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Article

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Composition of public expenditures and macroeconomic performance in the European Union

*Jesus Ferreiro, Maribel García del Valle, Carmen Gómez**

The objective of the paper is to test the existence of a relationship between the composition of public expenditures and the macroeconomic outcomes (GDP rate of growth, and unemployment and inflation rates) of the European Union member states during the period 1995–2007. We study the existence of clusters of countries with similar structures of public expenditure using multiple factorial analysis and principal component analysis techniques, and we compare the macroeconomic outcomes of the clusters obtained using statistics test of equality of means. The outcomes show that there is no evidence of the existence of a relationship between the structures of the public expenditure and the macroeconomic performances. This leads us to conclude that there is no single optimum model of public spending that warrants the best macroeconomic performance.

JEL classifications: C38, H50, O43, O52

Keywords: European Union, composition of public expenditures, economic performance, productive expenditures, cluster analysis

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1. Introduction

The European Monetary Union (EMU) requires member and candidate states to implement an orthodox macroeconomic policy that gives a special role to monetary policy downgrading fiscal policy. Fiscal policy is determined by the Maastricht Treaty and the Stability and Growth Pact (SGP); these require national fiscal policies in the eurozone and in candidate countries to avoid excessive fiscal deficits and to reduce the size of their public sectors.

These principles are based on a theoretical background according to which fiscal policy cannot affect the level of economic activity in the long run. Fiscal policies can only be implemented on a short-term basis, correcting cyclical disequilibria through the working of the built-in stabilizers. Long-term effects of fiscal policy on economic activity arise from the so-called non-Keynesian effects of fiscal policy. The literature about non-Keynesian effects of fiscal policy has given rise to a number of studies focusing on the expansionary impact of fiscal consolidation (Alesina/Perotti 1995, Alesina et al. 1998, Giavazzi/Pagano 1990, Hjelm 2006–7, Kumar et al. 2007).

In this view, demand-side policies do not affect economic activity in the long run, and, therefore, do not influence the path of growth of potential output. However, fiscal policy is recently gaining relevance under the influence of the public-policy endogenous growth models (Barro 1990, Lucas 1988, Rebelo 1991, Romer 1986 and 1990). The long-term economic growth rate would be influenced not only by the size of public spending (negatively) and fiscal imbalances (negatively) but also by the composition of public expenditures¹ (Angelopoulos et al. 2007, Aschauer 1989, Devarajan et al. 1996, Gemmel/Kneller 2001, King/Rebelo 1990, Kneller et al. 2001). Some categories of public expenditures would have a positive impact on the economic activity (provided that they do not have an »excessive« size). The Lisbon Strategy, the current Broad Economic Policy Guidelines (BEPG), and the reformed SGP accept that fiscal policy can have a positive impact on economic activity in the long run. This impact would come from the composition of public expenditures. Thus, the share of »productive« expenditures should be increased.

This view is encompassed in a more general strategy of management of public finances based on the principles of the so-called »quality of public finances«. The analysis of this strategy has generated a rising number of papers and studies elaborated by the European Commission (Barrios/Schaechter 2008, Barrios et al. 2009, Deroose/Kastrop 2008, European Commission, Directorate-General for Economic and Financial Affairs 2002, 2004 and 2008).

In practice, this view involves the acceptance of a single model of fiscal policy (as a tool of macroeconomic policy) and also a single model of public sector and public spending. Public finances would be ruled by economic reasons (to foster economic growth), thus excluding other potential objectives of public activities and different preferences of constituencies and societies about the role and functions to be played by the respective national public sectors (Ferreiro et al. 2009, 2010 and 2013). In the European Union authorities' view there is an implicit assumption that there is an optimal size and composition of public expenditures that leads to the best possible macroeconomic performance (basically, the highest economic growth rate).

1 And also by the size and composition of public revenues.

The theoretical basis of these recommendations is the public-policy endogenous growth models (PPEGMs). These models, based on the endogenous growth theory, argue that fiscal policy can accelerate the long-run rate of economic growth by shifting the revenue stance away from distortionary forms of taxation and towards non-distortionary forms, and by switching expenditures from unproductive to productive forms (Angelopoulos et al 2007, Aschauer 1989, Barro 1990, Devarajan et al. 1996, Gemmel/Kneller 2001, Gupta et al. 2005, King/Rebelo 1990, Irmen/Kuehnel 2009, Kneller et al. 1999 and 2001, Romero de Avila/Strauch 2003).

PPEGMs define as »productive« expenditures those that, by complementing private sector production and generating positive externalities to firms, have a positive effect on the marginal productivity of capital and labour, and »unproductive« expenditures would be those that give direct utility to households (Angelopoulos et al. 2007, Devarajan et al. 1996, European Commission, Directorate-General for Economic and Financial Affairs 2004). Although the empirical evidence is mixed, for a number of studies »productive« expenditures include the following items: public investment, R&D, active labour market policies, defence, public order and general administrative costs, transport and communication and, up to a limit, education and health (Afonso et al. 2005, Afonso/González Alegre 2008, Angelopoulos et al. 2007, Aschauer 1989, Atkinson/van den Noord 2001, Barro 1990, Bleaney et al. 2001, Devarajan et al. 1996, Easterly/Rebelo 1993, Gemmel/Kneller 2001, Kneller et al. 2001, Romero de Avila/Strauch 2003).

PPEGM models, and the strategy of fiscal policy based on a high quality of public expenditures, do not imply that a rise in overall public expenditures driven by a rise in productive expenditures has a positive impact on the (short term and/or long-term) economic activity. In these approaches, a basic argument is that the overall size of the government has a negative impact on long-run growth (Barrios/Schaechter 2008).

Therefore, for the European Union the recommendations arising from these models are, first, to reduce the current size of overall public expenditures², and, second, to change the composition of public expenditures of that »government activity and related public spending that is essential for the performance of the economy« (Afonso et al. 2005: 10). This »core«, »essential« or »productive« spending would include spending for essential administrative services, basic research, basic education and health, public infrastructure and internal and external security (Afonso et al. 2005). Nonetheless, even in the case of productive expenditures, the positive effects of these expenditures depend on that spending being below certain limits, above which the impact on productivity of inputs would be negative.

European institutions accept that the current levels of expenditures in productive outlays³ or in other outlays (like those related to the Welfare State that fulfil redistributive

2 For Buti et al. (2003) the maximum stabilizing size of governments would be 35 per cent of GDP for small open economies and 40 per cent of GDP for large open economies. Notice that in 2007 the average size of public expenditures for France, Germany, Italy, Spain, Sweden and United Kingdom, countries that can be labelled as large economies was 46.8 per cent of GDP, and the average size of public expenditures for the other 21 EU countries was 42.1 per cent of GDP.

3 In the elaboration of a quality of public finances composite indicator, the European Commission (2009) include as productive spending the expenditures on transports, R&D, education, health, public order and safety, and environmental protection.

objectives) are below the limits that lead to negative impacts on economic growth (European Commission 2002). Nonetheless, if this spending is financed with distortionary taxes, productive spending may have a negative impact on long-run growth. Moreover, if the overall size of governments is excessive, then the overall economic impact of public finances may well be negative. Hence, the need to reduce the size of governments along with a recomposition of public revenues and expenditures (Deroose/Kastrop 2008).

The latter point is key to understanding the real meaning of this strategy of fiscal policy. Despite that from the previous analysis it can be inferred that certain items of public expenditures would have a positive impact on economic activity, however, it cannot be inferred that real fiscal activism must be used to manage economic activity either in the long-run or in the short-run. The reason is that, in opposition to the arguments made by the post-Keynesian approach, the management of the public expenditure items is subject to three constraints that limit the potential benefits of higher public expenditure: the need to reduce, or remove, the fiscal deficits, the need to reduce the overall size of public expenditures, and the negative consequences of higher taxation.

As we mentioned above, the European institutions defend the implementation of a ›new‹ strategy of fiscal policy for all the EU economies, that involves the existence of an optimum size and composition of public expenditures (and revenues) that leads to an optimum macroeconomic performance. Does such an optimal fiscal finances exist? The evidence is not conclusive. The different studies do not provide us with the exact datum of the optimum size both of the whole public expenditure and of the different items individually considered. These studies take the existence of such limit for granted but they do not clarify the size of such limit (in absolute value or as percentage of GDP), whether that magic figure is constant or varies over time, or whether that percentage has a universal validity or it is specific of each economy. In this regard, it is quite illustrative what is stated by the report *Public Finances in EMU 2002* of the European Commission:

»Parallel to the institutional debate, a large economic literature has explored the links between the composition of public spending and economic growth, employment, etc. [...] In general, there is no consensus as ›evidence is found to admit no conclusion on whether the relation is positive, negative or non-existent‹ [...] Within certain limits, public spending may have a positive impact on growth, but this trend reverses once expenditure exceeds a maximum level [...]. This inverted-U shape holds for many spending items, but the reversal point differs across expenditure items« (European Commission, Directorate-General for Economic and Financial Affairs 2002: 97–98).

If that hypothesis were correct, a better macroeconomic performance would be associated with a certain size and composition of public expenditures. Then, it would make sense to recommend a generalized change in public expenditures towards that optimum public expenditure. The objective of this paper is to check for the existence of a relationship between the composition of public expenditures and macroeconomic performance of the EU Member States. Thus, the paper will study whether there is a relationship between the composition and size of public expenditures and the macroeconomic performance, in terms

of rates of economic growth, employment and inflation, in the European Union. Moreover, we will study whether there is a relationship between the macroeconomic performances and the composition of the public expenditures in terms of the items considered as productive or unproductive. If these relationships are not detected, then the universal recipes about the size and composition of public expenditures lack of sense, and each economy should have the freedom to decide what size and composition of public expenditures best fit better economic objectives.

With this aim, we will first cluster the countries along the fiscal variables, independently of their macroeconomic outcomes. Here, our objective is to group the EU countries that have a similar composition and size of their public expenditures. Later, we build for each cluster the average of the main macroeconomic outcomes: GDP growth, unemployment rate and inflation rate. Finally, we test whether a systematic link may be identified between these outcomes and the main fiscal characteristics across the clusters and across the time periods.

The paper is structured as follows. The first section presents the data and methodology followed in the paper. The second section presents the results of the analysis of the relationship between the composition of public expenditures and the different clusters of countries detected on the basis of their respective sizes and shares of public expenditure, and the macroeconomic performance of EU economies. The final section summarizes and concludes.

2. Data and methodology

As explained above, EU institutions are implicitly assuming that there is an optimum size and composition of public expenditures that is able to generate the best macroeconomic performance. In this sense, our objective is to test whether this hypothesis is correct, and whether the best macroeconomic outcomes in Europe in terms of GDP growth, unemployment and inflation are related to a certain size and composition of public expenditures.

With this aim, we proceed as follows. Firstly, we use multiple factorial analysis (MFA) and principal component analysis (PCA) techniques to obtain clusters of countries with similar sizes and composition of public expenditures.⁴ Then, we apply tests of equality of means to the macroeconomic performance (GDP growth, inflation and unemployment) registered in the clusters obtained. Thus, we are testing the hypothesis that different clusters (i.e., countries with different composition of public expenditures) should register different macroeconomic outcomes.

⁴ The objective of applying MFA and PCA techniques is to obtain homogenous clusters of countries. To get this outcome, we must minimize the variance of the variables that shape a cluster (that is, to make that the countries belonging to a cluster have the highest possible similarity in the size and composition of their public expenditures). Simultaneously, the variance between clusters must be maximized (that is, there must be the maximum possible differences in the size of composition of public expenditures between countries belonging to different clusters).

This analysis has been applied to the European Union Member States (EU-27), and the period analyzed is 1995–2007. To analyze the macroeconomic performance of the EU-27 we use the data provided by Eurostat regarding the GDP rate of growth, and the rates of inflation and unemployment. The source of the data on public expenditures is the Eurostat Government Finance Statistics. We have used the data of the COFOG classification, namely the COFOG I that provides information about ten broad categories of public spending. For each country, the size of the total public expenditure is measured as a percentage of the GDP, and the composition of public expenditures is measured as the percentage of each item of public expenditure as a percentage of total public spending. For the period 1995–1999, the Eurostat Government Finance Statistics does not provide data for Bulgaria, Lithuania, Poland, and Slovenia. Therefore, the analysis for that period only comprises 23 countries.

The period analyzed, 1990–2007, has been split into 3 sub-periods: 1995–1999, 2000–2004, and 2005–2007. For each sub-period we have calculated the average of the variables analyzed, both those related to the public spending and those related to the macroeconomic performance of the 27 economies. This allows us to avoid business cycles effects on the composition and size of public spending.⁵

To get the clusters of countries with similar sizes and composition of public expenditures, we first applied a MFA to get a global view of the whole period. The objective of the MFA is to determine whether there is a strong inertia among the sub-periods so that the global study is feasible. That is, we want to know, if the variables (that is, the size of the total public expenditure and the weight of the 10 kinds of public expenditure) that determine the different factors in the 3 sub-periods are similar or not. If they are similar, then the variables that will determine the composition of the clusters of countries in each sub-period will be the same. In sum, we want to detect if the sizes and compositions of public expenditures have not changed significantly, thus allowing us to make an accurate analysis of the whole period. The MFA has been applied to a longer period 1990–2007 that has been divided in 4 sub-periods: 1990–1994, 1995–1999, 2000–2004, and 2005–2007. Since we have data for only 10 countries for the first sub-period (1990–1994), these four years are taken only for illustrative purposes. We have included this four years because they provided additional and useful information about the stability of the structure of public expenditures in the 10 countries with available information for that period.

Second, we have applied a principal component analysis to the different periods. We will apply cluster techniques to the coordinates obtained with the PCA in order to get groups of countries with similar characteristics, that is, similar size of total public spending, and

5 Five years is a standard measure in the empirical literature to avoid business cycles effects on the evolution of a variable. Obviously, there are alternatives that avoid with a higher precision these effects, for instance, estimating the trend using HP filters, or using dating peak-trough rules. However, these techniques are more useful when we are analyzing time series for a single individual. The problem when working with sample with a high number of individuals, as it is our case, is that individual business cycles may not necessarily be synchronized and, consequently, in a certain period of time may co-exist different phases or depths of the business cycle.

similar composition of public expenditures. In the cluster analysis, the clusters are defined by those items of public expenditure that are statistically significant at a 5 per cent level.

Once we have obtained the clusters of countries for the different sub-periods, we have applied tests of equality of means to the macroeconomic outcomes (GDP growth, inflation and unemployment) registered in each period in the clusters obtained. As mentioned in the above section, we are testing the hypothesis that countries belonging to a group (i.e., countries with similar composition of public expenditures) should have similar macroeconomic outcomes, and the mirror that different clusters (i.e., countries with different composition of public expenditures) should register different macroeconomic outcomes.

3. Results

As mentioned above, the MFA gives us a global view of the whole period 1995–2007. The analysis we have carried out shows that the variables that define the factorial spaces remain across the 3 sub-periods, showing that the basic structure of the inertia is maintained, allowing an analysis of the 3 sub-periods.⁶

Tables 1 to 3 show the clusters obtained with the PCA for the three periods studied.⁷ In the third column of each country we show the fiscal variables that configure each cluster. The significance of these variables in the formation of the clusters is given by the test value.⁸ For the construction of the clusters we have chosen those variables that are significant at a 5 per cent level. Variables are ranked according to the absolute value of the test values: the higher test value the higher significance of that variable in the formation of the cluster.

6 Data available on request.

7 The number of clusters obtained may be explained by the degree of significance of the items that shape the clusters. However, a 1 per cent level of significance does not alter too much the results of the cluster analysis. It could be thought that the high number of clusters obtained could be explained by the strong heterogeneity of the countries analyzed, and that a more homogenous group, comprising a lower number of countries could significantly reduce it. However, in Ferreiro et al. (2009), where a similar analysis is implemented to ten countries belonging to the euro area, the number of clusters obtained is four (two of them with two members, and one cluster with only one member). This result would be explained, in our view, by the existence of deep differences in the size and composition of public expenditures, despite the higher/lower similarities of the countries studied.

8 Test value is a descriptive index used in the correspondence analysis following the methodology of hypothesis tests. A variable is not a relevant to form a group if the n_k values of this variable seem to have been randomly extracted among the n observed values. The more doubtful the hypothesis of a random extraction, the best this variable will characterize the group of n_k individuals. The order of value test in each group will give the continuous variables that characterize the group in a positive way (the mean of the group is sufficiently higher than the overall mean), or in a negative way (the mean of the group is lower). For the categories of nominal variables, the order allows to get those categories whose proportion within the group is sufficiently different from the overall proportion, because it is higher (a positive test value) or lower (a negative test value). Critical probabilities allow to rank the variables by order of relevance: the most relevant (critical variable) is that with the lowest probability.

Table 1: Clusters of EU countries 1995–1999

Clusters	Countries	Variables	Cluster average	Overall average	Cluster standard deviation	Overall standard deviation	Test value	Probability
Cluster 1	Belgium, Italy, Sweden	Total public expenditures General public services	54.372 21.602	46.553 17.064	4.901 3.316	7.203 4.879	1.97 1.69	0.024 0.046
Cluster 2	Austria, Denmark, Finland, France, Germany	Social protection Total public expenditures Public order	41.643 54.384 2.538	34.972 46.553 3.853	1.695 2.676 0.552	5.689 7.203 1.582	2.90 2.69 -2.06	0.002 0.004 0.020
Cluster 3	Greece	General public services Recreation Education	29.60 0.557 6.031	17.064 2.383 11.553	4.879 0.976 2.761	4.879 0.976 2.761	2.51 -1.82 -1.96	0.006 0.0344 0.025
Cluster 4	Hungary, Netherlands, United Kingdom							
Cluster 5	Cyprus, Romania	Housing Defence Environment Total public expenditures Social protection Health	4.650 5.223 0.595 35.772 26.373 7.558	2.468 3.391 1.469 46.553 34.972 11.169	1.044 0.487 0.048 0.213 5.381 0.064	1.236 1.323 0.671 7.203 5.689 2.350	2.55 2.01 -1.89 -2.17 -2.19 -2.22	0.005 0.022 0.030 0.015 0.014 0.013
Cluster 6	Luxembourg	Environment Recreation	3.15 4.13	1.469 2.383	0.671 0.976	0.671 0.976	2.45 1.75	0.007 0.040
Cluster 7	Czech Rep., Ireland, Latvia, Malta, Portugal, Slovakia, Spain	Economic affairs Public order Environment Total public expenditures Social protection	15.287 5.114 1.940 42.532 31.233	11.677 3.853 1.469 46.553 34.972	4.450 1.031 0.460 3.656 2.775	4.174 1.582 0.671 7.203 5.689	2.68 2.47 2.18 -1.73 -2.04	0.004 0.007 0.015 0.042 0.021
Cluster 8	Estonia	Recreation Education Public order	5.46 18.74 7.13	2.383 11.553 3.853	0.976 2.761 1.582	0.976 2.761 1.582	3.08 2.55 2.02	0.001 0.005 0.022

Table 2: Clusters of EU countries 2000–2004

Clusters	Countries	Variables	Cluster average	Overall average	Cluster standard deviation	Overall standard deviation	Test value	Probability
Cluster 1	Belgium, Italy, Poland, Slovenia							
Cluster 2	Austria, Denmark, Finland, France, Germany, Sweden	Total public expenditures	51.881	44.162	2.991	6.086	3.46	0.000
		Social protection	42.335	35.392	1.916	5.572	3.40	0.000
		Environment	1.007	1.545	0.344	0.658	-2.23	0.013
		Economic affairs	7.904	10.655	1.746	2.970	-2.52	0.006
Cluster 3	Greece	Public order	2.629	4.134	0.506	1.321	-3.10	0.001
		Defence	7.34	3.557	1.701	1.701	2.18	0.015
		General public services	21.39	15.075	3.434	3.434	1.80	0.036
		Recreation	0.71	2.543	0.981	0.981	-1.83	0.034
Cluster 4	Bulgaria, Hungary, Netherlands, Slovakia	Education	6.51	12.410	2.655	2.655	-2.18	0.015
		Health	10.323	12.410	1.050	2.655	-1.67	0.047
		Health	10.691	12.492	1.134	2.171	-1.76	0.039
		Housing	5.220	2.197	0.249	1.223	3.57	0.000
Cluster 5	Cyprus, Romania	General public services	19.362	15.075	3.815	3.434	1.80	0.036
		Defence	5.540	3.557	0.779	1.701	1.68	0.046
		Environment	0.646	1.545	0.001	0.658	-1.97	0.024
		Health	9.422	12.492	2.027	2.171	-2.04	0.021
Cluster 6	Luxembourg	Social protection	25.665	35.392	4.000	5.572	-2.52	0.006
		Environment	2.85	1.545	0.658	0.658	1.95	0.026
		Recreation	4.42	2.543	0.981	0.981	1.88	0.040
		Defence	0.67	3.557	1.701	1.701	-1.66	0.0485
Cluster 7	Czech Rep., Latvia, Lithuania, Malta, Portugal, Spain, UK	Public order	5.021	4.134	0.806	1.321	2.03	0.021
		Total public expenditures	40.668	44.162	3.852	6.086	-1.73	0.042
		Education	16.187	12.410	2.591	2.655	2.05	0.020
		Recreation	3.889	2.543	1.952	0.981	1.98	0.024
Cluster 8	Estonia, Ireland	Public order	5.844	4.134	1.139	1.321	1.87	0.031
		Health	15.048	12.492	3.285	2.171	1.70	0.045
		General public services	9.988	15.075	0.505	3.434	-2.14	0.016
		Total public expenditures	34.023	44.162	1.076	6.086	-2.40	0.008

Table 3. Clusters of EU countries 2005–2007

Clusters	Countries	Variables	Cluster average	Cluster standard deviation	Overall standard deviation	Test value	Probability	
Cluster 1	Belgium, Greece, Italy, Sweden	General public services	17.294	13.732	1.920	3.444	2.20	0.014
		Total public expenditures	48.895	43.524	3.666	5.940	1.92	0.027
		Public order	3.119	4.249	0.555	1.456	-1.65	0.049
		Housing	1.109	2.178	0.352	1.300	-1.75	0.040
		Recreation	1.754	2.711	0.620	1.104	-1.84	0.033
Cluster 2	Austria, Denmark, Finland, France, Germany	Education	10.271	12.422	2.288	2.409	-1.90	0.029
		Social protection	42.785	35.445	1.954	5.637	3.17	0.001
		Total public expenditures	49.642	43.524	2.612	5.940	2.50	0.006
		Environment	1.125	1.745	0.322	0.721	-2.09	0.018
		Public order	2.714	4.249	0.532	1.456	-2.56	0.005
Cluster 3	Cyprus	Economic affairs	7.595	10.716	1.756	2.772	-2.74	0.003
		General public services	23.24	13.732		3.444	2.71	0.003
		Housing	5.5	2.178		1.300	2.51	0.006
		Education	16.79	12.422		2.409	1.78	0.038
		Social protection	23.92	35.445		5.637	-2.01	0.022
Cluster 4	Hungary, Netherlands, Poland, Portugal, Slovenia	Health	7.01	13.489		2.374	-2.68	0.004
		Defence	6.76	3.315		1.348	2.51	0.006
		Economic affairs	17.30	10.716		2.772	2.33	0.01
		Environment	2.726	1.745	0.104	0.721	1.96	0.025
		Total public expenditures	36.700	43.524	1.978	5.940	-1.66	0.049
Cluster 5	Ireland, Luxembourg	General public services	9.432	13.732	1.185	3.444	-1.80	0.036
		Defence	0.925	3.315	0.335	1.348	-2.56	0.005
		Environment	2.431	1.745	0.508	0.721	2.87	0.002
		Public order	5.288	4.249	1.062	1.456	2.15	0.016
		Total public expenditures	17.294	13.732	1.920	3.444	2.20	0.014
Cluster 6	Bulgaria, Czech Rep., Lithuania, Malta, Slovakia, Spain, United Kingdom	General public services	48.895	43.524	3.666	5.940	1.92	0.027
		Public order	3.119	4.249	0.555	1.456	-1.65	0.049
		Housing	1.109	2.178	0.352	1.300	-1.75	0.040
		Recreation	1.754	2.711	0.620	1.104	-1.84	0.033
		Total public expenditures	10.271	12.422	2.288	2.409	-1.90	0.029
Cluster 7	Estonia, Latvia	Education	42.785	35.445	1.954	5.637	3.17	0.001
		Social protection	49.642	43.524	2.612	5.940	2.50	0.006
		Environment	1.125	1.745	0.322	0.721	-2.09	0.018
		Public order	2.714	4.249	0.532	1.456	-2.56	0.005
		Economic affairs	7.595	10.716	1.756	2.772	-2.74	0.003
Cluster 8	Cyprus	General public services	23.24	13.732		3.444	2.71	0.003
		Housing	5.5	2.178		1.300	2.51	0.006
		Education	16.79	12.422		2.409	1.78	0.038
		Social protection	23.92	35.445		5.637	-2.01	0.022
		Health	7.01	13.489		2.374	-2.68	0.004

A positive test value indicates that the average of this value in this cluster is higher than the average of the whole set of countries, and vice versa.

In some cases, the data of a cluster is in blank. The reason is that the values of the items of these countries are not significantly different from those of the averages of the 11 fiscal variables. In other words, these countries would be the 'average' cluster.

We want to note some conclusions we can extract from the cluster analysis. The first conclusion is that all the variables are significant in the formation of the countries in all the periods, both those items of expenditure that the PPEG models consider as productive and unproductive. Actually, in the characterization of the clusters we find productive and unproductive expenditures. The second conclusion is that, despite the existence of a convergence process detected in the evolution of some variables, there still are significant differences among countries, leading to the existence of a high number of clusters: eight clusters in each sub-period. Thus, if we compare the evolution of the overall average and the overall standard deviations of the eleven variables between the periods 1995–1999 and 2004–2007, we detect different patterns of behaviour of the variables studied. Thus, the averages and the standard deviation of total public expenditures, general public services, and economic affairs have all fallen, showing a downward convergence process in the values of these variables. The averages of public order, education and social protection have risen, whilst their standard deviation have fallen, showing an upward convergence process. In the case of environmental affairs and health, both the average and the standard deviation have risen, showing an upward divergence process. Finally, in the case of housing, recreation, and defence, the average has fallen, and the standard deviation has risen, showing a downward divergence process.

Table 4: Composition by countries of the clusters

1995 – 1999	2000 – 2004	2005 – 2007
Belgium, Italy, Sweden	Belgium, Italy, Poland, Slovenia	Belgium, Greece, Italy, Sweden
Austria, Denmark, Finland, France, Germany	Austria, Denmark, Finland, France, Germany, Sweden	Austria, Denmark, Finland, France, Germany
Hungary, Netherlands, United Kingdom	Bulgary, Hungary, Netherlands, Slovakia	Hungary, Netherlands, Poland, Portugal, Slovenia
Greece	Greece	Cyprus
Cyprus, Romania	Cyprus, Romania	Romania
Luxembourg	Luxembourg	Luxembourg, Ireland
Estonia	Estonia, Ireland	Estonia, Latvia
Czech Republic, Ireland, Latvia, Malta, Portugal, Slovakia, Spain	Czech Republic, Latvia, Lithuania, Malta, Portugal, Spain, United Kingdom	Bulgaria, Czech Republic, Lithuania, Malta, Slovakia, Spain, United Kingdom

The third conclusion is the remarkable stability of the clusters in terms of the countries belonging to each cluster. Table four summarizes the tables 1 to 3, showing the countries included in each cluster. If we focus on the 23 countries included in the whole period, we see that 12 countries belong to the same cluster during the three sub-periods.

How is this behaviour of public expenditures related to the macroeconomic performance of EU countries? Table 5, 6 and 7 shows the macroeconomic performance of the EU economies (GDP growth, inflation and unemployment rates) for the 3 periods. In all the cases we include the figures of the mean and the coefficient of variation of the clusters detected in each period with the mean and the coefficient of variation of the whole set of countries analysed in each sub-period. If we focus on the behaviour of the macroeconomic variables for the whole set of countries, we can see that in the cases of unemployment and inflation both the means and the coefficient of variations fall, thus indicating a downward convergence process. In the case of the GDP rates of growth, these have accelerated, but the coefficient of variation remains unchanged. As we saw before, some items of the so-considered productive expenditures increased their shares in the total public expenditures, but others fell. Consequently, it is difficult to assume that the changes in the composition of public expenditures explain that higher economic growth.

To reinforce this initial conclusion, we must look at the macroeconomic performance of each cluster obtained in the three sub-periods. The hypothesis to be tested is that the different clusters should have significantly different macroeconomic outcomes.

Table 5: Macroeconomic outcomes 1995–1999

Clusters	Statistics	GDP	Unemployment	Inflation
All countries	Mean	3.54	8.84	16.95
	Coefficient of variation	0.57	0.43	2.88
Cluster 1 (3)	Mean	2.53	9.69	1.72
	Coefficient of variation	0.30	0.14	0.65
Cluster 2 (5)	Mean	2.85	8.50	1.44
	Coefficient of variation	0.36	0.43	0.29
Cluster 3 (1)	Mean	2.98	10.28	6.01
	Coefficient of variation			
Cluster 4 (3)	Mean	3.48	6.91	7.64
	Coefficient of variation	0.10	0.28	1.27
Cluster 5 (2)	Mean	2.29	4.35	34.39
	Coefficient of variation	1.53	0.37	1.31
Cluster 6 (1)	Mean	4.76	2.72	0.96
	Coefficient of variation			
Cluster 7 (7)	Mean	4.53	10.41	5.39
	Coefficient of variation	0.53	0.47	0.69
Cluster 8 (1)	Mean	5.68	9.96	14.96
	Coefficient of variation			

Note: The figure in parenthesis in column 1 refers to the number of countries in each cluster. In the clusters with only one country there is no coefficient of variation.

In the sub-period 1995–1999 (Table 5), the tests of means only detect differences in the inflation rates. The Kruskal-Wallis (KW) test detects that differences in inflation rates among clusters are significant at a 7.6 per cent level. Clusters with higher GDP growth than mean (although the differences are not significantly different) are clusters 6, 7 and 8 (9 countries in total). Clusters with lower than average unemployment rates are clusters 2, 4, 5 and 6 (11 countries in total). Clusters with lower than mean inflation are clusters 1, 2, 3, 4, 6, 7, and 8 (21 countries in total).

Table 6: Macroeconomic outcomes 2000–2004

Clusters	Statistics	GDP	Unemployment	Inflation
All countries	Mean	3.58	8.53	4.07
	Coefficient of variation	0.54	0.51	1.17
Cluster 1 (4)	Mean	2.59	10.36	3.94
	Coefficient of variation	0.4	0.54	0.54
Cluster 2 (6)	Mean	2.06	6.97	1.82
	Coefficient of variation	0.37	0.31	0.15
Cluster 3 (1)	Mean	4.54	10.48	3.32
	Coefficient of variation			
Cluster 4 (4)	Mean	3.81	10.93	6.02
	Coefficient of variation	0.39	0.68	0.37
Cluster 5 (2)	Mean	4.42	5.89	14.51
	Coefficient of variation	0.31	0.40	1.12
Cluster 6 (1)	Mean	4.20	3.10	2.44
	Coefficient of variation			
Cluster 7 (7)	Mean	3.86	8.93	2.37
	Coefficient of variation	0.62	0.38	0.47
Cluster 8 (2)	Mean	7.09	7.79	3.85
	Coefficient of variation	0.19	0.63	0.11

Note: The figure in parenthesis in column 1 refers to the number of countries in each cluster. In the clusters with only one country there is no coefficient of variation.

In the second sub-period 2000–2004 (Table 6), the tests of means detect significant differences in the GDP growth and in the inflation rates. The KW test detects that differences in inflation rates among clusters are significant at a 3.3 per cent level. The analysis of variance shows that differences in the GDP rates of growth are also significant at a 2.6 per cent level. Clusters with higher GDP growth than mean are cluster 3, 4, 5, 6, 7 and 8 (17 countries in total). Clusters with lower than average unemployment rates are clusters 2, 5, 6 and 8 (11 countries in total). Clusters with lower than mean inflation are clusters 1, 2, 3, 6, 7 and 8 (21 countries in total).

In the last sub-period 2005–2007 (Table 7), the tests of means detect significant differences in the three variables. The KW test detects significant differences in GDP growth and unemployment rates, at 0.2 per cent and 0.7 per cent levels respectively. The analysis of variance shows significant differences in inflation rates a 0.8 per cent level. Higher GDP

growth than the mean is registered in clusters 4, 5, 6, 7, and 8 (14 countries in total). Clusters with lower than average unemployment rates are clusters 2, 4, 5, 6 and 8 (11 countries in total). Clusters with lower than mean inflation are clusters 1, 2, 3, and 5 (15 countries in total).

Table 7: Macroeconomic outcomes 2005–2007

Clusters	Statistics	GDP	Unemployment	Inflation
All countries	Mean	4.64	7.21	3.12
	Coefficient of variation	0.54	0.34	0.56
Cluster 1 (4)	Mean	2.75	7.73	2.16
	Coefficient of variation	0.38	0.13	0.36
Cluster 2 (5)	Mean	2.81	7.05	1.79
	Coefficient of variation	0.3	0.35	0.07
Cluster 3 (5)	Mean	3.69	7.75	2.79 _i
	Coefficient of variation	0.51	0.48	0.52
Cluster 4 (1)	Mean	6.12	6.97	6.80
	Coefficient of variation			
Cluster 5 (1)	Mean	4.39	4.63	2.48
	Coefficient of variation			
Cluster 6 (2)	Mean	5.84	4.48	3.12
	Coefficient of variation	0.003	0.005	0.28
Cluster 7 (7)	Mean	5.6788	7.98	3.50
	Coefficient of variation	0.42	0.35	0.47
Cluster 8 (2)	Mean	9.90	6.70	6.42
	Coefficient of variation	0.15	0.11	0.32

Note: The figure in parenthesis in column 1 refers to the number of countries in each cluster. In the clusters with only one country there is no coefficient of variation.

Are the different economic performances related to a certain size or composition of public spending? Is there any kind of optimum structure of public expenditures that lead to a better performance? To answer these questions, we have grouped the fiscal variables that are present in the clusters that present better or worse economic outcomes in the three sub-periods and that are relevant in the formation of the clusters. Tables 8 to 10 show these variables. In these tables we only report those relevant variables that have the same sign (higher/lower value than average) in those countries that have the same (better or worse than average) performance. Therefore, if in the same group of clusters a variable appears with the opposite sign this variable is not included in the table, since it is indicating that a certain economic performance can be reached with an expenditure higher than the average but also with an expenditure lower than average⁹ In sum, we exclude those fiscal variables

9 Two examples can help to clarify this point. In the period 1995–1999, in the clusters 6, 7 and 8, the economic growth was higher than the average. In these three clusters, the size of the items environment protection and public order and safety was higher than the average (as shown in Table 1). Therefore,

that present opposite signs (in terms of being higher or lower than the average) for the same economic performance.

We argue that a fiscal variable is directly related to a macroeconomic outcome when there is a positive relationship between the value of the fiscal variable (higher/lower than average) and the relative value of the macroeconomic outcome (higher/lower than average). For instance, a variable X will be positively related to the GDP growth if clusters with higher (lower) than mean value of that variable also have higher (lower) than average GDP rates of growth. On the contrary, a variable X will be negatively related to the GDP growth if clusters with higher (lower) than mean value of that variable also have lower (higher) than average GDP rates of growth¹⁰.

Table 8: Fiscal variables associated to economic growth performance

Period	Higher GDP growth	Lower GDP growth
1995–99	Higher environment Higher recreation Higher economic affairs Higher public order Higher education Lower total public expenditure Lower social protection	Higher general public services Higher housing Higher defence Lower public order Lower education Lower environment Lower health
2000–04	Higher housing Higher public order Lower social protection	Higher total public expenditure Higher social protection Lower environment Lower economic affairs Lower public order
2005–07	Higher economic affairs Higher environment Higher recreation Higher education Higher public order Lower total public expenditures Lower social protection	Higher general public services Higher total public expenditures Lower environment Lower public order Lower recreation Lower economic affairs Lower health

both items are included in Table 8, associating a higher spending in these items with a higher GDP growth. However, in the cases of the clusters 1 to 5, all of them with a GDP rate of growth lower than the average, there are two clusters that have a higher size of total public expenditures (clusters 1 and 2), but there is one cluster (#5) whose total public expenditure is lower than the average. Therefore, we cannot say that a worse economic performance is associated to higher or lower public expenditures.

¹⁰ We are implicitly assuming the existence of a linear relationship between the value of a fiscal variable and the corresponding macroeconomic outcome. Obviously, this relationship must not necessarily be linear: It can be non-linear, asymmetric, threshold effects may exist, etc. (We thank one referee for this comment). The analysis of the precise way of this relationship, if any, is outside the scope of our paper. In this sense, our aim is much more modest, i.e., to give an answer to the question whether a higher or lower size of a certain item of public expenditure is a necessary and sufficient condition to reach a predetermined macroeconomic outcome.

Table 8 shows the fiscal variables that are associated with the outcomes in terms of GDP growth. The results differ for the three sub-periods. In the first sub-period the economic growth is directly associated with the shares of the expenditures on environment protection, public order and safety, and education. In 2000–2004, economic growth is positively associated with the expenditures on public order and safety, and negatively related to spending on social protection. Finally, in the last sub-period, economic growth is positively associated with spending on economic affairs, environment protection, recreation, and public order and safety, it would appear to be negatively associated with the size of total public expenditures. In sum, for the whole period analysed, only the expenditures on public order and safety would appear to be associated with economic growth.

Table 9: Fiscal variables related to unemployment performance

Period	Higher unemployment	Lower unemployment
1995–99	Higher general public services Higher economic affairs	Higher housing Higher defence Higher recreation Lower public order Lower health
2000–04	Higher defence Higher general public services Higher public order Lower recreation Lower education Lower health Lower total public expenditures	Higher housing Higher recreation Higher education Lower economic affairs
2005–07	Higher general public services Higher environment Lower recreation Lower social protection Lower health	Higher recreation Higher education Lower general public services

Table 9 associates those fiscal variables that determine the composition of the clusters with their performance in terms of rates of unemployment. In the first sub-period there is no clear association between the fiscal variables and the (relative) rates of unemployment. In the period 2000–2004, higher unemployment rates are associated with lower shares of spending on recreation and education, and vice versa. Finally, in the period 2005–2007, the higher unemployment rates are associated with a lower share of spending on recreation and a higher share of spending on general public services, and vice versa. In sum, the unemployment performance is not related to a certain size and/or composition of public expenditures.

Finally, Table 10 associates those fiscal variables that determine the composition of the clusters with the inflation performance. In the first sub-period a lower inflation rate is associated with a higher share of the spending on environment. In the period 2000–2004,

Table 10: Fiscal variables related to inflation performance

Period	Higher inflation	Lower inflation
1995–99	Higher housing Higher defence Lower environment Lower total public expenditure Lower social protection Lower health	Higher general public services Higher environment Higher economic affairs
2000–04	Higher education Higher housing Higher general public services Higher defence Lower health Lower environment Lower social protection	Higher social protection Higher health Lower economic affairs
2005–07	Higher environment Higher public order Higher recreation Higher education Lower total public expenditure Lower general public services Lower defence Lower social protection	Higher general public services Higher total public expenditure Higher defence Lower public order Lower environment Lower health

better inflation outcomes would appear to be related to higher shares of spending on social protection and health. In the period 2005–2007, lower inflation would appear to be associated to a higher size of total public expenditure, to higher shares of spending on general public services and defence, and to lower shares of expenditure on public order and environment. In sum, as in the case of the unemployment rates, the inflation performance is not associated with a certain size and/or composition of public expenditures.

4. Conclusions

In the European Commission's recent view about the role to be played by fiscal policies in the European Union it is implicitly assumed that there is a single optimum model of public expenditures that contributes to generate the best macroeconomic performance. Consequently, the EU Member States should adapt their current public expenditures (in terms of the size of public expenditures and composition of public spending) to that ideal model of public finances.

The analysis carried out in this paper allows us to detect that there are significant differences in both aspects among EU economies, and that these differences are lasting, thus

making it difficult, if not impossible, to discern a convergence process to a similar pattern of public expenditures.

Moreover, it is impossible to detect a clear and unequivocal association between the economic performance of EU countries and the size and composition of public expenditures, on the one hand, and the shares of the items of public expenditure considered productive or unproductive.

This conclusion does not mean that the size and composition of public expenditures does not influence the macroeconomic performance. To reach that conclusion we should have made an empirical analysis of the impact of the fiscal variables, controlling for additional variables, on the economic outcomes. Moreover, such an analysis should be made using both panel data techniques for the whole set of EU economies, and time series techniques for each EU country. However, these analyses are far from the scope of this paper.

Our objective was more modest: to detect whether in the last two decades there has been a model of public expenditures that was associated with the best economic performance. And the answer is clearly no. This conclusion is in line with the caveats arising from the European Commission's own reports, as we mentioned in the first section, and with those theories, like theories of varieties of capitalism, comparative capitalism and welfare production regimes, that argue that these factors set the national-state economic policies (Bernard/Boucher 2007, Campbell/Pedersen 2007, Crouch/Streeck 1997, Hall/Soskice 2001, Iversen/Stephens 2008, Jackson/Degg 2008, Rhodes 2005).

Any decision made about the size and composition of public expenditures should therefore be based on national criteria, which should not only include 'economic' elements and arguments, but also political elements reflecting the preferences of the different national constituencies on the size and role played by public sectors in their respective economies. Consequently, the optimal level and pattern of public expenditure would not necessarily be the same for each country, mainly if there are economic, social and political constraints that affect the size and composition of public budgets.

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