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Clustering of EU member states according to tax audit activity indicators

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Abstract
The article aims to identify how to group the tax administrations of the EU member states according to the indicators specific to the tax audit activity. The practical work used the tax information related to the years 2014 and 2020 made available by the OECD through the Series of comparative information on tax administration. At the same time, information on tax revenues and gross domestic product published by Eurostat was also used. Research results show that tax administrations can be grouped by considering similarities in their tax audit activities, which can generate clues about the tax performance level. At the same time, the shift between 2014 and 2020 in the position of the clustered states considered with tax performance is also analyzed. Tax professionals can use the research results to see where their tax administration stands to import best practices from tax administrations located in the best performing cluster.

Keywords: Cluster analysis, dendrogram, fiscal inspection, additional tax obligations, government performance

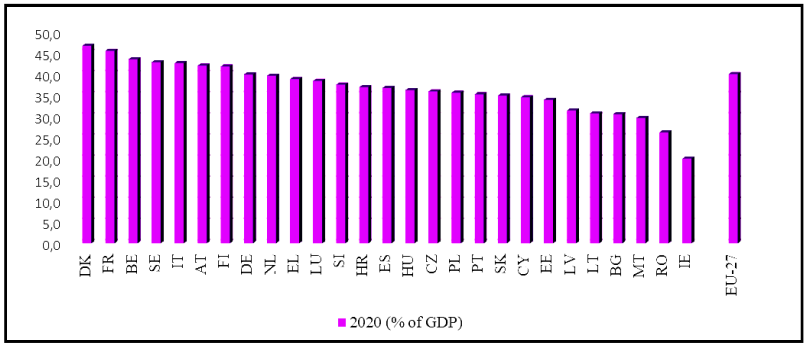
Introduction

An important topic in the current economic and social context is the analysis of the tax administrations performance, these being the institutions with the most important role in the collection of tax revenues. Various national and international organizations study and analyze the field. The Organization for Economic Co-operation and Development, the International Monetary Fund and the World Bank constantly publish various materials that focus on the collection of tax obligations. The tax audit activity carried out by tax administrations also has a role in the collection of tax revenues. This structure is responsible for increasing the level of declaration but also for establishing additional tax obligations as a result of the tax audits carried out. Taxes and fiscal charges established by the bodies with tax audit powers refer to tax obligations not declared by taxpayers or only partially declared. Under these conditions, the importance of knowing the results of the tax audit activity is a subject of real interest for decision-making bodies in the fiscal field.

The paper's aim is to identify groups or clusters of EU member states that consider the tax audit activity and, based on them, to determine a causal relationship between the level of collected tax revenues and the used variables. By using clustering as a research method, we capture not only the fiscal dimension of the tax administrations belonging to the EU member states in terms of tax audit activity, but also the potential gaps that are created between them. The variables used in the grouping were extracted from the publications of the Organization for Economic Cooperation and Development (OECD) regarding the tax audit activity for the years 2014 and 2020. The first part of the paper includes some materials published by various authors that we could identify regarding the grouping of member states in terms of tax performance. Since I did not find any research that groups the EU member states based on similarities in the tax audit activity, I considered it was appropriate to make this grouping, thus contributing to improving the specialized literature.

The second part of the paper presents the research methodology used in order to achieve the grouping of the EU member states based on the tax audit activity indicators.

The grouping of the EU member states through the prism of the indicators specific to the tax audit activity is found in the third part of the research, and it was carried out with the help of the SPSS computer program by presenting the descriptive statistics, the variables' normality test, drawing up the dendrogram, testing the belongingness of the cluster allocation and interpreting the results the obtained grouping. At the same time, the paper also includes a possible influence of the tax audit activity on the level of tax revenues related to the gross domestic product.



Source: Eurostat (online data code: gov_10a_taxag) (extracted May 2022)

Fig 1: Tax revenue (including compulsory actual social contributions) % of GDP, 2020

The research carried out led to the conclusion that tax administrations can be grouped based on the results of tax audit activity with visible contributions to the level of tax revenues.

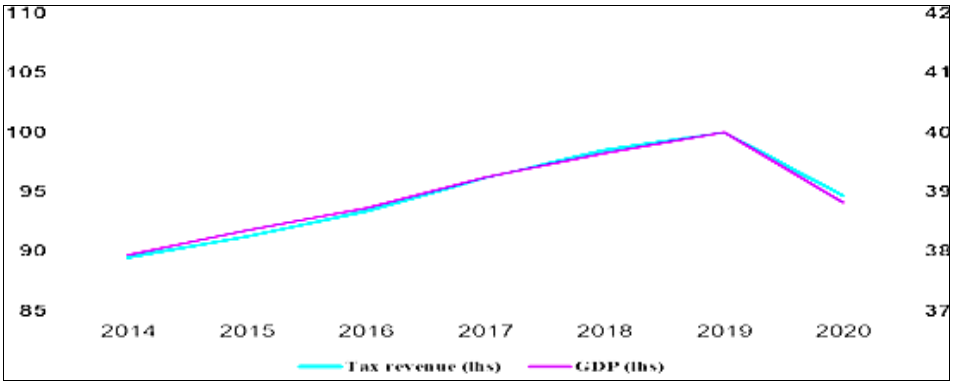
The present work is intended to be a first attempt at highlighting the similarities of tax administrations in the field of tax audit. At the same time, we want the research to represent a good starting point for possible econometric modeling to establish the degree of influence of tax audit indicators on tax revenues.

2. Literature review

Tax revenue collection is quantifiable, making its assessment extremely useful to political decision-makers (Das-Gupta *et al*., 2016) [9], and the improvement of used administrative acts and procedures would be a useful tools for raising the level of tax collection (Kaul *et al*., 2006) [14]. In this context, the role of the tax administration becomes extremely important in ensuring the need for the collection of tax revenues, which is necessary for the activities in the budget sector.

In the conditions of a market economy in which capital and labor move easily between countries, with the fulminant evolution of information technology, the taxable bases require fair and efficient taxation. The fiscal strategy used to collect budget revenues differs from one state to another in terms of the number of levies and taxes levied, the level of taxation, levies levied, etc.

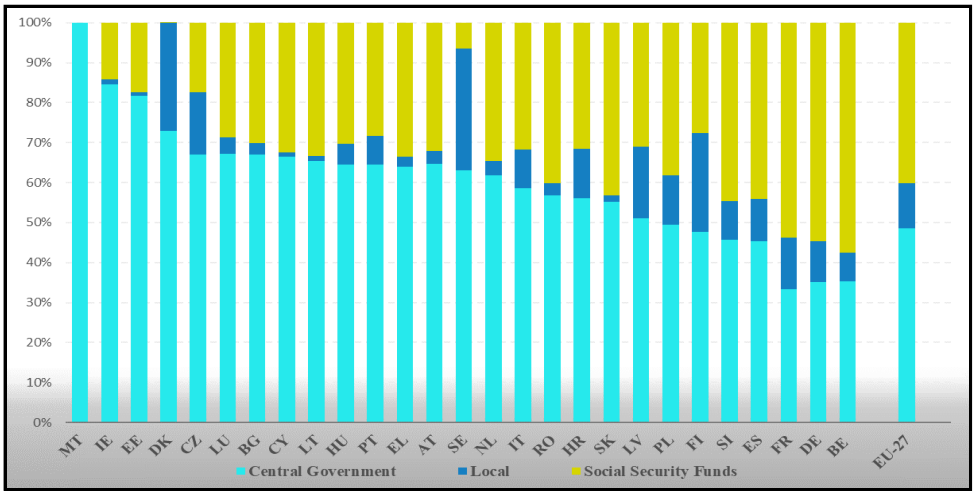
In the European Commission's work "Taxation trends in the European Union" the degree of tax collection achieved by each EU member country in 2020 is presented. The situation is represented by the following Fig:



Source: Eurostat (online data code: gov_10a_taxag)

Fig 2: Revenue structure by level of government (% of total taxes) 2020

According to the situation presented, the states with a collection rate above the average of the EU states in 2020 are Belgium, France, Denmark, Austria, Finland, Italy. The average of EU member states for tax collection was 40.1%. The structure of revenues at the level of each government of the EU member states in 2020 is presented as follows:



Source: European Commission, DG Taxation and Customs Union calculations based on DG ECFIN, AMECO, data (extracted May 2022).

Fig 3: EU-27, TAX REVENUE AND GDP (2014-2020)

It is worth noting that the largest share in tax collection is held by taxes and fees owed by taxpayers for the economic activities carried out. The tax audit activity has the role of contributing to the collection of these taxes and fees owed by taxpayers. As this paper aims to specify whether there is a causal link between the tax audit activity and the tax revenues obtained as a result of the collection of taxes and fees, weanalyzed the evolution of tax revenues and the gross domestic product during thisperiod. A turning period is observed, which can be explained by the presence of the context of the Covid pandemic starting in 2019. Although the indicators were on an upward trend, the trend in 2019 is downward, so it is necessary to improve the efficiency of tax collection. As economic needs are ever greater, the degree of tax revenue collection at the highest level becomes a necessity. A first step of the undertaking was to

review the works that assumed the grouping of the member states considering the fiscal efficiency of their administrations. There are not many papers in which the authors followed the grouping of member states according to certain fiscal indicators. The situation is generated by the multitude of demographic, geographical, human and behavioral factors that have an effect on the fiscal situation, thus the grouping of states is cumbersome.

Following the research carried out, however, we identified a series of published works in which the authors grouped the EU member states based on various fiscal indicators.

Stevan Lukovic (2015) [17] carried out a cluster analysis of European states using the following variables: tax rates (profit tax, VAT, salary tax, social contributions, income tax), individual fiscal pressure, number of taxes and fees and the period required to fulfill tax obligations expressed in hours. The author highlights 3 clusters in which they were grouped:

- states with a burdensome tax system with a large number of taxes and fees, a large number of hours allocated to the fulfillment of tax obligations, but also a high average tax rate;
- states in which stimulation of the tax system is suggested (the second cluster) with a reduced number of taxes and fees, but also of hours required to fulfill tax obligations, but with a low tax rate;
- states where the efficiency of the tax system is of a moderate level (the last cluster) with the level of the variables located between the first and the second cluster (lower than in the first group, but higher than in the second).

The study's conclusions revealed a high efficiency of the tax administrations that use a tax system with average values of tax rates, number of taxes and fees and number of hours needed by taxpayers to fulfill tax obligations.

Andrejovska and Hudakova (2016) [3] made the grouping of EU member states considering: economic performance (GDP/capita), public debt/GDP ratio, state budget balance expressed as a share of GDP, nominal and relative rate of profit tax and tax burden.

Using the hierarchical Ward method, 5 groups were highlighted where the authors concluded that there are links with the level of corporate profit taxation. The states included in the first two clusters practice a profit tax rate between 10% and 21%, being characterized by a high public debt, but with a low budget deficit level (cluster 1) or with an economic performance below the average of the member states EU (cluster 2). Cluster 3 and 5 were characterized by a persistent public debt crisis and financial instability, and the corporate tax rate applied by these states varied between 22% and 36%. States assigned to group 4 use a rate for taxing profits between 24% and 29%. The conclusions of the study showed that in addition to the profit tax rates, tax revenues are also influenced by macroeconomic indicators recorded by each state so a harmonization of the profit tax is not sufficient to increase fiscal efficiency. The same conclusion was reached by the authors Mihokova and others (2017) [19] following a cluster analysis using the same variables, using the non-hierarchical k-means method, specifying a low fiscal efficiency of the states that recently joined the EU compared to the other countries, an aspect that certifies the fiscal benefits of the fiscal harmonization of the profit tax.

The authors Korecko, Radovan Slovakia and Voznakova (2019) [15] considered the realization of a clustering of the EU member states in order to analyze the impact of fiscal harmonization. The variables used were the rates of profit tax, income tax, and salary tax. The conclusions of the study showed that significant differences in tax revenues are registered among the formed clusters based on profit and income tax rates, so these authors also support the gains of tax harmonization.

In a more recent work (Pîrvu, Duţu and Mogoiu, 2021) [24], it is argued that the grouping of tax administrations based on organizational and operational characteristics can be associated with a certain degree of efficiency. The study used 21 variables related to the tax administrations of the EU member states regarding the institutional framework, the organizational structure, the nature of the technological solutions adopted, the degree of autonomy of the tax administration, performance standards, organizational characteristics related to making payments and managing fiscal appeals, the number of personnel employed in the administration per 1,000 inhabitants, the share of personnel with tax audit duties in the total number of employees, and the number of administration offices per 1 million inhabitants. The wage cost is reported as a percentage of the fiscal budget, rewarding wage performance, the level of segmentation of the organization, the use of electronic tax payment, the value of VAT refunds in the total net income collected, the existence of teams of taxpayer behavioral perspectives, the resolution of disputes at the administration level, the dynamics of the employed staff, the use of innovative managerial approaches, the professional training of the staff, the use of human resources strategies.

Other researchers such as Ravšelj and others (2019) [25] using the indicators of tax burden, time expressed in hours required to fulfill tax tasks and the number of new taxpayers per 1000 inhabitants, concluded that the efficiency of tax administrations is influenced more by the complexity of the tax system than by the tax burden. The cluster analysis carried out by these authors grouped tax administrations into 4 groups characterized by: tax systems with excessive tax burdens, tax systems with a high degree of complexity, tax systems that require stimulation and burdensome tax systems.

The authors Velichkov and Stefanova (2017) [26] carried out a cluster analysis of tax administrations belonging to the EU member states based on the following variables: total taxes as a percentage of the GDP, direct taxes as a percentage of total taxes, indirect taxes as a percentage of total taxes, social contributions as a percentage of total taxes. The analysis grouped the countries into three clusters that generally included states with a close geographical location and a similar degree of economic development. The first cluster comprises states with a high tax burden. The second group presents the lowest percentage of tax revenues in the GDP, the tax system in the states that make up this cluster is oriented towards indirect taxation. Cluster number three has the highest share of tax revenues in the GDP, registering the highest relative share of direct taxes in total tax revenues. The similarities of the tax systems used by the states in the same cluster are a prerequisite for the composition of the grouping, the authors conclude.

A cluster analysis of states by the GDP/capita and tax burden variables by Hoang *et al* (2021) [13] showed that most

taxes have a positive impact on tax revenue for poor countries, and taxes on goods and services promote economic growth in rich countries. At the same time, the conclusions of the study mention that the property tax hurts tax revenues in rich states and has a positive impact on poor states.

Considering the analyzed studies, at the European level, a major concern of each member state to increase the collected tax revenues by adopting a tax policy appropriate to its needs is observed. The tax audit activity is part of tax administration, having an important role in establishing and collecting tax revenues.

Regarding the definition of tax audit activity, we noted that several authors, such as Costea (2017) [7], D'Agosto and others (2021) Lethbridge (2013) [16] define tax audit as a basic function of tax administration, which includes all the procedures used to verify the tax debt collection mechanism. Tax audit involves completing the taxable amount (Brushwood *et al*., 2018) or "detecting the tax hidden by the taxpayer" (Bozanic *et al*., 2017) [5]. Tax audit is an important tool used by tax authorities to improve tax compliance by identifying, recovering and collecting owed taxes (Mazzolini, 2021 [18], Fitriyani, 2020 [12], Advani *et al*., 2019) [1]. We found no studies in which EU member states are grouped according to the results of the tax audit activity, so this paper aims to eliminate this shortcoming. As part of the fiscal activity with an important role in collecting the revenues of each state, the study of the tax audit activity and fiscal influence became the subject of this paper.

Research methodology

Clustering states according to control indicators could generate clues about the level of tax performance, with the results useful for tax professionals to see where their tax administration stands, as they could import best practices from the best-performing cluster. The tax audit's role as a collector of tax revenues is what led us to carry out this work.

The purpose of the research proposed by us is to find the answer to the following hypotheses:

1. Between 2014 and 2020, were there any changes in the activity carried out by the tax audit structures in the administrations of the EU member states?
2. Is there a causal link between the results obtained through the tax audit activity carried out by the tax administrations of the EU member states and the level of tax revenues?
3. If such a causal link is identified, can it be measured or identified?

We found that the best way to answer these questions is to perform cluster analysis. We proposed to carry out these analyzes in two different years in order to highlight the influence of administrative, economic and social factors on the functioning of tax audit structures, based on the changes in the cluster structure. As the OECD provides the data reported by various states based on non-binding questionnaires, we extracted from the database only those indicators considered relevant for tax audit activity, for which data were found for all 27 EU member states. Perhaps this is the reason why we did not find studies that group together the tax audit structures of the administrations belonging to the EU member states.

The source of information for the cluster analysis carried out is the tax information communicated by each EU member state separately, made available by the OECD through the periodically published "Comparative information on tax administration" works. The analysis will cover two periods: 2014 and 2020. The consideration of the two years (2014 and 2020) took into account the fact that OECD data can no longer be accessed for a period older than 2014, and the most recent data refer to 2020.

The OECD publication includes tax data for several states, but from these tax information was extracted related to EU member states reported for 2014 and 2020. Because in 2020, Great Britain completed the exit process from the EU, from the database used, all the indicators that referred to this state were removed, both for the year 2014 and for the year 2020, so the research was limited to a number of 27 EU member countries.

The variables considered relevant for which we were able to obtain data for 2014 and 2020 are:

- the average number of tax audits related to the number of taxpayers denoted for simplicity as audits;
- the average share of the staff with tax audit duties in the total number of employees of the tax administration denoted for simplicity as employees;
- the share of tax obligations established additionally in the total of tax revenues denoted for simplicity as assessments;
- the weight of tax audits in which additional tax obligations were established, compared to the total number of tax audits denoted for simplicity as audit rate;
- number of criminal reports drawn up by tax audit bodies denoted for simplicity as sanctions;
- the average percentage of solutions rejecting the contested issue by the court in the EU member states denoted for simplicity as contestations;
- the weight of the declaration of tax obligations on the taxpayers' own initiative denoted for simplicity as declaration degree;
- the weight of payments of tax obligations declared by taxpayers grade denoted for simplicity as payment;
- the cost of collection, representing tax expenses related to collected revenues denoted for simplicity as collection cost.

For the cluster analysis, we used the computer program IBM SPSS Statistics for hierarchical grouping. The choice of a hierarchical grouping was imposed by the existence of numerical variables, using the Ward Linkage Range Euclidean distance method, as it is "the most effective and efficient of all hierarchical classification algorithms" (Armeanu *et al*., 2012) [4]. The cluster ranking technique assumes that initially, the number of clusters is equal to the number of studied states (27), and they are grouped according to similarities so that each state belongs to a single cluster group (Yim and Ramdeen, 2015) [28].

The cluster analysis, in the first phase, involves examining the data from the point of view of the normality of distribution. For this approach, we used the Kolmogorov-Smirnov test and the Shapiro-Wilk test (Yap and Sim, 2011) [27] to determine the normality of the data distribution.

After accepting the null hypothesis for the normality of the data (the distribution of the variables is normal), we retained

in the clustering the statistically relevant variables, for which we created a graphic representation of the dendrogram type.

The membership of each state to the assigned cluster was verified by using the ANOVA methodology to test the statistical significance of the average values of the analyzed variables recorded at the cluster level.

Following the grouping carried out for an analysis of the characteristics of each cluster, we represented in a table the level of each variable relative to the average of all 27 states considered. The methodology was as follows: we compared the level of each variable with the average of the respective variable for the 27 states. From the lowest to the highest level of a variable, we divided the range into 3 groups with the same step, generating 3 intervals: below average, above average, and in the average range.

We made a graphic representation of the tax revenues related to the gross domestic product obtained by each of the 27 states in 2014 and 2020 using the data communicated by Eurostar.

In order to answer the research hypothesis regarding the possible existence of a causal link between tax audit activity and tax revenues, we proceeded as follows:

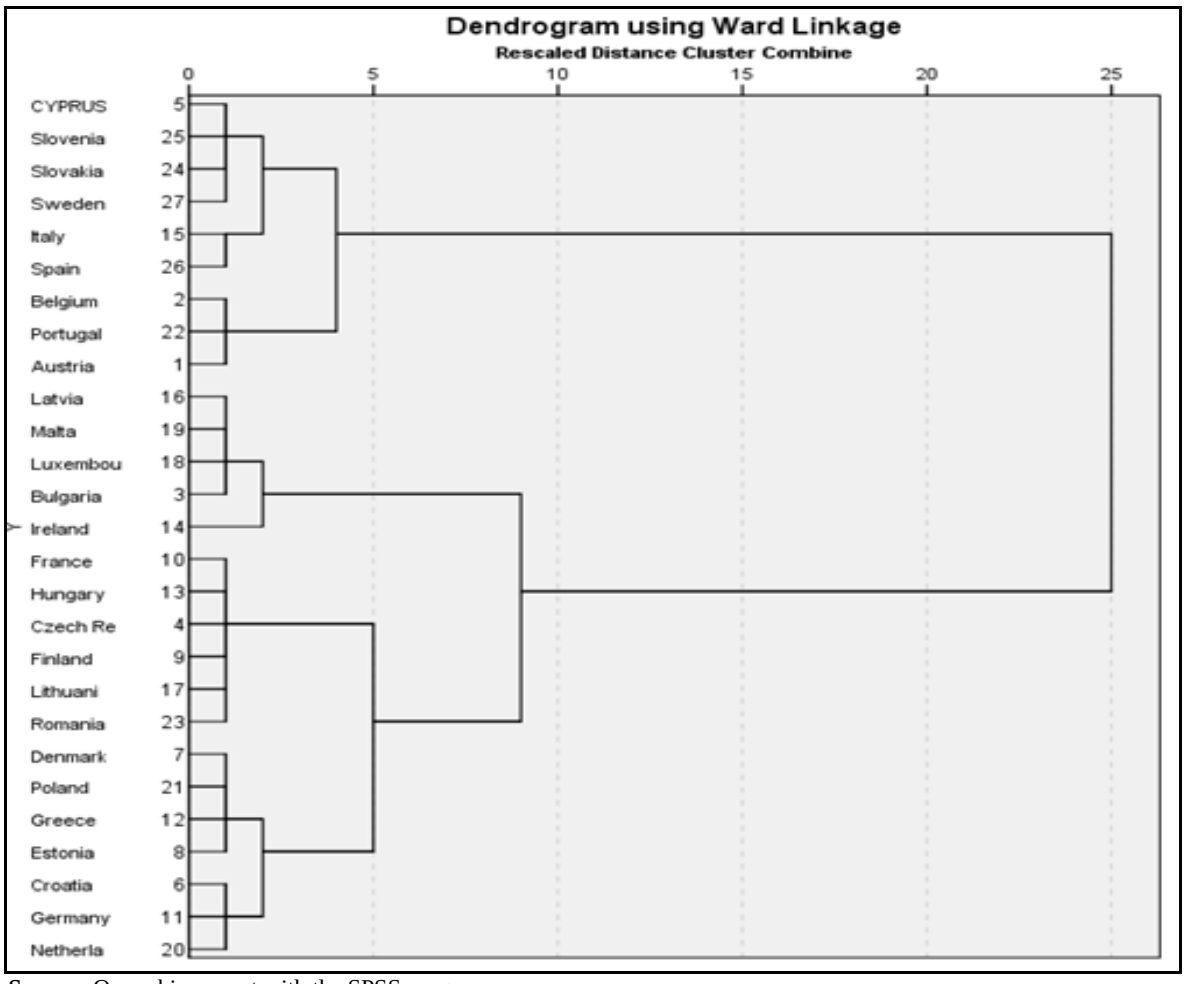
We identified the states assigned to the cluster whose variables are above the average of all EU member states. For the same states, the ranking position of the ratio between tax revenues and gross domestic product was identified. If we find the identification of the same states, then we can conclude that the causal link between tax audit activity and tax revenues reported to GDP has been identified.

Clustering of EU member states according to tax audit activity indicators

The normality of the distribution of the variables was tested using the Kolmogorov-Smirnov test and the Shapiro-Wilk test, the results showing whether or not there are significant differences between the distribution of the variables and the normal distribution level. The two tests produced good results for the 2014 and 2020 variables, with one exception.

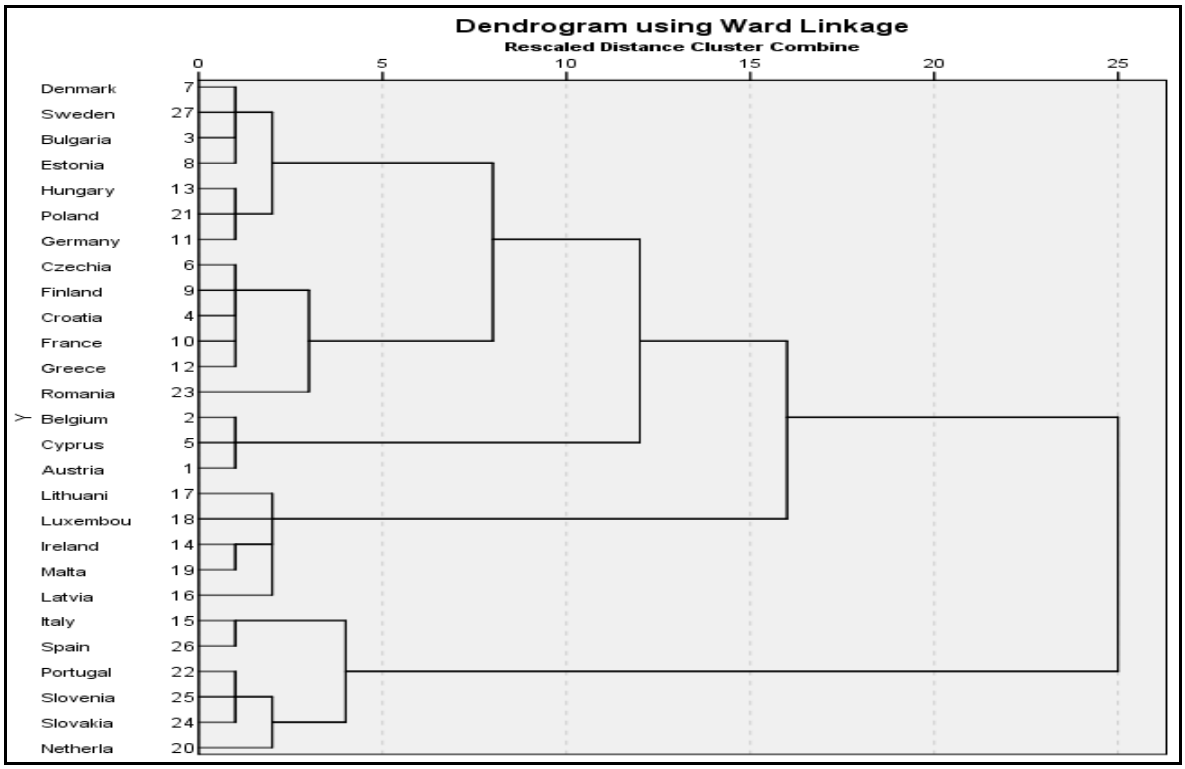
Since neither the Kolmogorov-Smirnov normality test nor the Shapiro-Wilk test (Sig. < 0.05) is verified for the "sanctions" variable related to 2014 and 2020, this indicator is removed from the performed analysis. For the other variables (audits, employees, evaluations, audit rate, appeals, declaration level, payment level, collection cost) considering the results of the normality tests of the distribution that suggest the acceptance of the null hypothesis (H0 – the distribution is normal), it is considered that they can be used for the cluster analysis and the results obtained will be statistically relevant.

By using Ward's Euclidean distance method, the SPSS computer program initially generated several clusters for the variables with the following centers, to then consider the efficient use of a number of 5 clusters. The cluster dendrograms for the variables for the years 2014 and 2020 are shown below



Source: Our achievement with the SPSS program

Fig 4: 2014 clustering dendrogram



Source: Our achievement with the SPSS program

Fig 5: 2020 clustering dendrogram

The composition of the 5 clusters obtained is showed in table no. 1

Table 1: Composition of clusters 2014 and 2020

Cluster number	No states included in the cluster	Cluster structure
C 1 2014	3	Austria, Belgium, Portugal
C1 2020	3	Austria, Belgium, Cyprus
C 2 2014	5	Bulgaria, Ireland, Latvia, Luxembourg, Malta
C2 2020	5	Ireland, Latvia, Lithuania, Luxembourg, Malta
C 3 2014	6	Finland, France, Hungary, Lithuania, Romania, Czech Republic
C3 2020	6	Czech Republic, Croatia, Finland, France, Greece, Romania
C 4 2014	6	Italy, Cyprus, Slovakia, Slovenia, Spain, Sweden
C4 2020	6	Italy, Holland, Portugal, Slovakia, Slovenia, Spain
C 5 2014	7	Croatia, Denmark, Estonia, Germany, Greece, Netherlands, Poland
C5 2020	7	Bulgaria, Denmark, Estonia, Germany, Hungary, Poland, Sweden

Source: SPSS's own creation

To test the membership of the states to the allocated clusters, we applied the ANOVA methodology, and the results obtained indicated a correct allocation.

Results and discussion

By plotting the level of each variable in relation to the average of the variable for all 27 EU member states, the characteristics of each cluster were obtained.

As we presented in the methodology chapter, the level of the variables compared to the EU average.

The states assigned to C1 clusters are mainly characterized by the lowest average level of the audit rate variable. This variable registered significant reductions since 2014 (76.2 average in 2014 compared to 57.32 average in 2020) the explanation is given by the pandemic situation which left deep marks on the efficiency of tax audit because of the impossibility of traveling to taxpayers. The level of variables obtained by Austria and Belgium made these states keep their position in cluster 1 both in 2014 and 2020. At the same time, the cluster values indicate a reduced weight of the tax obligations additionally established by the audit bodies in the total tax revenues, certainly due to the lowest value of the audit degree. The percentage of rejection of appeals to tax audit acts is average. moreover, the degree of declaration and payment of tax obligations is above the average of the EU member states.

Cluster C2 groups state whose main characteristic is the lowest degree of declaration registered as a variable. Bulgaria leaves the C2 cluster allocated in 2014 because in 2020 the degree of declaration was 97.53 compared to the cluster 2 average of 95.17. As for Lithuania, it did not fit into the criteria of cluster 2 in 2014, but it was included in this cluster in 2020 due to the level of the obtained variables. The level of the variables obtained by Ireland,

Latvia, Luxembourg and Malta, make these states keep their position in cluster 2 both in 2014 and in 2020.

The main characteristic of cluster 3 is the inclusion of the states with the lowest number of employees related to the tax audit activity in the total number of employees. Hungary and Lithuania no longer fit into this characteristic, so they left the C3 group. Instead, Greece and Croatia, which were not part of cluster 3 in 2014, met the criteria of the cluster in 2020.

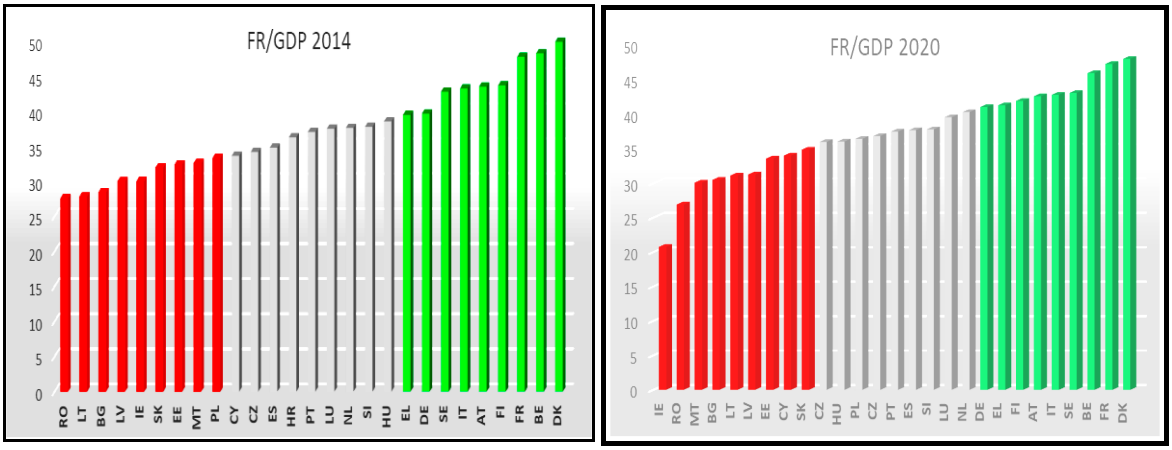
Cluster 4 includes states whose variables have the highest levels: number of tax audits, level of payment, and additional tax obligations. Sweden and Cyprus are countries that left the group in 2020 compared to 2014, as they no longer recorded these variables at a high level

The last cluster, cluster 5, is characterized by the lowest number of employees with tax audit duties in the total number of employees of the administration. Croatia, Greece and the Netherlands no longer met the criteria of the cluster and were eliminated, and Bulgaria, Sweden and Hungary are new states that became part of the C5 group in 2020.

The composition of the clusters cannot necessarily be defined by maximum or minimum representative values, these being relatively distributed among the 5 clusters. It is not possible to establish with certainty the cluster that contains the best-performing tax audit structures of the tax administrations of the member states. Through the hierarchical cluster analysis, we also revealed the change in the structure of the clusters in 2020 compared to 2014. Thus, we noticed that the way of grouping the states was mostly preserved with the exception of 8 states (Portugal, Bulgaria, Croatia, Greece, Netherlands, Cyprus, Hungary and Lithuania).

Since the tax audit activity has as an important objective the increase of the tax collection rate, we considered a comparison of the variables from 2014 with those from 2020 for the clusters where the best performers were found (C4 2014 and C4 2020). We noticed that the composition of these groups was not changed in 80%, Cyprus and Sweden disappeared, but the Netherlands and Portugal were introduced into the cluster. For the states that keep their position in the cluster rated with the best results in the tax audit activity: Italy, Slovakia, Slovenia and Spain, we have identified their position in the ranking of the EU member states as a ratio between tax revenues and the gross domestic product communicated by Eurostat.

According to the data communicated by Eurostat, Italy and Slovenia are at the top of the ranking and Spain and Slovakia are positioned in the middle, both in 2014 and in 2020, which indicates good results obtained by these states at the level of tax revenues.



Source: Eurostat data 2014 and 2020 https://ec.europa.eu/eurostat

Fig 6: Ranking EU member states tax revenue/GDP 2014 and 2020

Conclusions

As a general analysis of the variables used in 2020 compared to 2014, we observed a reduction in their level, except for the collection cost, which registered an increase. The explanation is that the pandemic situation was still present in 2020, and tax audits could no longer be carried out at taxpayers' homes, their number is reduced, thus being affected the degree of collection, the voluntary payment of tax obligations and the submission of tax returns.

In conclusion, the grouping highlighted an interdependence between the variables of tax audit activity in the sense that a large number of employees with tax audit attributions generates, under the conditions of a high degree of audit by increasing the number of audits, a high level of established tax obligations, they can materialize in an increase in tax revenues. At the same time, the large number of tax audits matches with a high degree of declaration and payment of tax obligations, since one of the roles of the tax audit activity is to guide and increase the level of collection through voluntary compliance. Regarding appeals filed by taxpayers against tax administrative acts concluded by tax audit bodies, it is noted that they are mostly rejected by the court, the degree being extremely high in all EU member states. It is no less true that the financial implications of supporting the tax audit activity are reflected in the cost of collection.

Italy, Slovenia, Spain and Slovakia are, according to data provided by Eurostat, at the top of the ranking in terms of tax revenue to GDP, both in 2014 and 2020.

The fact that these states are included in the clusters that predominantly record values of tax audit activity above the average of all EU member states can be considered a contribution of this structure in the tax administration to the increase in the level of tax collection.

With the help of the cluster analysis, we discovered that there is a causal link between the results obtained through the tax audit activity carried out by the tax administrations of the EU member states and the level of tax revenues. Thus, for the states considered with good results of the tax audit activity, the level of tax revenues compared to the gross domestic product is also high. Thus, it is necessary to pay special attention to increasing the efficiency of the tax audit activity in order to retain large tax revenues. At the same time, as a result of our research, we have shown that there were changes between 2014 and 2020 regarding the results of the tax audit activity. These results are reflected in the position of the EU member states in the composition of the clusters for the two years analyzed. We have found that the composition has been changed, on the one hand by the impact of the pandemic situation and on the other hand by changing the way the tax audit activity works. Some states reduced the number of staff assigned to tax audit activities, but increased the number of performed audits, others increased the tax penalties applied. These changes in the tax policy applied in the tax audit activity were reflected in the level of tax revenues compared to GDP, an aspect that strengthens the highlighted causal link.

It should be noted, however, that neither the level of influence nor the way in which the indicators of tax audit activity can contribute to the increase of tax revenues of a state can be defined. Under these conditions, the third hypothesis of the research could not receive any answer, but the present research leaves room for a future analysis by creating an econometric model of the influence of tax audit indicators on tax revenues.

The fact that we addressed how the tax audit activity contributes to increasing state revenues, how administrative organization influences tax collection and how they are reflected on fiscal activity, gives added value to the studies in the specialized literature. From the point of view of practical applications, the research is unique because, based on the tax audit activity, a grouping of the EU member states was made, an extremely useful analysis tool in highlighting the causal link between the tax audit activity and tax revenue collection.

The objectives of the research were achieved, demonstrating that there is a causal link between tax audit activity and tax revenues. The results are useful for tax professionals to see where their tax administration stands in order to import best practices from the best performing cluster. Italy, Slovakia, Slovenia and Spain performed well in terms of tax revenue to GDP. The other countries can borrow from the way the structures in these countries are organized and function, respectively: a large number of employees with tax audit duties generated, under the conditions of a high degree of auditing by increasing the number of audits, a high level of obligations established tax rules, which lead to an increase in tax revenues.

In carrying out the research, we encountered a series of limitations in achieving the objectives, mainly generated by the lack of recent information. Thus, for the cluster analysis, the only institution that provides information in this area is the OECD. We had to analyze the data related to the years 2014 and 2020 because this institution no longer allows access to data before 2014, and the last reference year is 2020. At the same time, the variables considered in the cluster analyzes were limited to those indicators, for which we found data for all member states, the database being drawn up on the basis of questionnaires completed by tax administrations, which are not mandatory.

References

1. Advani A, Elming W, Shaw J. Efectele dinamice ale auditurilor fiscale. Centre for Competitive Advantage in the Global Economy Department of Economics,2019:414:3.
2. Alena A, Mihóková L, Slavomíra M. Meta-analysis categorization of EU countries in the context of corporate income tax. Contaduría y Administración,2017:62:1001–1018.
3. Andrejovska A, Hudakova M. Classification of EU countries in the context of corporate income tax. Acta universitatis agriculturae et silviculturae mendelianae brunensis,2016:64(5):1699-1708.
4. Armeanu D, Vintilă G, Moscalu M, Filipescu MO, Lazăr P. Using Quantitative Data Analysis Techniques for Bankruptcy Risk Estimation for Corporation. Theoretical and Applied Economics,2012:19(1):97–112.
5. Bozanic Z, Hoopes J, Thornock I, Williams B. IRS Attention. Journal of Accounting Research,2018:55(1):79-114.
6. Brushwooda J, Johnston D, Lusch S. The effect of tax audit outcomes on the reporting and valuation of unrecognized tax benefits. Advances in Accounting,2018:42:1-11.
7. Costea IM. Tax audit. Bucharest: Hamangiu Publishing House, 2017.
8. D'Agostino E, De Benedetto M, Sobbrio G. Tax evasion and government size: evidence from Italian Provinces. Economia Politica,2021:38:1149–1187.
9. Das-Gupta A, Estrada G, Park D. Measuring tax administration effectiveness and its impact on tax revenue. Economic Research Institute for ASEAN and East Asia,2016:1-30.
10. European Union. [On-line]. Available at: https://ec.europa.eu/eurostat. Accessed January 09, 2023.
11. European Union. [On-line]. Taxation trends in the European Union. Available at: https://op.europa.eu/en/publication-detail/-/publication/f85da28f-f5be-11ec-b976-01aa75ed71a1. Accessed November 12, 2023.
12. Fitriyani R, Heryah N. The Effect of Tax Audit, Tax Billing, and Tax Sanctions on Value Added Tax Revenues (Survey on KPP in Bandung City Registered at the Regional Office of DJP West Java I for the 2015-2019 Period). Advances in Social Science, Education and Humanities Research,2020:536:112-120.
13. Hoang LK, Cao BT, Le KM, Nguyen DT. Taxation and economic growth: a regression analysis based on a new classification. Economic Horizons,2021:23(3):215-229.
14. Kaul I, Conceição P. The new public finance responding to global challenges. New York: Oxford University Press, 2006.
15. Korecko J, Bacik R, Voznakova I. Public administration in UE: harmonization of income taxes. Marketing and Management of Innovations,2019:4:280-291.
16. Lethbridge C. Detailed guidelines for improved tax administration in Latin America and the Caribbean,

chapter 8: Audit. USAID'S Leadership in Public Financial Management, 2013, 1-58.
17. Lukovic S. The impact of globalization on the characteristics of European countries' tax systems. Economic Annals,2015:60(206):117-139.
18. Mazzolini G, Pagani L, Santoro A. The deterrence effect of real-world operational tax audits on self-employed taxpayers: evidence from Italy. Int Tax Public Finance, 2021, 1-26.
19. Mihokova L, Andrejovska A, Martinkova S. Categorization of corporate taxation in the European Union countries using cluster analysis: a comparative study. Economic Annals-XXI,2016:160(7-8):4-8.
20. Organization for Economic Cooperation and Development. Joint Audit 2019 – Enhancing Tax Co-operation and Improving Tax Certainty: Forum on Tax Administration. OECD Publishing, 2019. Available at: https://doi.org/10.1787/17bfa30d-en. Accessed December 08, 2022.
21. Organization for Economic Cooperation and Development (OCDE). Tax Administration 2015: Comparative Information on OECD and Other Advanced and Emerging Economies, 2015. Available at: https://www.oecd-ilibrary.org/taxation/tax-administration-2015_tax_admin-2015-en. Accessed March 27, 2023.
22. Organization for Economic Cooperation and Development. Tax Administration 2022 Comparative Information on OECD and other Advanced and Emerging Economies,2022. Available at: https://www.oecd-ilibrary.org/taxation/tax-administration-2022_1e797131-en. Accessed March 27, 2023.
23. Organization for Economic Cooperation and Development. Tax Administration 2019: Comparative Information on OECD and Other Advanced and Emerging Economies, 2019. Available at https://doi.org/10.1787/74d162b6-en. Accessed January 18, 2023.
24. Pîrvu D, Duţu A, Mogoiu C. Clustering Tax Administrations in European Union Member States. Transylvanian Review of Administrative Sciences,2021:63:110-127.
25. Ravšelj D, Kovač P, Aristovnik A. Tax-Related Burden on SMEs in the European Union: The Case of Slovenia. Mediterranean Journal of Social Sciences,2019:10(2):69-79.
26. Velichkov N, Stefanova K. Tax Models in the EU: a Cluster Analysis. Alternative Economice,2017:4:573-583.
27. Yap BW, Sim CH. Comparisons of various types of normality tests. Journal of Statistical Computation and Simulation,2011:81(12):2141-2155.
28. Yim O, Ramdeen K. Hierarchical Cluster Analysis: Comparison of Three Linkage Measures and Application to Psychological Data. The Quantitative Methods for Psychology,2015:11(1):8–21.