ANALYSIS OF SELECTED INDICATORS OF THE TAX BURDEN ON ENTREPRENEURS IN THE EU

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Abstract: *The idea of gradually converging the tax systems of the Member States of the European Union is as old as the Union itself. It can be stated that the achievement of tax harmonization objectives has progressed in many areas. The main objective of this process is to facilitate the movement of goods and services in the common European market and to remove administrative barriers to cross-border trade within the Union. The paper aims to examine and analyze similarities, respectively the diversity of Member States' tax systems in different respects. Priority analysis is focused on business entities. It can be stated that the tax or administrative burden on entrepreneurs in EU countries varies to a large extent.*

Keywords: *Tax and Contribution Rate, Entrepreneur, European Union, Cluster Analysis*

1. INTRODUCTION

Specifics in each country's development have led to the fact that the tax systems applied in each country have evolved and are still evolving in a different way, in line with the specific circumstances and objectives of each country. The structure and content of an optimal tax system depends on who, when and where it will create or apply it. The European Union endeavors to create a harmonized structure of the Member States' tax systems, thus promoting a better functioning of the internal market.

2. THEORETICAL BACKGROUND

The second half of the 20th century was characterized by a relatively rapid process of globalization and internationalization in many social areas, including international economic cooperation. Of course, the European Union and its Member States, with their own tax systems, could not avoid this from the outset. Tax systems need to respond to the systems of their trading partners as a result of increasing international trade.

The convergence of tax systems is often associated with different terms to express this process. To explain these terms, we use the Council of Economic Analysis (2014) definitions:

"Cooperation" refers to joint optimization: countries A and B jointly determine the tax bases and rates so as to maximize some common social objective. In the European union, the common external tariff policy is an example of cooperation. "Coordination" refers to commitment: since the choices of country A depend on those of country B and vice versa, there might be multiple equilibria (for instance one with high tax rates and another one with low tax rates). Coordination then consists in a reciprocal commitment to a specific behavior. Coordination includes infor-

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mation exchange, for instance on savings income. "Harmonization" refers to an equalization of tax bases and/ or tax rates. A variant of harmonization is to impose minimum bases or rates. Harmonization is one form of coordination. "Convergence" refers to a narrowing of base differentials or of tax differentials. Convergence may arise from coordination or from competition.

Harmonization will in general refer to full equalization of tax rates, while tax coordination will encompass rate harmonization as well as other less sweeping measures, such as minimum tax rates or unified tax bases. (Zodrow, 2003, Široký, 2010).

Proponents of the unification of tax systems argue that harmonization is a prerequisite for the functioning of the single market, while opponents are convinced that, in the case of direct taxes, sovereignty in individual countries should be maintained (tax competition). Keen (1993, p. 16) explain that "there may exist collective gains from limited measures of harmonization in particular areas or, more flexibly still, from mutual adherence to some simple rules in tax-setting."

Mintz (2004) points to corporate tax consolidation. He says, it would reduce the need for European governments and businesses to comply with complicated rules such as the allocation of overhead costs (especially interest expense), transfer pricing, transferability of losses, financial derivative trading and cross-border mergers and acquisitions. Even with consolidation, individual European states could still operate with a great deal of autonomy by providing special treatment to business activities through state-specific tax rates, credits and allowances.

One of the reasons for the need for tax harmonization is international juridical double taxation. OECD (2019) defines international juridical double taxation as the imposition of comparable taxes in two (or more) States on the same taxpayer in respect of the same subject matter and for identical periods. It has harmful effects on the international exchange of goods and services and cross-border movements of capital, technology and persons. In recognition of the need to remove this obstacle to the development of economic relations between countries, as well as of the importance of clarifying and standardizing the fiscal situation of taxpayers who are engaged in activities in other countries, the OECD Model Tax Convention on Income and on Capital provides a means to settle on a uniform basis the most common problems that arise in the field of international juridical double taxation (OECD, 2019).

The Convention establishes two categories of rules. There is determined regarding different classes of income, the respective rights to tax of the State of source or situs and of the State of residence and it is done the same regarding capital. In the case of several items of income and capital, an exclusive right to tax is conferred on one of the Contracting States. The other Contracting State is thereby preventing from taxing of those items and double taxation is avoided. As a rule, this exclusive right to tax is conferred on the State of residence (OECD, 2019).

3. MATERIAL AND RESEARCH METHODS

Despite significant rises since 2010, EU-28 income tax revenue as a percentage of GDP reached a plateau in 2015, with euro area following a broadly similar trend. The structure of taxation varies quite significantly across the Member States. When it comes to the share of direct taxes in total tax revenues, Denmark has the highest share (66%), followed by Ireland, the United Kingdom, Sweden and Malta with shares lying between 40% and 50% of revenue. (Genschel, Jachtenfuchs, 2018)

Figure 1 shows the evolution of Total Tax and Contribution Rate (TTCR) over the period 2012 to 2017 in the Member States. The graph clearly shows that the evolution of TTCR for 5 years long period was diverse. The most significant drop in the rate was recorded in Italy (-12.7%), followed by Spain (-11.6%) and Hungary (-9.4%). On the other hand, the largest rate increase was recorded in Greece (+ 7.9%). The tax burden on businesses has not changed only for Bulgaria. The EU-27 average (excluding Croatia) was 41% in 2017, while France recorded the highest TTCR (60.4%).

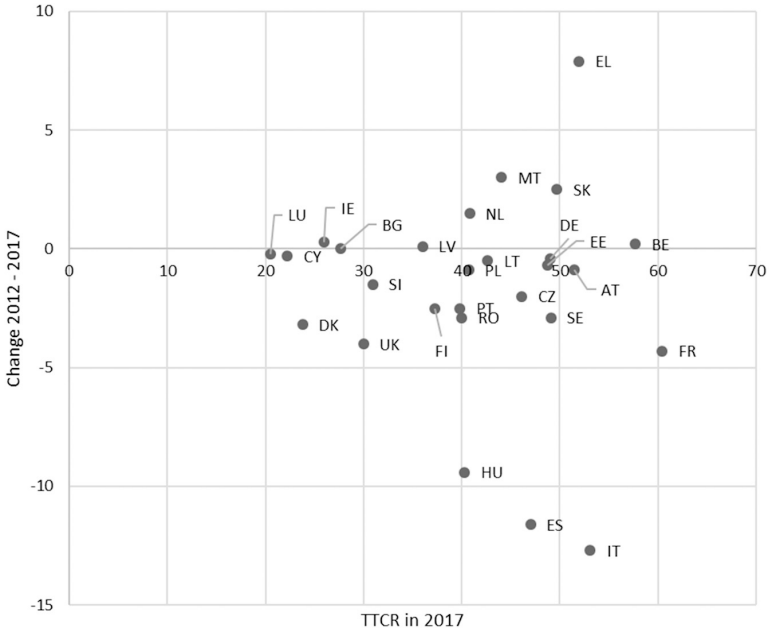

Figure 1. Total Tax and Contribution Rate (TTCR) in 2012 and 2017 (%)

Source: authors according PWC, 2019

Another indicator that indicates the difficulty of the business environment is the number of payments made during the year.

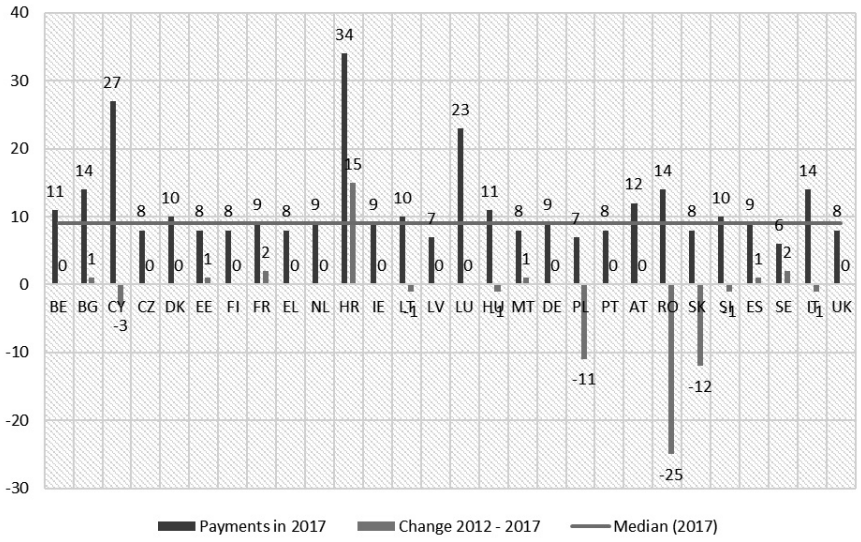

Figure 2. Number of payments in 2012 and 2017

Source: authors according PWC, 2019

It is the number of all payments (taxes and levies) that an entrepreneur must make in a year. For score clarity, the values are shown in a bar graph (Figure 2). Romania recorded the largest decrease in the number of payments compared to 2012 (from 39 payments to 14 in 2017), followed by Slovakia and Poland. The highest number of payments made by entrepreneurs was declared in 2017 in Croatia. The median within the EU-28 was at the level of 9 payments.

The following Figure 3 shows the number of hours an entrepreneur spends completing compulsory payment forms and visiting offices. The graph indicates that the highest-burdened on the tax administration in 2017 were entrepreneurs in Bulgaria (up to 453 hours). Most countries, in this case, are in the range of 50-250 hours. Poland recorded the highest increase in this indicator compared to 2012 (+ 48 hours). Clearly, the most significant drop in the hours in the period under review was achieved by the Czech Republic (-183 hours).

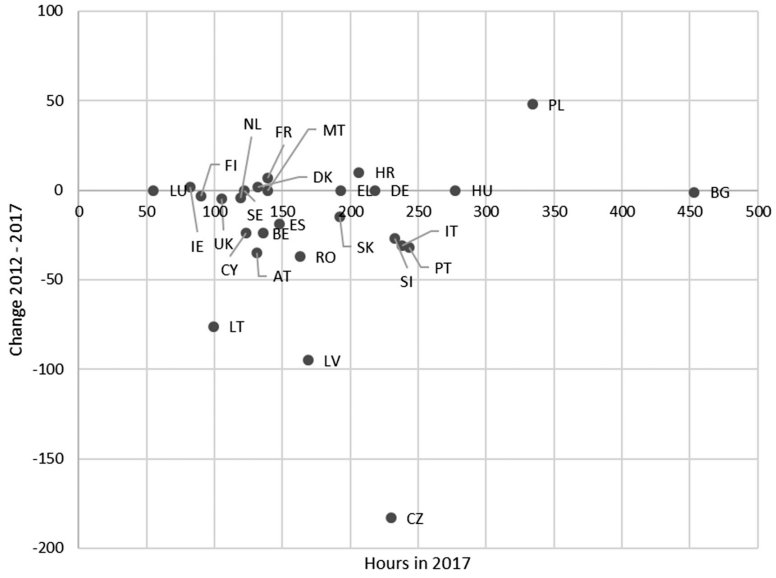

Figure 3. Number of hours spent by the tax administration in 2012 and 2017

Source: authors according PWC, 2019

Previous graphical data processing indicated similarity in the evolution of the indicators in space and time. Therefore, we decided to use multidimensional cluster analysis for further analysis.

Imputed variables for cluster analysis were secondary data from PWC database. Research method was cluster analysis conducted in statistical software R 3.4.1. There were used two clustering methods – hierarchical agglomerative clustering and non-hierarchical clustering. Three imputed variables for Member States were TTCR, HOURS spent by the tax administration and the Number of PAYMENTS in 2017. The objective of cluster analysis was to achieve such groups of states, which would be characterized by certain homogeneity in case of selected tax indicators. Cluster analysis sorted data into sets with the greatest possible similarity within the group and the largest difference between groups. (Farley et al., 2012)

4. RESULTS

Hierarchical clustering methods are based on sequentially joining of clusters, their number decreases continuously until finally all clusters are combined into one. The result is graphically displayed as tree diagram respectively cluster dendrogram. Ward's method we've used involves an

agglomerative clustering algorithm. It looks for groups of leaves that it forms into branches, the branches into limbs and eventually into the trunk. Ward's method starts out with n clusters of size 1 and continues until all the observations are included into one cluster. (Meloun et al., 2012, p. 324)

Ward's method use the Euclidean distance defined by the formula:

$$d_{ij} = \sqrt{\sum_{k=1}^{K} (x_{ik} - x_{jk})^2} \tag{1}$$

Where x_{ik} is the value of „*k"* variable for *i-th* object and x_{jk} is the value of „*k"* variable for *j-th* object. For calculated distance is than determined the rule of linking statistical units into clusters. There were „*p"* objects in the analyzed group, namely 28 countries in which were pursued „*k"* quantitative characters (3 variables), the distance d_{ij} between *i-th* element and *j-th* element was Euclidean distance.

The assumption of cluster analysis is that the characters examined do not correlate with one another. We used Spearman's correlation coefficient to determine the tightness of the relationship between the variables studied. Histograms of interval variables confirmed the condition of normality distribution. Spearman's correlation coefficient has confirmed low correlation between variables.

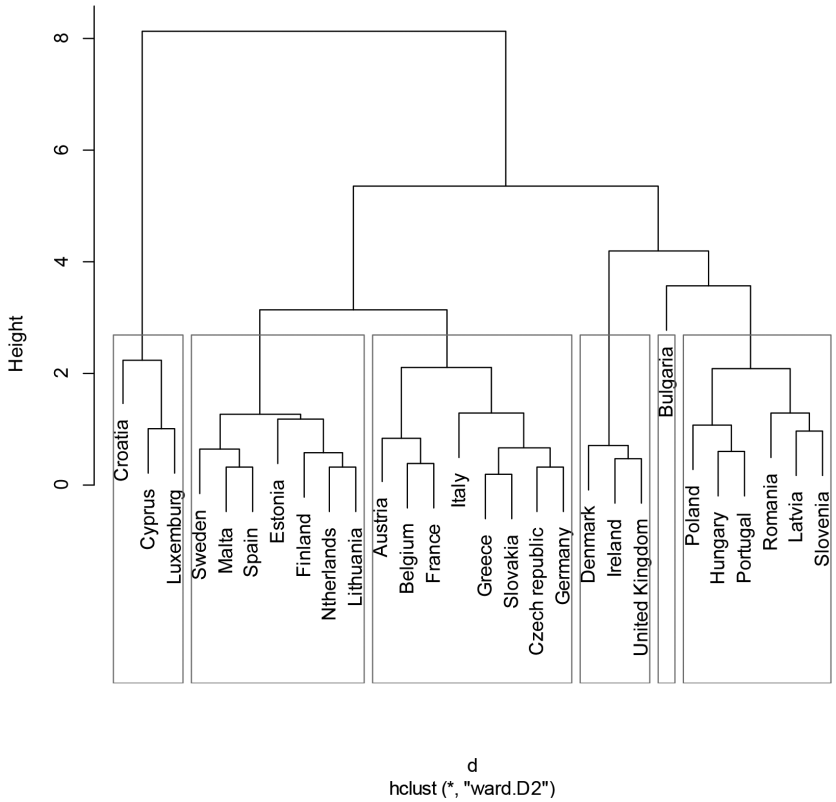

Figure 4. Cluster dendrogram according Ward's method (2017 data)
Source: authors

In the dendrogram we can identify six groups of countries with similar characteristics. These groups are highlighted. There are two larger clusters with 7 or 8 countries. Outside of clusters remained only Bulgaria. In order to draw conclusions that consider the exact distances, we have also used a non-hierarchical clustering method, the output of which is scatterplot.

If we consider two variables (components), clusters can be visualized by using non-hierarchical method K-means. Based on previous hierarchical method, it is considered similar number of clusters. K-means clustering is the most popular partitioning method. It requires the analyst to specify the number of clusters to extract. There are two components, which explain 85,21 % of the point variability.

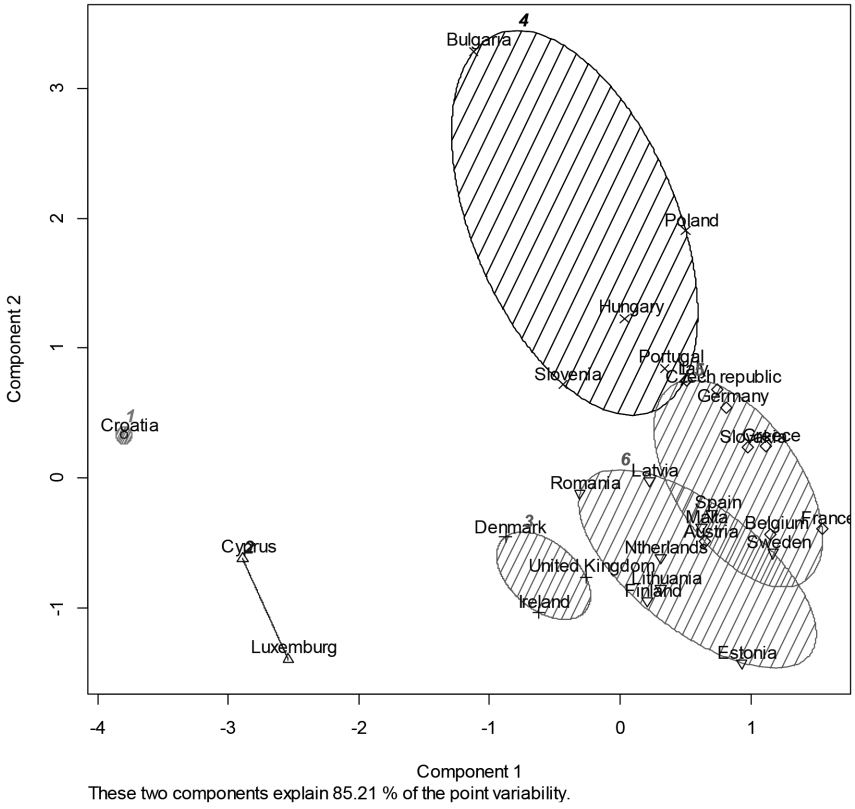

Figure 5. Scatterplot according K-means method (2017 data)
Source: author*s*

Due to testing we have chosen 6 clusters as an imputed command for K-means clustering. We consider the data set, which contains n=28 objects, and partition it into k=6 clusters. The ellipses are based on the average and the covariance matrix of each cluster, and their size is such that they contain all the points of their cluster. The ellipses sizes of clusters 5 and 6 are similar. Cluster no. 6 displays less variability of Component 1. Cluster no. 4 is quite extensive because of object on boundaries of the ellipse. The larger shading intensity indicates the largest density of divided objects in ellipses.

5. CONCLUSION

The analysis carried out in the paper shows that the different economic, political and social developments in Europe have also been reflected in the working of the tax systems in individual countries. The European Union has constantly initiated efforts to bring the tax systems of Member States closer together. The analysis of selected business taxation indicators has shown that the Member States differ significantly from one another. In the paper we examined the development of Total Tax and Contribution Rate, the Number of Hours spent by the tax administration and the Number of Payments made by entrepreneurs in a year.

The level and the evolution of indicators have shown that the business environment in terms of paying taxes and contributions is constantly changing across countries. Only a few countries remained at the level of five years ago. France recorded the highest TTCR in 2017, the tax administration took the most hours to entrepreneurs in Bulgaria and the most payments per year were made by businesses in Croatia. The research has shown that the Member States differ not only in the level of tax rates but also in other indicators that contribute to the creation of business environment.

The unification of tax systems could begin with their gradual convergence. The idea of harmonizing taxes in all Member States at once is unrealistic. Cluster analysis that can evaluate multidimensional data can be a way of gradual coordination. The process could start at first in clusters and later at the EU level.

In future research, we would like to add indicators from the research area and subject them to a similar statistical analysis.

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