EURO AREA FISCAL STRUCTURES. A MULTIVARIATE ANALYSIS

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Abstract: *The European framework for fiscal policies is constructed mainly on the objective of monitoring budget balances and public debt, allowing national governments to decide on the specific fiscal policy that is more suitable to their internal context and public needs. However, for Euro Area member states this autonomy is restricted by the conditions imposed through the Stability and Growth Pact. As the recent macroeconomic dynamics underlined the necesity of improving the fiscal outcomes, the fiscal framework was updated and modified by the provisions of the new European economic governance meant to avoid unsound and unsustainable fiscal policies that could affect the stability of other Euro Area member states. The Six-Pack, the Fiscal Compact and the other conditions imposed by the reform of the fiscal governance framework are meant to ensure more discipline in drafting and executing national budgets. Even so, national authorities maintain their fiscal sovereignty and the decision regarding fiscal structures remains at their disposal, as long as the drafts are approved and the outcomes are maintained in the limits imposed through the supranational fiscal framework. Regardless of the numerous differences between member states, similar trends regarding tax mixes can be noticed in time. The objectives of this paper is to analyze fiscal structures of Euro Area member states and to determine, if any, groups with similar fiscal structures, their composition and the similarities that characterize Euro Area in this respect. In order to have a clear overview of fiscal structures within Euro Area, we analyzed data for 17 member states, for year 2012, taking into consideration total general government revenue, indirect taxation, direct taxation and social contributions. As one of the aims of this paper is to determine whether in Euro Area the main contributors are corporations or individuals, we also analyzed the structure of direct taxation, dividing it into taxes on income of corporations and taxes on income of individuals and households and other current taxes. Actual social contributions were also split into employer's actual contributions, employee's social contributions and social contributions of self- and non-employed persons. As the primary data analysis revealed many differences between Euro Area member states, but also similarities concerning various fiscal aggregates, we completed the analysis through multidimensional analysis, with the aims of classifying Euro Area member states into subgroups with similar fiscal structures. Taking into consideration the above mentioned variables, we used cluster analysis in order to determine which member states have similar fiscal structures and which are the main similarities that characterize Euro Area in this respect.*

1. Introduction

The Euro Area fiscal framework imposes few restrictions on member states regarding national budgets. Therefore, governments have a high degree of autonomy regarding

fiscal policies. The restrictions regard mainly the budget balance and public debt, as stipulated through the criteria that are meant to ensure stability and avoid the existence of unsustainable and unsound fiscal aggregates that could affect the other member states and also the stability of Euro Area as a whole. As the Stability and Growth Pact had proved to be insufficient, it was reformed and, due to the economic crisis and its effects, the Euro Area fiscal framework was updated and modified by the provisions of the European economic governance framework. The Six-Pack, the Fiscal Compact and the other conditions imposed by the reform the fiscal governance framework are meant to ensure more discipline in drafting and executing national budgets. Even so, national authorities maintain their fiscal autonomy, and therefore, the decision regarding fiscal structure remains at their disposal, as long as the outcomes are maintained in the limits imposed through the supranational fiscal framework. This context allows the existence of many differences between fiscal structures, as national budgets are constructed in every country regarding their structure, needs, taxation base and collecting capacity.

2. Primary Data Analysis
In order to have a clear overview of fiscal structures within Euro Area, we analyzed data for 17 member states, for year 2012, taking into consideration total general government revenue, indirect taxation, direct taxation and social contributions (all data are according to ESA 95, EUROSTAT database). As one of the goals of this paper is to determine whether in Euro Area the main contributors are corporations or individuals, we also analyzed the structure of direct taxation, dividing it into taxes on income of corporations, taxes on income of individuals and households and other current taxes. Actual social contributions were also split into employer's actual contributions, employee's social contributions and social contributions payable by self- and non-employed persons.
Euro Area is an area of high tax, as in average, in 2012, total revenue accounted for 46.3% GDP (Figure 1) even in the post crisis period, when economic activity registered slow and selective recovery. Five of the seventeen member states registered public revenue above Euro Area average (Austria, Belgium, France, Italy and Netherlands). The other states registered revenue below Euro Area average, among which Cyprus, Estonia, Ireland, Slovakia and Spain collected revenue that accounted for less than 40% GDP.
With total public revenue ranging form 33.2% GDP (Slovakia, 2012) to 54.4% GDP (Finland, 2012), Euro Area can be considered an area with significant fiscal difference among member states.
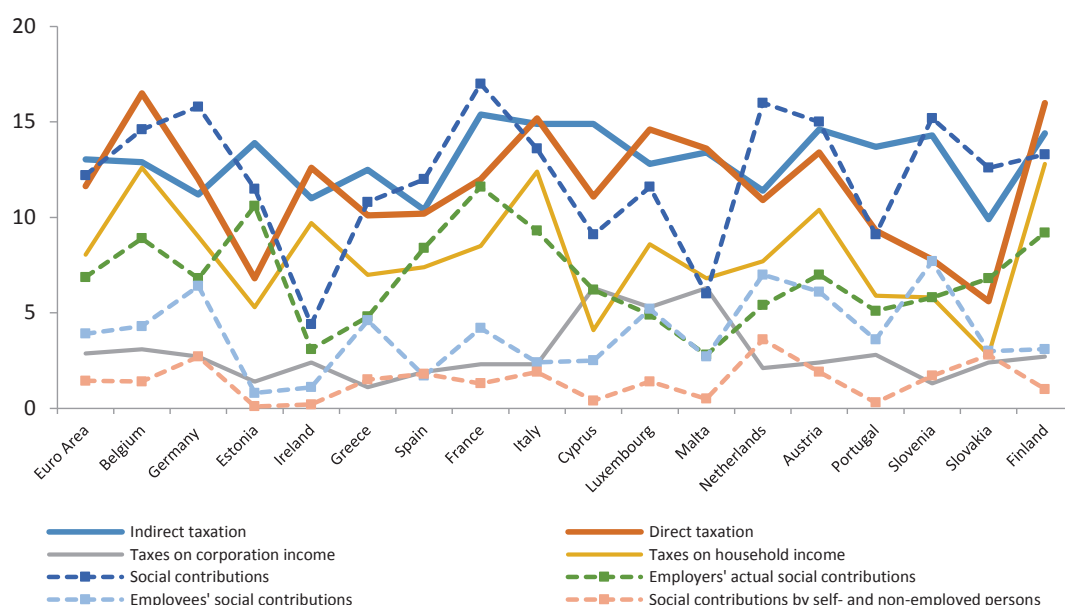
Figure 1 Fiscal revenue in Euro Area members states and Euro Area average, in 2012 (%GDP)
Source: EUROSTAT, authors' calculations

The structure of fiscal revenues and division between indirect taxation, direct taxation and social contributions differs between member states. Although most countries (Austria, France, Germany, Netherlands, Slovakia, Slovenia and Spain) rely mainly on social contributions, as the revenue collected is higher than those from the other types of taxation, the revenue collected through indirect taxation vary between 9,9% GDP to 15.4% GDP (Figure 2).
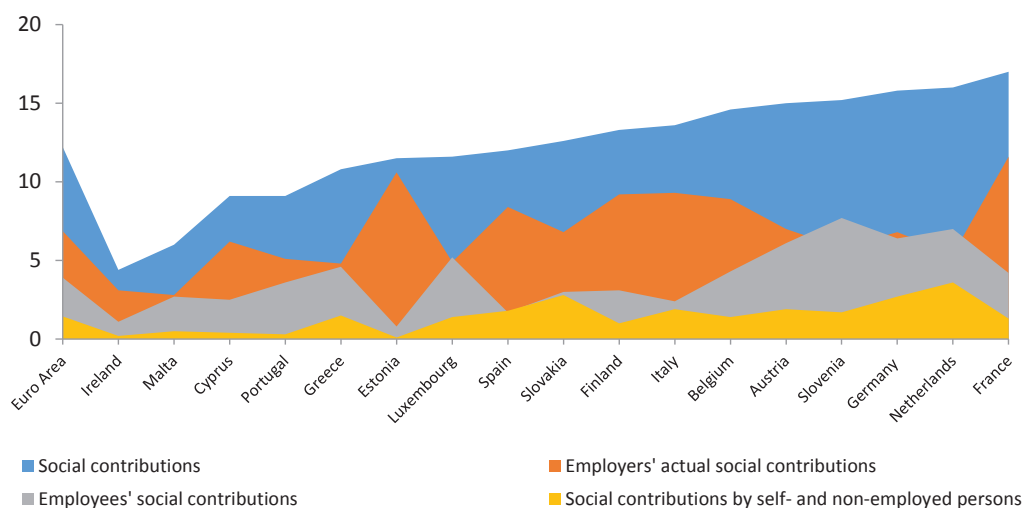

Figure 2: Social contributions and subdivisions, in Euro Area member states and Euro Area average, in 2012 (%GDP)
Source: EUROSTAT, authors' calculations

From the structure of social contributions, most revenue is collected through employers' social contributions. Even so, the differences are significant, as the percentages vary from 2.8% GDP (Malta) to 11.6% GDP (France). Only in Slovenia (5.5% GDP), Luxemburg

(5.2% GDP) and Netherlands (7.7% GDP) revenues from social contributions paid by employees' are higher than from the other two subdivisions of social contributions: employers' social contributions and social contributions paid by self-employed and non-employed.

Direct taxes are the main resource of budgetary revenue in five out of the seventeen Euro Area member states (in 2012), these being: Belgium (16.5% GDP), Ireland (12.6% GDP), Italy (15.2% GDP), Luxemburg (11.1% GDP) and Malta (14.6% GDP). Direct taxes are defined as current taxes on income, which we have divided into direct taxes payable by enterprises, taxes on individuals' and households' income, and other current taxes. Average Euro Area revenue collected through direct taxation payable by corporations as taxes on income is of 8.04% GDP, while taxes payable by individuals and households applied on their income is lower then 3% GDP (Figure 3). For most countries, direct taxation on individuals and households income is the main direct tax resource for government revenue, although revenue can vary from 2.8% GDP (Slovakia) to 12.8% GDP (Finland). In 2012, only Cyprus registered more revenue from direct taxes on income payable by corporations than revenue from direct taxes on individuals' and households' income.
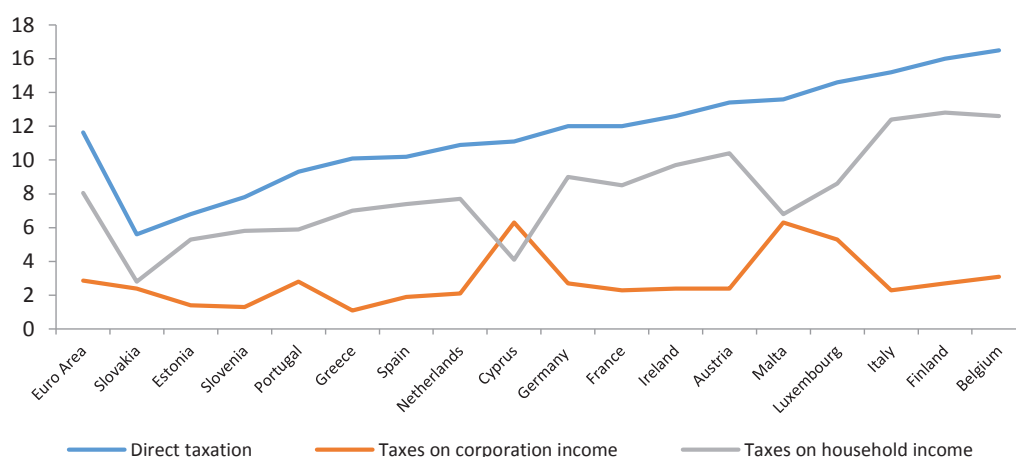

Figure 3: Direct taxation revenues, in Euro Area member states and Euro Area average, in 2012 (%GDP)
Source: EUROSTAT, own calculations

Countries that rely mainly on indirect taxation are Cyprus, Estonia, Finland, Greece and Portugal. Countries that registered indirect tax revenue above Euro Area average (13.3% GDP) are: France (15.4% GDP), Cyprus (14.9% GDP), Italy (14.9% GDP), Austria (14.6% GDP), Finland (14.4% GDP), Slovenia (14.3% GDP), Estonia (13.9% GDP), Portugal (13.4% GDP) and Malta (13.4% GDP). Although revenue collected from indirect taxation vary in Euro Area from 9.9% GDP (Slovakia) to 15.4% GDP (France), in most cases VAT type taxes remain the main resource for budgetary revenue.

3. Multidimensional Analysis

As the primary data analysis revealed many differences between Euro Area member states, but also similarities concerning various fiscal aggregates, we completed the analysis through multidimensional analysis, with the aims of classifying Euro Area member states into subgroups with similar fiscal structures. Taking into consideration indirect taxation, division of direct taxation into taxes on corporations' income, taxes on individuals' and households' income and other current taxes, and the structure of actual social contributions, employers' actual contributions, employees' social contributions and

social contributions payable by self-employed and non-employed, we used cluster analysis in order to determine which member states have similar fiscal structures.

Cluster analysis has been previously used in order to group OECD countries in accordance wit their tax systems taking into account the proportion of each type of tax in total revenue (Peters, 1991). Bernardi (2003) used a similar methodology for OECD Countries, while Kemmerling (2003) applied this procedure on European countries and obtained comparable results, regarding groups with similar fiscal structures. Delgado (2010) took into consideration fiscal pressure and tax structure in order to determine tax mix convergence within the European Union. Cluster analysis applied on fiscal pressure and division of tax structure on indirect taxation, direct taxation and social contributions was also applied for the study of fiscal convergence in the enlarged European Union (Vintila, Onofrei, Tibulca, 2014). There are also studies that differentiate from this methodology and used cluster analysis in their study of the effects of globalization on tax mixes (Kubatova, Vaneurova and Foltysava, 2008) or to determine the degree of nominal and real convergence (Miron, Dima and Paun, 2009).

Our study intends to take the analysis further, by identifying groups with similar tax structures based not only on tax revenue and main tax categories, but on their subcategories, taking into consideration the division into taxes payable by corporations and taxes payable by individuals and households. In order to achieve the before mentioned objective, we applied hierarchical cluster analysis on the above mentioned data set and decided to use the between group linkage method. We used range of solutions, from 2 to 7, as the maximum number of clusters in the literature was 6 we outreached and extended the range to 7, and measured intervals with squared Euclidian distance. The results of this exploratory analysis underlined the existence of six clusters (when deciding on the number of clusters we took into consideration the idea of greater segmentation of common features between the clusters obtained).

The cluster composition is as follows (Figure 4). Cluster 1 consists of Germany (2), Netherlands (12), Greece (5), Luxemburg (10), and Slovenia (15). Germany, Luxemburg and Slovenia are the only Euro Area countries in which social contributions payable by employees are higher than social contributions paid by employers. Clustering all the three countries in the same subgroup, underlines the criteria for grouping this way. Germany and Netherlands were grouped in the same cluster by previous analysis that took into consideration only total revenue, indirect taxation, direct taxation and social contributions (Lazar, 2012). One similar feature between the latest and Slovenia is that all three countries rely mainly on social contributions as resource for budget revenue.

Cluster 2 is specific for high fiscal burden countries and is formed of Italy (8), Austria (13), Belgium (1), Finland (17) and France (7). Taking into consideration the division of tax revenue into direct and indirect taxation, it cannot be concluded on a common structure for this cluster, as the fiscal structures are different among the participating cases. However, except indirect taxation revenue, all countries rely mainly on taxes on individuals' and households' income and on employers' actual contributions.
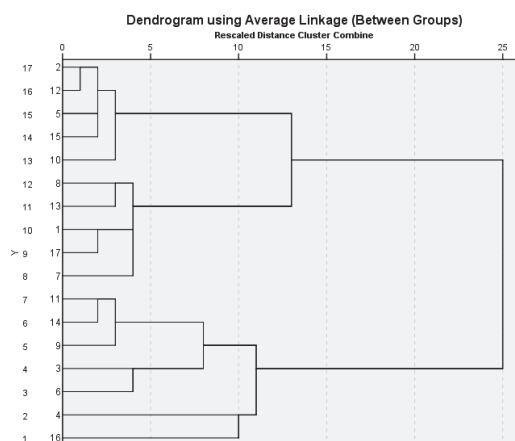
Figure 4: Dendogram output of cluster analysis
Source: Authors' calculations

Cluster 3 if formed by Malta (11), Portugal (14) and Cyprus (9). All three countries have fiscal revenue of about 35% GDP and total revenue very close to 40% GDP.

Estonia (3) and Spain (6) form the forth cluster. These are countries with fiscal burden below Euro Area average (38.1% GDP). In 2012 both countries registered fiscal revenues near 33% GDP: Estonia (32.4% GDP) and Spain (33.3% GDP).

The last two clusters consist of only one country that has features that differentiate it from the other groups. Cluster 5 consists only of Ireland (4) that has the lowest share of actual social contributions among all Euro Area member states. Cluster 6 is represented by Slovakia (6) that has the lowest fiscal burden in Euro Area, of less than 30% GDP. Slovakia registered in 2012 the lowest revenue from direct and indirect taxation, but was above Euro Area average on actual social contributions (12.6% GDP). Cluster composition obtained through hierarchical cluster analysis was similar by running k-means cluster analysis, for a number of 6 clusters, as underlined by the hierarchical analysis.

4. Conclusions

Euro Area is formed of countries with different fiscal structures that nevertheless register many similarities in terms of tax revenue. As a general trend, most countries rely mainly on VAT type taxes, rather than on other type of indirect tax.

The main direct taxes revenue is covered, in most Euro Area member states, by individuals and households as direct taxes on their income. However, employers are the main contributors to social contribution revenue, as employers pay more taxes as social contributions than their employees in most Euro Area countries.

The cluster analysis classified Euro Area member states in six subgroups, taking into consideration total revenue, indirect taxation, division of direct taxes into taxes payable by corporations on their income and taxes on individuals and households income, and division of actual social contributions into employers' social contributions, employees' social contributions and social contribution payable by self-employed and non-employed. Analyzing the clusters obtained, it can be easily noticed that the level of total revenue (%GDP) can easily explain the composition of some clusters, while in others fiscal revenue can be a common variable for the countries that form a specific cluster. While social contributions payable by employees can explain joining part of the composition of the cluster, the division into income taxes payable by corporations and taxes payable by individuals did not play an obvious role in grouping countries based in a higher extend on this criteria.

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