaggregation of government expenditure have concentrated in particular functions -primarily social expenditure including education and health (Baqir, 2002) and occasionally social welfare expenditure (Ravallion, 2002) - or in the composition of local government spending (Borge and Rattsø, 1995). This paper innovates using the functional disaggregation of consolidated government expenditure (COFOG, Classification of the Functions of the Government), being as far as we are aware, the first study on the effects of fiscal consolidation in the composition of government expenditure by functions for the OECD.

The assessment of the effects of aggregate government expenditure is of great interest in the present atmosphere of budgetary cuts and cost controls. Thus, in first place, fiscal consolidation affects economic growth through its impact on the composition of public expenditure. Along these lines, some endogenous growth models incorporate the composition of government spending 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 share of each component equals its growth elasticity relative to all the function's growth elasticities. Therefore, by changing the composition of government expenditure, fiscal consolidation can approach or deviate the structure of public spending from its optimal structure.

In order to investigate this aspect, section 2 reviews the existing literature on the effects of fiscal consolidation on the composition of government expenditures. In section 3, we go on using a voter group model following Craig and Inman (1986), which lead to stable outcomes even when issues are multidimensional. The final allocation of government expenditure is a weighted average of each group's preferred allocation. Moreover, varying the allocation of government expenditure may be a process requiring a slow adjustment. Thus, in section 4, we analyze the composition of government expenditure 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 expenditure.

During the period 1970-1997 the share of government expenditure in GDP has increased in the OECD from 30.5% in 1970 to 43.3% in 1997 (OECD: Economic Outlook and National Accounts. Volume II: Detailed Tables). However, this expansion has fluctuated in the course of the three decades. During the decade of the seventies and the early years of the eighties the public sector increased its size constantly. This trend was interrupted in 1983 when public expenditure as a share of GDP became stable. At the beginning of the nineties public expenditure increased again its size until 1995 the peak for the whole period. Thereafter, OECD countries have increasingly implement government spending reforms towards more controlled government spending and active deficit management (Tanzi and Schuknecht, 2000). Certainly, EU Member States signed the Stability and Growth Pact, 1996, which constrained their public deficits and debt levels, whereas the United States adopted the Balanced Budget Amendment. Moreover, Zaghini (2001) shows that EU Member States have accomplished cutbacks on public deficit through an expenditure reduction policy.

The reduction of the public sector size does not necessarily lead to proportional decreases in the components of government spending, but may change the composition of government expenditures by particularly affecting some of its components and protecting others. In this way, several studies have analyzed the effects of fiscal consolidation on the composition of government expenditures focusing on two specific components: public investments and social spending (including education, health and social welfare expenditure). These studies predict two different and opposite outcomes. The first strand of studies claims that fiscal adjustments will fall over investments whereas protecting

social spending. Thus, Roubini and Sachs (1989) claim that at a time of fiscal consolidation, public investments are the first to be reduced because these are the least rigid component of expenditures. Oxley and Martin (1991) also contend that political reasons make it easier to diminish or postpone investment spending than current expenditure. Furthermore, Sturm (1998) suggests that myopic governments in need of budgetary cuts reduce those less visible and long-term expenditures in order to minimize the political costs associated with government spending cutbacks. Along these lines, Henrekson (1988), for Sweden over the period 1950-1984, Sturm (1998), for a sample of 22 OECD countries over the period 1980-1992, and Jonakin and Stephens (1999) for a sample of 5 Central America countries over the period 1975-1993, find that fiscal adjustments particularly affect public investments.

Therefore, we could expect fiscal consolidation falling primarily over public investments and protecting the rest of expenditures. Actually, studies examining the effects of fiscal adjustments on pro-poor expenditures -mainly social expenditures- predict that budgetary cuts will not primarily affect social spending. Thus, Ravallion (1999) claims that if cutting expenditures save taxes to the non-poor, these voters, in turn, would be more willing to protect pro-poor expenditure. Furthermore, Ravallion (2000) contends that poor groups could build influential interest groups with Non-Governmental Organizations or non-poor groups interested in avoiding the external costs of poverty. Accordingly, Snyder and Yackovlev (2000) for a sample of 19 Latin American and Caribbean countries during the period 1970-1996 and Cashin et al. (2001) and Baqir (2002) for a sample of 179 and 167 countries during the period 1985-1998, respectively, find that education and health expenditure are isolated from fiscal adjustments

A second strand of studies predicts that budgetary cuts will fall over social expenditures and protect productive expenditures. Thus, Aubin et al. (1988) argue that reducing investments –a type of productive expenditure- has more adverse political effects than decreasing public consumption and wages because the former is more visible. Actually, Alesina et al. (1998) show that adjustments primarily based on public transfers and wages if anything, increased the probability of survival of governments over the period 1960-1995 in a sample of 19 OECD countries. Moreover, Tanzi (2000) maintains that globalization will reduce government revenues and expenditure because of the tax competition among jurisdictions and increased mobility of factors. These authors suggest that the reduction of government spending will not be proportional but affect particularly to social spending and preserve productive expenditures that enhance countries competitiveness and attractiveness to Foreign Direct Investment (FDI). Along these lines, Keen and Marchand (1997) elaborate a model in which governments encourage country competitiveness by raising above its optimal level the allocation to productive expenditures and contracting utility enhancing spending such as social welfare spending. Furthermore, Ghate and Zak (2002) elaborate a model in which politicians maximize votes whereas voters support to politicians depending not only on the transfers they receive but also on the of output growth. As a consequence, at a first stage social welfare expenditure drives the growth of government, but then a threshold emerges where in order to maintain positive output growth governments reduce aggregate government expenditure cutting social welfare expenditure. Accordingly, Tanzi and Schuknecht (1997) show that industrialized countries that have undertaken reforms in the size of public sector in the mid eighties, such as New Zealand and Chile, have accomplished it through the reduction of public subsidies and transfers. Furthermore, Ravallion (2002) finds that decreases in aggregate government expenditure in the decade of the 80's and the 90's in Argentina has led to more than

proportional cuts in education, health, housing and social security spending whereas increases in aggregate government spending did not increase at all the size of social spending.

Among productive expenditures, Kneller et al. (1999) include those devoted to general administration services, public order, defense, health, education, housing and transport and communication. Therefore, these two hypothesis agree in predicting that education and health expenditures –considered both, as social and productive spending– would be protected from fiscal adjustments but disagree in the effects of fiscal consolidation on public investments –at least those related to transport and communications- and social welfare spending.

3. Theoretical model.

The base model under which the determinants of government expenditure are usually considered is the median voter model, developed from the studies of Borchering and Deacon (1972) and Bergstrom and Goodman (1973). In this model it is assumed that citizens vote by means of a majority system, voter preferences are single-peaked and the size of the public sector is the single issue to be decided. However, Craig and Inman (1986) show that when issues are multidimensional, as the composition of government expenditure, majority rule does not lead to a stable equilibrium because any allocation can be beaten by another proposal, cycling from one proposal to another. It is required to add legislative structures to the majority rule to insure a stable allocation. Along these lines Craig and Inman (1986) propose a voter group decision model, where the final outcome, the structure-induced equilibrium, is a weighted average of each group's preferred allocation. Following Borge and Rattsø (1995), we use Craig and Inman's

model assuming that aggregate government expenditure is already determined when voter groups choose the composition of government expenditure. This assumption is also usual in the literature analyzing the composition of government expenditure or some of its components (Dunne et al. 1984, Sturm, 1998 and Baqir, 2002) including those adopting a consumer demand framework (see Tridimas, 2001 for a survey). Therefore, in this model voter groups and not governments decide which components are primarily to be reduced (increased) at times of fiscal contractions (expansions). Thus, we assume that a group h maximizes a utility function that depends on the per capita consumption of component f of government expenditures $(G_1, \dots, G_f, \dots, G_F)$, per capita private consumption (Y^h) and structural characteristics (Z) , subject to a budget constraint such:

$$\max U^h(G_1, \dots, G_f, Y^h, Z) \quad s.t. \quad \sum_{f=1}^F P_f G_f = G; \quad f = 1, \dots, F. \quad (1)$$

The inclusion of structural characteristics in the utility function still makes that the problem has the form of a consumer problem where G is the previously determined aggregate government expenditure and the price for component of government expenditure G_f is $P_f = C_f N^{\eta_f}$, where C_f is the cost of a unit of public good and service of component f , N is total population and η_f the degree of congestion of component f of public goods and services¹. Per capita private consumption Y^h is taken into account to capture the degree of complementarity or substitutability between government services and private consumption. The final outcome will be a weighted average of each group's preferred allocation:

¹ As Borchering and Deacon (1972) we assume that there is no tax discrimination, so that the tax share T for each individual is $T = 1/N$. This assumption does not introduce a significant bias in the empirical estimation, as it seems reasonable to assume that changes in price tax are inversed to changes in population (Borchering et al. 2003).

$$\left(\frac{G_f}{G}\right) = \sum_{h=1}^H \omega^h f^h(P_1, \dots, P_F, Y^h, G, N, Z); \quad f = 1, \dots, F; \quad h = 1, \dots, H. \quad \sum_{h=1}^H \omega^h = 1 \quad (2)$$

Where ω^h is the political strength of group h . We assume that this political strength is proportional to the share of each voter group in total population². Groups will be differentiated by the age structure of the population, considering three groups: population below 15 years, over 64 and between 15 and 64. Indeed, age appears to be as one of the most important characteristics shaping voter's preferred allocations. Thus, age groups may have a higher demand for those components of government expenditures for which they are the primarily beneficiaries. In fact, Gemmell et al. (1999) suggest that the omission of the age structure of the population may give rise to bias in the estimation of the rest of elasticities. Due to lack of data availability we assume that unit costs across components are equal ($C_f = C''_f$) and that each age group has the same income per capita. Therefore we cannot estimate cross-price elasticities and constrain income elasticity to be the same across age groups. On the other hand, we enable the public/private sector price ratio to be modified in the course of time, including relative prices ($P_r = C/P_x$, where P_x is the price of the private sector, Gemmell et al., 1999 and Tridimas, 2001). Replacing P_f and G_f in (2), and assuming constant elasticities, we could finally express the demand system as:

$$\left(\frac{G_f^*}{G^*}\right) = Y^{a_f} P_r^{b_f} N^{f_f} \left(\prod_{h=1}^3 \left(\frac{N_h}{N}\right)^{f_{h,f}}\right) (G^*)^{w_f}; \quad f_f = (b_f + 1)(h_f - 1) + h_f - 2h + 1 - hw_f$$

(3)

Where G_f^* is government spending in component f in real terms with $G_f = G_f^* N^{h_f}$, G^* is aggregate government spending with $G = G^* N^h$ and a_f , b_f , f_f , $f_{h,f}$ and w_f are income, price, total population, age group and aggregate government expenditure elasticities of

² Nevertheless increases in the age group may not necessarily lead to increases in the political strength because it may also raise the incentive to free ride of the former members of the group (Olson, 1965).

component f of government expenditures and h group in the age interval 0-14 years, 15-64 years and over 64, respectively. Protected components will have a government elasticity (w_f) negative indicating that the share of this type of spending will increase (decrease) as aggregate government decrease (increase). Fiscal consolidations will fall over those expenditures with positive government elasticity, whereas those expenditures with government elasticity not significantly different from zero would be reduced or increased proportionally to changes in aggregate government expenditures. The model does not explain why fiscal consolidations happen at all, as aggregate government expenditure is assumed to be previously determined, but focus on the effects of aggregate government expenditure changes on its composition. The model is consistent with the strand of studies that argue that governments reduce those expenditures associated with less political costs. Thus, voter groups decide which component's cutback they prefer more or they dislike less. Hence, governments seeking to minimize the political costs of reducing aggregate government expenditure would just cutback those components decided by voter groups. Our model would be only consistent with Keen and Marchand (1997), Tanzi (2000) and Tanzi and Schuknecht (2000) if governments reduce social spending and protect productive expenditures because this happens to be the decision of voter groups and not just the strategy of governments for encouraging the competitiveness and attractiveness to FDI of the country.

We also introduce dynamics in the model to capture that adapting to changes of voter group's demand or changes of group's political strength is a process requiring a slow adjustment. Actually, some of the government expenditures show a high degree of rigidity since some of the expenditure are previously committed, as those related to social security and public employees wages. Introducing dynamics we also match Craig and Inman's

(1986) model in that the final outcome depends not only of the group's preferred allocation but also on the status quo, reflected by the composition of government expenditure in the previous year. Actually, the incrementalist decision-making literature has shown the decisive advantage of the status quo in the determination of government expenditure (Borge and Rattsø, 1995). Finally, the model will be used for explaining consolidated government expenditures for a panel of 26 OECD countries over the period 1970-1997 (all State Members of the OECD except Poland, Czech Republic, Hungary and Slovak Republic). We consider nine components of government expenditures corresponding to the functional disaggregation of government expenditure. Components are arranged in a very similar order to the one used in the Classification of Functions of the Government (COFOG, United Nations, 2000): public services (including general administrative services and public order and law), defense, health, education, social welfare, housing, economic services (making a distinction between transport and communications and other economic services), and recreational, cultural and religious affairs. We exclude other non-classified functions (mainly interest payments) that are exogenously determined. Therefore, the share of a component is measured as the proportion of this component in the aggregate government expenditure, excluding interest payments. To sum up we have a system with demand functions for $F-1=8$ components of government expenditure and inferring coefficients for recreational, cultural and religious affairs from the budget restriction. Thus, assuming that actual composition of government expenditure does not match the voter groups' desires immediately, but by a partial adjustment process, expressing the demand functions in logarithmic form and rearranging terms, we get

$$\begin{aligned}
\ln\left(\frac{G_{f,k,t}^*}{G_{k,t}^*}\right) &= (1-I)\ln\left(\frac{G_{f,k,t-1}^*}{G_{k,t-1}^*}\right) + I\ln\left(\frac{a_{f,k}}{a_k}\right) + I(\mathbf{a}_f + \mathbf{w}_f)\ln(\bar{Y}_{k,t}) + I\mathbf{b}_f\ln(P_{r,k,t}) + \\
&+ I(\mathbf{f}_f + \mathbf{w}_f)\ln(N_{k,t}) + I\mathbf{f}_{1,f}\ln\left(\frac{N_{1,k,t}}{N_{k,t}}\right) + I\mathbf{f}_{3,f}\ln\left(\frac{N_{3,k,t}}{N_{k,t}}\right) + I\mathbf{w}_f\ln\left(\frac{G_{k,t}^*}{Y_{k,t}}\right) + I\sum_{k=1}^{K-1}u_k + I\mathbf{e}_{k,t} \\
f : 1, \dots, 8. \quad t : 1970, \dots, 1997, \quad k : 1, \dots, 26
\end{aligned} \tag{4}$$

Where λ is the constant speed of adjustment, 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 term³.

4. Data and econometric analysis.

Data for government expenditures is built on OECD publication National Accounts. Volume II: Detailed Tables. This source is chosen inasmuch as it offers information on the consolidated spending of all levels of government and, in addition, it follows the accrual criterion⁴. 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 OECD: Economic Outlook. The per capita income (in Purchasing Power Parities of the 1995 dollar and in real terms of that year), population and government expenditures series are obtained from the

³ We focus on age groups 1 and 3, the share of young and old population, since these groups do have specifically needs for public goods and services.

⁴Data 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. Although IMF data covers a longer period of time, it is not consolidated for all levels of public administrations as a rule and uses the cash criterion.

OECD: National Accounts: Volume I. Main Aggregates, whereas the age structure of the population is taken from the OECD: Labor Force Statistics. We compute permanent income per capita since demand is based on permanent income rather than on temporary income levels (Peltzman, 1980). We approximate permanent income per capita by taking a three-year moving average reducing the sample by two observations for each country.

We use the GMM estimator suggested by Arellano and Bond (1991), based on taking first differences on (4), dropping unobservable country dummies. 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 $\ln(G_{f,k,t}^*/G_{k,t}^*)$. Moreover, income per capita introduces simultaneity as government expenditure and its composition affect long run economic growth⁵. Furthermore, there might also be correlation between the equation errors and aggregate government spending. Therefore, we take as instruments for the first differences of income per capita and the size of aggregate government expenditure at least two lagged values of the levels of income per capita and the size of aggregate government expenditures. Finally, note that after taking first differences we introduce 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 at least three periods lagged values of the levels of income per capita and the size of aggregate government expenditure. As it can be seen from Table 1, the M2 tests do not reject the null

⁵ See Agell et al., 1999, for a survey on fiscal policy and economic growth. This endogenous issue has not received much attention in empirical studies (Borcherding et al. 2003). This may be due to the fact that this potential source of endogeneity is reduced considering that the size and composition of public spending effects on economic growth are likely to unfold slowly (Devarajan et al., 1996).

hypothesis of absence of second-order serial correlation. Furthermore, the Sargan test statistic of overidentifying restrictions does not reject the validity of the instruments used.

[Table 1, around here]

Focusing on the variable of interest, we find a negative and significant relationship between aggregate government expenditure and education, health and social welfare expenditure. Therefore, reductions (increases) in aggregate government expenditure increase (reduce) the share devoted to social expenditures. Thus we find some indication of social expenditure being the most isolated both from fiscal contractions or expansions. This result is in line with Dunne et al. (1984) for general current government expenditure in the UK during the period 1950-1980 and Borge and Rattsø (1995) for local expenditure in Norway during the period 1986-1989, who find that education expenditure have the property of necessities. Furthermore, our results are consistent with Snyder and Yackovlev (2000), who find that primary and secondary education spending are relatively more insulated from economic shocks and Cashin et al. (2001) and Baqir (2002), who find that at a time of budgetary cuts, not only education but also health expenditure is protected. On the other hand, public services, housing and economic services show a positive and significant relationship with aggregate government expenditures, giving indication of more than proportional reactions to changes of the size of aggregate government expenditure. Hence, it seems that at a time of fiscal contractions, budgetary cuts fall over housing, economic services and public services expenditures. Finally, we find that transport and communications and defense react proportionally to changes in the size of government expenditure.

These results do not entirely support or reject any of the two hypotheses considered.

Thus, we find that education and health expenditure are protected from fiscal cycles, as claimed by both hypotheses. Nevertheless, we do not find any indication of transport and communications, the most productive expenditure (Easterly and Rebelo, 1993) and the most associated with public investment, being particularly protected or targeted at times of fiscal adjustment, which is in contrast with both hypotheses. Finally, we find that social welfare expenditure is the most isolated spending from fiscal contractions or expansions as predicted by the first hypothesis and in sharp contrast to the second.

The rest of results are in line with the economic literature. From the speed of adjustment, it can be seen that education and defense expenditure seem to be the most rigid of the components of government expenditure. These results are in line with Dunne et al. (1984), who find that military expenditures is the component showing the most long planned expenditure character among general current government expenditure in the UK over the period 1950-1980 and Golini (1998) who suggest that education have a low speed of adjustment because most of the staff is pre-committed for long term and schools are also a fixed stock. The effect of income changes increases the share of functions such as education, social welfare, public services and transport and communications, confirming that Wagner's law is especially applicable for welfare services (Peacock and Scott, 2000). Social welfare, health, and education are the least price elastic, a result consistent with Baumol's conjecture (1967), since wage and salary predominant in health and education expenditure. Population reduces the allocation to pure public goods such as defense (Murdoch and Sandler, 1985 for Australia military demand over the period 1961-1979), transport and communications (Randolph et al., 1996, for 27 low and middle-income countries over the period 1980-1996) and economic services whereas increases merit good services as education and housing along with social welfare. Elderly population increases the demand for health and social

security as this age group receives more benefits from it than the others age groups. This result is partially consistent with Lindert (1996), who finds that ageing population is strongly and positively associated with social welfare spending for a panel of 19 OECD countries during the period 1960-1981. Nevertheless, this author does not find any significant effect of elderly population on health expenditure. We also find evidence of elderly reducing the share of education in total government expenditure corroborating the findings of Bergstrom et al. (1982) for individual survey data in Michigan in 1978, Borge and Rattsø (1995) for local public spending in Norway during the period 1986-1989, and Fernandez and Rogerson (2001) for state spending in the U.S. over the period 1950-1990. As for young population we find that this group significantly increases the size of social security, showing evidence of the relevance of family and child benefits in the social welfare spending (Than Dang et al, 2001), whereas it does only significantly decrease defense expenditure. Finally, we find a positive elasticity of young population on the share of education but not to a significant level.

5. Asymmetry in fiscal contractions and expansions.

In previous section we have constrained the effects of fiscal expansions and contractions on the composition of government expenditure to be the same. Nevertheless, components may react differently to increases or decreases in government spending. Actually, Ravallion (2002) finds that social spending in Argentina during the 80's and 90's decade decreased more than proportionally after reductions in government expenditure whereas it did not significantly increase following raises in government spending. Thus we include a variable in the transformed model, which takes the value of the first differences if government expenditure is reduced and zero otherwise. Table 2 shows results of the

estimation taking into account possible asymmetry on the effects of government size changes. Again, M2 do not reject the null hypothesis of absence of second-order serial correlation. Furthermore, the Sargan test statistic of overidentifying restrictions does not reject the validity of the instruments used.

[Table 2, around here]

Looking at the coefficients associated to government size it can be seen that some of the components of government expenditure have a significantly different pattern if government size is increased or if it is reduced. Thus, we find that the share of defense in aggregate government spending is reduced either when government size is increased or decreased. Therefore we find indication that fiscal consolidations fall over defense along with economic services. This result is in line with Gupta et al. (2001), who find that fiscal consolidations fall primarily over defense expenditure in a sample of 120 countries over the period 1985-1998, and in contrast to Davoodi et al. (1999) and Jonakin and Stephens (1999), who find that defense expenditure is more protected when fiscal discipline is implemented in a sample of 130 countries for the period 1985-1998 and 5 Central America countries over the period 1975-1993 respectively. Public services and housing increase their shares in aggregate government expenditures in fiscal expansions, and to some extent, also in fiscal contractions. Finally, some of the components show the same sign associated with increases or decreases of government size, but with different magnitudes. Interestingly, the share of social welfare expenditure decreases in fiscal expansions by a higher magnitude than the increases associated with fiscal contractions. In contrast, the share of education is more isolated from fiscal contractions than from fiscal expansions. Actually, we find evidence of social welfare expenditure being preserved during fiscal contractions but to a lesser extent than education and health expenditures. For the rest of variables we find coefficients

close to the table 1, though standard errors generally increase.

To sum up, we find evidence of social spending being isolated from fiscal expansions or contractions but to different degrees. Thus, social welfare reduces its share in the aggregate government expenditure more than education and health spending in fiscal expansions, whereas these two latter expenditures increase their shares more than the former in fiscal contractions. In fact, education is the most protected component of government expenditure. Therefore, social spending with a productive character –education and health spending- is more protected than social spending without productive character –social welfare spending.

6. Conclusions.

This paper explores how fiscal consolidation can affect the composition of government expenditures analyzing the relationship between the size of aggregate government expenditure and each of its functional components in the OECD over the period 1970-1997. For this purpose we employ a voter group model following Craig and Inman (1986) in which the final allocation is a weighted average of the preferred allocations of the groups considered. We differentiate between young, middle-aged and elderly population, as age appears to be the most important characteristic shaping voter's preferred allocations. Furthermore, we introduce dynamics in the model because changes in the composition of government expenditure require a slow adjustment process. Previous economic literature predicted two contradictory effects of fiscal consolidation on the composition of government expenditure. The first strand of literature predicts that governments will reduce public investment because decreasing social spending has more

political costs. On the other hand, the second strand of literature predicts that governments will protect those more productive expenditures and make the fiscal consolidation fall over social welfare spending to enhance the competitiveness and attractiveness to FDI of the country. In our set up age groups and not governments choose the composition of government expenditure following changes in the size of government, which is assumed to be previously determined.

Thus, we find that at times of fiscal consolidation, expenditures with a social character are the most protected. But the productive character of the expenditure also matters, because among social expenditures, those being also productive such as education and health are even more protected than those without productive character as social welfare. Moreover, fiscal consolidation does not fall primarily over the most productive expenditure, transport and communications, but over defense and economic services. Hence, it seems as if voter groups protect first social spending, and among these expenditure, care specially about those with a productive character. This result may be given some evidence of voter groups realizing that reducing productive expenditures harm long-term economic growth. Therefore, voter groups reach an equilibrium between utility and economic-growth enhancing expenditure by protecting social spending with a productive character the most. Voters may also take into account the growth effects when deciding the composition of government expenditure. Along these lines, Ghate and Zak's (2002) elaborate a model in which voters support to politicians depend not only on the transfers they receive but also on the of output growth. Voters may be willing to accept some reductions on the transfers they desired if they think that this stimulates output growth. Nevertheless, these results are also consistent with governments reducing pure public goods, such as defense and economic services, whereas protecting merit goods,

such as education and health expenditure, and transfers when facing budgetary cuts. As pure public goods are less visible than merit goods, by reducing the former, governments may be minimizing the political costs of fiscal consolidations.

Finally, we show that the effects of fiscal consolidation on government expenditure components depend firstly on the purpose of the expenditure, and secondly on its productive character. Therefore, it is more useful to analyze the composition of government expenditure by purpose, using its functional classification rather than the economic classification. This is an important innovation of this paper, since most of the few analysis on the effects of fiscal consolidation on the composition of government expenditures have focused on its economic classification.

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Table 1: Estimation results of the determinants of the composition of government expenditure (GMM, Two-step estimate, Arellano and Bond, 1991)

Dependent variable	Share in aggregate government expenditure of ^a :								
	Public Services	Defense	Health	Education	Housing	Trans. & Comm.	Economic services	Social Welfare	Rec. & cult affairs
Lagged -1 $G_{f,t-1}$	0.398 (0.00)	0.615 (0.00)	0.427 (0.00)	0.835 (0.00)	0.249 (0.00)	0.439 (0.00)	0.492 (0.00)	0.334 (0.00)	-
Government Size G_t	0.514 (0.00)	-0.230 (0.13)	-0.422 (0.00)	-0.153 (0.04)	1.139 (0.00)	0.123 (0.26)	0.707 (0.00)	-0.355 (0.00)	1.033 (0.55)
Income Y	0.927 (0.03)	-0.703 (0.02)	0.009 (0.95)	0.387 (0.05)	-1.286 (0.03)	0.580 (0.10)	0.121 (0.78)	0.270 (0.00)	-10.028 (0.02)
Relative Prices P_r	-1.259 (0.00)	-0.415 (0.31)	0.821 (0.00)	0.327 (0.09)	-0.819 (0.01)	-0.477 (0.28)	-0.507 (0.01)	0.870 (0.00)	-7.734 (0.04)
Population N	-0.086 (0.86)	-0.743 (0.01)	0.060 (0.78)	0.417 (0.05)	2.494 (0.00)	-1.495 (0.00)	-2.311 (0.00)	1.223 (0.00)	-6.326 (0.24)
% Pop < 15 N_1/N	0.246 (0.53)	-1.307 (0.00)	0.062 (0.76)	0.309 (0.16)	-0.667 (0.15)	0.420 (0.12)	0.056 (0.95)	0.470 (0.00)	-7.212 (0.09)
% Pop >64 N_3/N	-1.034 (0.05)	-0.121 (0.70)	0.436 (0.02)	-0.611 (0.02)	-0.854 (0.44)	-0.422 (0.45)	0.016 (0.98)	0.371 (0.00)	6.390 (0.23)
M1 (26)	-1.35 (0.17)	-2.09 (0.04)	-2.40 (0.02)	-2.87 (0.00)	-1.43 (0.15)	-3.080 (0.00)	-2.49 (0.01)	-1.001 (0.31)	-
M2 (26)	0.34 (0.73)	0.90 (0.36)	0.10 (0.92)	-0.53 (0.60)	0.46 (0.64)	-1.345 (0.18)	-1.49 (0.14)	-0.981 (0.33)	-
Sargan test	18.85	21.00	24.48	20.85	14.88	20.21	20.97	22.82	-
Degrees of freedom	48	43	46	67	68	43	66	44	-

Sample: 26 OECD Countries (All actually OECD Member countries, except Poland, Czech Republic, Hungary and Slovak Republic), 1971-1996.

^a p-values in parentheses

Table 2: Estimation results distinguishing between increases and decreases of aggregate government expenditure (GMM, Two-step estimate, Arellano and Bond, 1991)

Dependent variable	Share in aggregate government expenditure of ^a :								
	Public Services	Defense	Health	Education	Housing	Trans. & Comm.	Economic services	Social Welfare	Rec. & cult affairs
Lagged -1 $G_{f,t-1}$	0.293 (0.00)	0.624 (0.00)	0.283 (0.00)	0.845 (0.00)	0.150 (0.00)	0.345 (0.00)	0.381 (0.00)	0.323 (0.00)	-
Government Size G_t	1.092 (0.00)	-0.311 (0.07)	-0.254 (0.05)	-0.102 (0.07)	1.917 (0.01)	-0.042 (0.83)	0.409 (0.09)	-0.615 (0.00)	1.458 (0.54)
Government Size Decreases	-1.185 (0.05)	0.383 (0.02)	-0.457 (0.18)	-0.369 (0.01)	-2.141 (0.04)	-0.200 (0.56)	0.457 (0.36)	0.463 (0.00)	5.843 (0.28)
Income Y	1.174 (0.03)	-0.264 (0.50)	-0.066 (0.79)	0.084 (0.69)	-3.026 (0.00)	0.446 (0.54)	0.246 (0.59)	0.300 (0.04)	-7.701 (0.12)
Relative Prices P_r	-1.561 (0.00)	-0.421 (0.40)	0.947 (0.00)	0.606 (0.00)	-0.725 (0.03)	-0.213 (0.70)	-0.471 (0.03)	0.850 (0.00)	-8.638 (0.04)
Population N	-1.456 (0.10)	-0.400 (0.46)	-0.512 (0.25)	-0.064 (0.79)	1.794 (0.46)	-2.210 (0.01)	-1.748 (0.14)	1.924 (0.00)	-2.681 (0.80)
% Pop < 15 N_1/N	0.667 (0.22)	-1.016 (0.07)	0.248 (0.27)	0.123 (0.53)	-1.115 (0.08)	0.270 (0.68)	-0.389 (0.74)	0.321 (0.05)	-4.449 (0.42)
% Pop >64 N_3/N	-1.994 (0.04)	-0.339 (0.26)	0.461 (0.11)	-0.494 (0.03)	-1.087 (0.29)	-0.264 (0.71)	-0.441 (0.71)	0.461 (0.00)	10.918 (0.03)
M1 (26)	-1.13 (0.26)	-1.01 (0.31)	-1.01 (0.31)	-2.85 (0.00)	-0.88 (0.38)	-2.45 (0.01)	-2.26 (0.02)	-1.01 (0.31)	-
M2 (26)	-0.04 (0.98)	-0.99 (0.32)	-0.99 (0.32)	-0.38 (0.70)	0.49 (0.63)	-1.45 (0.15)	-0.54 (0.12)	-0.99 (0.32)	-
Sargan test	17.21	22.86	24.09	19.87	14.52	19.56	19.90	23.07	-
Degrees of freedom	46	42	45	66	67	46	65	44	-

Sample: 26 OECD Countries (All actually OECD Member countries, except Poland, Czech Republic, Hungary and Slovak Republic), 1971-1996.

^a p-values in parentheses