CONVERGENCE OF EU MEMBER STATES IN THE FIELD OF EXCISE DUTIES IN THE PERIOD 2000–2015

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Abstract

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This article aims to determine the convergence of the 27 EU Member States in the field of excise duties in the period 2000–2015. However, more recent complete data for all states are not available yet. The development trend towards convergence or divergence of monitored indicators is detected by indicators that represent excise taxes in the tax systems of the Member States of the European Union from the Eurostat database. Excise taxes are collected as whole.
The article should answer two questions that are derived from generally preferred trends in the EU in a given period, ie. the trend growth of the tax burden to consumption and a trend approximation (harmonization) taxing consumption due to the functioning of internal market in the EU. The question is whether Member states and candidate countries are similar to each other in the field of excise duties and any similarity to the changes between the years 2000 and 2015. The second question is whether the differences are caused by tax policy states, ie. Changes in rates or absolute consumption.
The indicators of individual member states are subjected to cluster analysis, and subsequently evaluated by means of selected factors that relate to tax policy and national economic aggregates, especially the consumption of taxed products. Results show growing differences (divergence) between most countries of the original EU-15 group and the group of countries which joined the European Union in 2004 and 2007.

Keywords: European Union, excise duty, tax system, tax policy, tax harmonization.

INTRODUCTION

Excise taxes (together with value added tax) in the original fifteen Member States (EU-15) and 12 candidate countries (later the new EU Member States, called the EU-12) are subject to the harmonization process for the functioning of the internal market of the European Union. This is also true for a defined period of 2000–2015. The harmonization process brought the Member States the need to modify the legislation, excise duties and set common rules in the form of well tried obligatory directives. The harmonization process continues to adapt to the various changes in the economic environment of the Member States. Examples of these changes are, new states joining the EU in 2004 and 2007, economic growth

fluctuating, the varying of behavior of economic agents etc.

The divergence between Member States in the field of excise duties may be one of the factors that will influence the further development of future harmonization steps in EU Member States. Or, conversely can harmonization affect the level of divergence States. There may be interaction between the need for harmonization and fiscal autonomy of each EU country.

The level of harmonization of minimum rates enables the diversity of rates towards higher than minimum values and not limited divergence indicators related to consumption taxes.

Cnossen (2005) for example stated that in the tobacco excise tax in the European Union, which includes a combination of specific rates

to ad valorem rate, the application of combined rate indirectly discriminate in favor of European producers in the market who that tax adjust their production, compared to others who They did not do so.

MATERIAL AND METHODS

Application of cluster analysis in the field of taxation

Peters (1991) is the first author who used cluster analysis to classify countries according to their tax systems. He examined the proportion of taxes in relation to total tax revenue in 1965. The result of the cluster analysis are four clusters. English-speaking countries are grouped in the first cluster, the second cluster groups are Scandinavian countries, countries with a broad base tax (share of all taxes in total tax revenues in these countries the average level of OECD countries), the last cluster consists of a Latin country.

Messere (1998) used cluster analysis to study the economic development of OECD countries in 1960, 1970 and 1980. He divided the countries into groups according to the commonly observed indicators of economic development. The first group contains five non-European OECD countries, the five countries of southern Europe constitute the second group, the third group consists of five OECD countries with the highest tax burden and the last group of countries is Germany, Ireland and the United Kingdom, which are different from other OECD countries. Other authors who pay attention to the European countries are Kemmerling (2003), Bernardi (2003), Heinemann (1999) and Serrano (1994).

The results of the analyzes of Kemmerling (2003) and Bernardi (2003) can be considered very similar, both in terms of development of the overall tax burden and in terms of the composition of the tax mix.

Kubátová *et al.* (2008) defined the group of countries with similar characteristics that are historically relatively stable. This is a group of Scandinavian and Nordic countries, states in the Rhine and Bismarck continental states, the continental German speaking countries and English-speaking countries.

The hierarchical clustering method was used together with discriminant analysis in the dissertation of author Foltysová (2007). The cluster process has undergone 21 OECD countries from different continents in the period of 1965 to 2003 with the aim of creating a cross-section of the historical development of their tax mixes. The results of cluster analysis show a decrease in the share of income taxes in connection with the growth of the share of social security contributions and consumption taxes in the tax structures. The tax mixes of developed countries appears to be relatively stable. Due to the effects of liberalization and globalization, it is possible for these countries to observe the end of a defined period. At the same time national differences and customs of the deep historical, political, social and economic characteristics of the state remain.

General specific methods

Logical conclusions are deduced from an existing empirical work. Objectives are formulated by deduction. First, the processes of harmonization of excise duties in the European Union are analyzed incomplete inductive method.

The results are compared by clustering process, specified and generalized. In another development trends were identified clusters in the period. Definition of factors was needed. They could affect the development of SD harmonization processes in the EU on the taxation policy. Tax rates are analyzed as the main influences of fiscal policy. On the consumption side effects are identified absolute consumption of taxed products. It was necessary to remove the effects of the prices.

The synthesis was used in the evaluation and interpretation of the results of the cluster analysis and the evaluation of the effects of these factors.

The Actual Cluster Analysis

The subject of investigation is the harmonization process in the EU Member States in the field of excise duties and its influence on the development of macroeconomic indicators of individual member states. Excise taxes are collected as a whole. In this context, it is necessary to identify factors that may influence the development of the harmonization process in the field of excise duties. On the basis of established factors, it will be possible to deduce trends of the harmonization process and the divergence between EU states. Some factors may have died or vice versa new factors have arisen.

The objective of this article is to define the group of EU states and the importance of excise duties in their tax mixes, partial tax quotas and identify factors influencing the development of the harmonization process in the EU states in which the inclusion of countries into different groups interact. This is achieved by the statistical method of analysis of multidimensional data, cluster analysis. The agglomeration hierarchical clustering procedure which uses Ward's method from the cluster analysis methods was chosen. The group of states called clusters, with similar values of monitored indicators of the importance of excise taxes in the year 2000 and 2015 will be determined through this method. The factors that can cause changes in clusters of Member States to be identified was studied through the development of clusters between the year 2000 and 2015. The causes of the similarities observed which are indicators for the clustering processes can be very diverse. Therefore, it is necessary to evaluate data in a broader context and try to explain them using the above factors and economic aggregates.

Cluster analysis is applied to the data of twenty-seven Member States and candidate countries.

Twenty seven countries were divided into two subgroups. The first subgroup consist of the original fifteen EU countries, can be called EU-15.

The subgroup EU-15 contains: Austria, Belgium, Finland, France, Denmark, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Next, the second subgroup consist of countries that joined the EU after the year 2004 and later (in the year 2007).This subgroup is called EU-12. Croatia has not been included in this work because some data was not available.

The subgroup EU-12 contains candidate countries in the year 2000: Bulgaria, Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovenia, Slovakia. These countries are also defined as EU-12 in the year 2015, because a large differences persisted between the both subgroups still.

Three ratios that show the importance of excise duties in the tax systems of the Member States are selected for clustering processes:
● Excise duties as % of total taxation (the share of excise taxes in the tax mix,%)
● Excise duties as % GDP (partial tax quota,%)
● The share of consumer spending for the taxed products / GDP (%)

Consumer spending for the taxed product per capita is selected from the Household Budget Survey in the Eurostat statistics database. Household expenditures are divided by COICOP. It is the Classification of Individual Consumption According to Purpose. All indicators are given in the same units, so no data standardization undergo the clustering process.

Clusters of similar states are the result of any clustering process. The number of clusters is determined by the distance of states in the dendrogram. The number of clusters determines the distances of countries in the dendrogram. The formation of clumps is determined by the distance of five points in the diagram. The number of clusters is between 5–6 clusters.

The clustering processes data in the year 2000 and 2015 is evaluated by using the selected factors. These factors serve to identify the tax policy of a Member State, the living standards of the population and to justify differences and vice versa similarities between states, creating clusters and consequently their changes over time.

Factors for evaluating clustering:
● Factor 1: Excise tax rates in the Member States (Euro)
● Factor 2:Relative deviation of applied rates of duty since the minimum rate (%)
● Factor 3: Revenues of governments and EU institutions from excise taxes per person (Euro)

● Factor 4: GDP per capita in Euro (expressed in purchasing power of the population, PPS)

Clustering processes are evaluated (in addition to these factors) also through the economic consumption aggregates of taxed products. Economic aggregates on consumption taxed products are used together with these factors. The use of these units will be explained with load level of consumer excise taxes in the individual countries and compared.

The economic aggregates on consumption taxed products:
● Consumption pure alcohol (liters per person per year, age over 15 years)
● Number of cars / 1000 inhabitants (pieces)
● The percentage of daily smokers in the population (%)
● Cigarette consumption per capita per year

The last indicator is the Gini coefficient. This is an additional indicator and it affects income distribution in the society of a particular country. The Gini coefficient changes may affect the representation of the changes in excise duties, consumption of taxed products and consequently the development of the harmonization processes.

Data for the indicators is obtained from the database of Eurostat and the OECD. Some indicators are identified through their own calculation. The data source is Eurostat. Indicators were selected that are suitable for comparing data between countries. The OECD database is the data source for the Gini index and excise tax rates.

The convergence of EU countries is evaluated by changes in the variation coefficient between the years 2000 and 2015. If the coefficient of variation decreases, the convergence of the EU countries is growing.

RESULTS

Data from twenty-seven Member States of the EU without Croatia were subjected to the clustering process. The clustering process was applied to the data of the years 2000 and 2015.

Evaluation of the results of the clustering process in the year 2000

States are grouped into clusters:
● Cluster 1/2000: Austria, Belgium, Germany, France, Italy, Netherlands, Sweden
● Cluster 2/2000: Bulgaria Latvia, Poland, United Kingdom
● Cluster 3/2000 Lithuania, Luxembourg
● Cluster 4/2000: Cyprus, Czech Republic, Estonia, Greece, Hungary, Malta, Portugal, Romania, Slovenia, Spain
● Cluster 5/2000: Denmark, Finland, Ireland, Slovakia

Twenty-seven European Union countries that were or later became part of the EU formed five clusters in the year 2000. The first cluster, which

includes seven states from the original group of the European Union (known as the EU-15) is distanced from the other clusters significantly. The second highest distance separating the second and third cluster from the fourth and fifth. The second to fifth cluster contains some Member States of the EU-15, and at that time the candidate countries (later EU-12).

The first cluster includes seven states from the EU-15. This group of states differs from the rest of the eight states of the EU-15 countries. EU-15 Members that are not in the first cluster are also significantly different between each other. They are: Denmark, Finland, Ireland, Luxembourg, Portugal, Greece, Spain and United Kingdom. These countries came into clusters with candidate countries according to similarities of indicators. The causes of similarities of States can be very diverse. A more detailed explanation is found through the above mentioned factors and economic aggregates of consumption taxed products.

The year 2000 can be considered an initial period of twelve of the convergence processes of candidate countries that joined the EU-15 in the year 2004 and 2007. Candidate countries differ among themselves, but they also differ from the more developed countries of Western Europe, EU-15. Candidate countries can be characterized as a group of countries less economically developed than the EU-15, with lower revenues from excise taxes per person, but probably even lower rates of excise duties. These are states with lower consumption per person, which is limited by a lower standard of living of the population in terms of economic aggregates of consumption of taxed products. The tax system of some countries could probably have reserves in exploiting the potential of certain fiscal functions, such as the redistribution and allocation function of taxes. These statements are derived from the relatively high Gini coefficient of some candidate countries. Examples include Estonia and Latvia. In the case of excise taxes to the convergence process, the adjustment of consumption tax rules and changes in rates of individual taxed commodities at the level of the minimum rates which are set by EU directives is concerning.

This year, The Member States of the EU-15 already promoted the functioning of the internal market. Presumably these countries cooperate more and

could have greater similarity to each other than the candidate countries. The main leaders of these countries are grouped in cluster 1/2000.

The EU-15 includes eight countries that are different from cluster 1/2000. Some of them can be considered as economically weaker states. While others, Greece, Spain and Portugal, which in the year 2000 were clustered with the candidate countries, are examples of weaker states. Luxembourg is another state that is in the European Union and is different from most states and can be considered as the most economically advanced state on the basis of GDP.

Its high levels of partial tax rate and consumer spending to GDP was probably the reason why this state got into the cluster with Lithuania, whose parametric values for clustering were also very high. The cause for high values of Lithuania is completely different from Luxembourg.

Great Britain, Denmark, Finland and Ireland, like Luxembourg, have gathered among the candidate countries because of the similarity of values of the indicators (see Tab. I). However, the causes and explanations of values are totally different from the other candidate states.

Cluster 1/2000 groups countries which have the lowest share of excise duties in total tax on the basis of the average individual clusters of selected indicators. Conversely, the highest value of this indicator was found in cluster 2/2000. Through the low share of excise duties of total taxation in the developed Western European countries, which are members of the EU-15, it is possible to explain the high levels of total taxation, i.e. high tax quota. In contrast, total revenues from excise duties per person may actually be higher than in countries with a higher relative share of excise duties in total taxation. In countries that made up the original group of the EU-15, the composite tax quota is usually higher than in those states that were in the year 2000 candidate countries.

The share of consumption expenditure to GDP is highest in cluster 3/2000, it is mainly due to Luxembourg. The lowest value is observed in cluster 5/2000. A high proportion of consumer expenditure in relation to GDP can be explained by the high living of the population, the high price levels and low GDP, or a combination of these parameters.

I: *An arithmetic mean of clusters for ratios to excise duties in the year 2000*

Average of cluster	Average values for indicators of clustering process		
	Excise duties as % of total taxation (%)	Excise duties as % of GDP (partial tax quota, %)	The share of consumption expenditure to GDP (%)
Cluster 1/2000	6 14	2.69	5.65
Cluster 2/2000	11.53	3.78	6.96
Cluster 3/2000	11.15	3.85	10.16
Cluster 4/2000	8.91	2.93	7.26
Cluster 5/2000	9.15	3.68	5.30

Source: Eurostat (2017), the actual processing

II: *Factor 1 and 2 for evaluating of the clustering process in the year 2000*

Average of cluster	Factor 1 - Excise tax rates in the Member States (Euro)				Factor 2 Relative deviation of applied rates of duty since the minimum rate (%)			
	Ethyl alcohol	Unleaded Petrol	Gas Oil Propellant	Cigarettes	Ethyl alcohol	Unleaded Petrol	Gas Oil Propellant	Cigarettes
1/2000	1,860.88	530.0	348.56	76.14	238.34	84.67	42.27	-0.52
2/2000	3,009.69	765.81	749.5	183.95	447.22	166.83	205.92	14.16
3/2000	399.36	347.3	252.85	52.84	89.30	21.01	3.20	0.92
4/2000	802.4	349.96	256.11	54.05	45.89	21.94	4.53	3.07
5/2000	3,835.6	520.91	328.01	126.14	597.38	81.5	33.88	3.77

Source: Eurostat (2017)

III: *Factor 3 and 4 for evaluating the clustering process in the year 2000*

Average of cluster	Factor 3	Factor 4
	Revenues governments and EU institutions of excise taxes per capita (Euro)	GDP per capita in Euro (PPS)
1/2000	661.9	23,642.9
2/2000	362.08	11.100, 0
3/2000	1,209.09	27,000.0
4/2000	267.52	13,570.0
5/2000	858.28	20,475.0

Source: Eurostat (2017)

Some data for evaluation clusters is not available. It is a problem in evaluating clusters through factors and economic aggregates. Data from the candidate states to the applied rates of excise taxes in the year 2000 is not available. It can be assumed that the candidate states in the year 2000 generally do not reach the excise tax rates as the EU-15 countries. This fact proves the EU directive on excise duties where it is possible to detect exceptions and conditions for a gradual increase in rates for the new EU members in the defined period. A similar situation occurred with missing data in the event of economic aggregates, especially in cigarette consumption and the Gini coefficient. This limits the predictive ability of these comments.

Averages of Factor 1 and 2 for the individual clusters are calculated only from data provided by

the EU-15 countries (see Tab. II). The average value has less explanatory power because it does not reflect the candidate countries. In the first cluster, data is available for all grouped countries.

The data of one country is available in the second and third cluster. The fourth and fifth cluster has data from three countries. Other indicators include data on both candidate countries and members of the EU-15.

Factors 3 and 4 (see Tab. III) indicate the connection between the revenue from excise taxes per capita (Factor 3) and the living of the population (Factor 4). From the mean cluster it shows that in clusters with a higher standard of living higher absolute revenues from excise taxes per capita than states with lower living standards of

IV: *Economic aggregates of consumption and the Gini coefficient of the Member States in the year 2000*

Average of cluster	Economic aggregates of consumption,				Income distribution in society
	Consumption of pure alcohol (liters per person per year, age over 15 years)	Number of cars / 1,000 inhabitants	Percentage of daily smokers in the population	Consumption of cigarettes per person per year	Gini coefficient
1/2000	10.9	484.3	28.1	1531.4	27.5
2/2000	8.93	292	30	1,950.07	29.67
3/2000	11.51	479.0	31	1285.3	28.5
4/2000	9.87	357.6	29.73	2071.07	30.1
5/2000	11.16	335.0	26.75	1,369.075	27.0

Source: Eurostat (2017), OECD (2017)

the population is achieved. The data for these two factors is available for all 27 states.

The data on consumption of taxed products does not confirm that in states with a higher standard of living, the higher overall consumption of taxed products is in quantity units. Preferences of certain species of taxed products can be distinguished in the individual clusters (see Tab. IV).

Evaluation of the results of the clustering process in the year 2015

States are grouped into clusters:
- Cluster 1/2015: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden
- Cluster 2/2015: Hungary, Malta, United Kingdom, Portugal, Slovakia, Finland
- Cluster 3/2015: Bulgaria
- Cluster 4/2015: Czech Republic, Poland, Estonia, Romania, Slovenia
- Cluster 5/2015: Greece, Cyprus, Latvia, Lithuania

Twenty seven countries are members of the EU. The aforementioned subgroups EU-15 and EU-12 can be distinguished yet. They are very different from each other.

They all comply with the rules of the harmonization of excise duties. The focus is to determine changes in excise duties between the year 2000 and 2015. Furthermore, whether there has been a convergence between the old EU-15 countries that joined in the year 2004 and 2007 (also called the „new" EU members) due to harmonization steps.

States are divided into these clusters at five distance points after the implementation of the clustering process. Five clusters were created in the year 2015. Clusters 1/2015 and 2/2015 are far from all the other clusters with about 52 points. It is a high distance compared to the year 2000, which suggested more divergence among most countries of the EU-15 and the „new" EU member states.

The remaining three clusters are divided into two groups at a distance of approximately 12 points. They contains only one country of the EU-15, it is the Greece. Bulgaria is very different from all countries.

Cluster 1/2015 includes only EU-15 members. The average values of all indicators is the lowest in this cluster (see Tab. V). The reasons can be discerned in the high overall tax burden on citizens and the growth indicators of gross domestic product.

Cluster 2/2015 is a mixed cluster and contains countries from the subgroup EU-15 (Finland, Portugal, United Knigdom) and Hungary, Malta and Slovakia from the EU-12. Parametric values for clustering are low.

Bulgaria in the cluster 3/2015 appears very specific. The values of the indicators used for clustering in Bulgaria are the highest. It is evident that Bulgaria's GDP per capita is the lowest in comparison with other countries, similar to the overall level of taxation. In doing so, it has to meet the minimum excise duty rates set by the relevant directives.

Clusters 4/2015 and 5/2015 achieves the higher values of the indicators for the clustering than cluster 1/2015 and 2/2015. These two clusters (4/2015 and 5/2015) also presents a lower standard of living, lower revenues from excise duties per

V: *An arithmetic mean of clusters for ratios to excise duties in the year 2015*

Average of cluster	Average values for indicators of the clustering process		
	Excise duty on general taxation (%)	Excise duties % of GDP (%)	The share of consumption expenditure to GDP (%)
Cluster 1/2015	5.8	2.3	6.0
Cluster 2/2015	8.18	3.03	7.48
Cluster 3/2015	18.5	5.3	12.3
Cluster 4/2015	12.1	4.0	8.3
Cluster 5/2015	10.5	3.4	11.2

Source: Eurostat (2017)

VI: *Factor 1 and 2 for evaluating the clustering process in the year 2015*

Average of cluster	Factor 1 - Excise tax rates in the Member States (Euro)				Factor 2 Relative deviation of applied rates of duty since the minimum rate (%)			
	Ethyl alcohol	Unleaded Petrol	Gas Oil Propellant	Cigarettes	Ethyl alcohol	Unleaded Petrol	Gas Oil Propellant	Cigarettes
1/2015	2,084.7	457.7	598.7	168.7	279.0	38.7	66.8	87.4
2/2015	2,150.5	462.8	553.9	159.7	291.0	40.3	53.4	77.5
3/2015	562.43	329.79	363.02	79.39	2.3	–0.1	1.1	–11.8
4/2015	1,336.8	405.0	469.7	95.8	143.1	22.8	29.4	6.5
5/2015	1,521.9	360.8	498.7	103.5	176.7	9.4	38.9	15.0

Source: Eurostat (2017)

person on average a lower overall tax burden for citizens than in the two remaining clusters (see Tab. V and next).

The fact is that some countries of the original EU-15 did not increase the excise tax rate in the period. Some of these countries reduced excise duty rates. In contrast, in the countries that joined the EU in 2004 and 2007, the excise tax rates mostly grew.

Bulgaria shows the highest share of excise taxes in the tax mix and GDP. This is due to the extreme values given in a separate cluster (see Tab. V).

The highest average rate of excise duty varies in different clusters according to the type of product taxed (see Tab. VI). Cluster 2/2015 had the highest rate of tax on alcohol and gas oil (mainly Finland and United Kingdom). Petrol and cigarettes are the most burdened in the EU-15 members in cluster 1/2015.

The lowest averages of Factor 1 and 2 are found in Bulgaria (see Tab. VI). Data for the clustering process were high in Bulgaria. This fact shows the the low level of overall taxation and GDP in Bulgaria compared to other EU countries. Factors 3 and 4 confirm the same (see Tab. VII).

Some of consumption indicators are not known in Bulgaria (see Tab. VIII). EU-15 members grouped in cluster 1/2015 prefer the „consumption" of cars due to higher living standards and consume a low number of cigarettes per person per year.

States with lower standards of living had fewer cars per 1,000 inhabitants and a higher consumption of cigarettes and pure alcohol.

The changes between the average indicators in the years 2000 and 2015

An average value of the indicator for the reference year is calculated by the arithmetic average of the available values for all 27 states, not by the average values of clusters. Orientations of the EU in the field of excise duties can be derived by modifying the reference years. They can be detected by changes in the tax policy of the state and economic aggregates of consumption of taxed products.

The share of excise taxes in the tax systems of the EU degresed slightly. Conversely, consumer spending relative to GDP grew (see Tab. IX). Differences between countries are growing despite they are affected by the harmonization process. The average tax quota of twenty seven EU countries remains approximately at around 37% in both years, see Eurostat (2017).

Convergence does not exhibit these indicators. These indicators are influenced by the development of overall taxation and GDP.

The average values of Factors 1 and 2 for all 27 EU countries fell between 2000 and 2015. This can be explained by the absence of data of the candidate countries in the year 2000. It was assumed that the rates were very low in the candidate countries

VII: *Factor 3 and 4 for evaluating the clustering process in the year 2015*

Average of cluster	Factor 3 Revenues governments and EU institutions of excise taxes per capita (Euro)	Factor 4 GDP per capita in Euro (PPS)
1/2015	1,029.8	43,327
2/2015	740.2	23,700
3/2015	336.7	6,300
4/2015	563.8	13,840
5/2015	535.7	15,550

Source: Eurostat (2017)

VIII: *Economic aggregates of consumption and the Gini coefficient of the Member States in the year 2015*

Average of cluster	Economic aggregates of consumption				Income distribution in society
	Consumption of pure alcohol (liters per person per year, age over 15 years)	Number of cars / 1,000 inhabitants	Percentage of daily smokers in the population	Consumption of cigarettes per person per year	Gini coefficient
1/2015	10.1	518	19.1	1,453.5	29.1
2/2015	9.8	464	20.2	926.0	29.6
3/2015	-	416	-	1,574.97	35.4
4/2015	11.3	447	21.5	1,301.3	30.3
5/2015	10.7	441	24.1	1,269.5	34.9

Source: Eurostat (2017), OECD (2017)

IX: *The changes between the average values of ratios for the clustering processes in the years 2000 and 2015*

	Excise duty on general taxation (%)	Excise duties % of GDP (%)	The share of consumption expenditure to GDP (%)
Average values for indicators of all the states for the clustering processes			
Year 2000	8.78	3.17	6.72
Year 2015	8.67	3.07	7.74
Coefficient of Variation			
Year 2000	0.221	0.191	0.209
Year 2015	0.374	0.274	0.284

Source: Eurostat (2017)

X: *The changes between the average values of Factors 1 and 2 in the years 2000 and 2015*

	Factor 1 - Excise tax rates in the Member States (Euro)				Factor 2 Relative deviation of applied rates of duty since the minimum rate (%)			
	Ethyl alcohol	Unleaded Petrol	Gas Oil Propellant	Cigarettes	Ethyl alcohol	Unleaded Petrol	Gas Oil Propellant	Cigarettes
Average values for indicators of all the states for clustering processes								
Year 2000	2,066.07	492.33	311.23	87.36	275.65	72.72	41.35	2.13
Year 2015	1,821.0	430.0	543.2	140.2	231.1	30.3	50.3	55.8
Coefficient of Variation								
Year 2000	0.765	0.246	0.343	0.433	1.043	0.585	1.172	2.105
Year 2015	0.683	0.208	0.208	0.429	0.978	0.894	0.599	1.198

Source: Eurostat (2017)

in the year 2000. This is true in most cases for the year 2015. However, the differences in rates between the two groups of states is lower. All States must respect the minimum rates or exemptions prescribed by EU law. The excise tax rate is slightly closer to each other between states, but the explanatory power indicator is limited.

Revenues from excise taxes increased in the EU between the observed years (see Tab. XI). This is similar to the standard of living of the population. Increase revenue from excise taxes can be explained by increases in the rates of excise duties in Member States. The highest growth rate was recorded in the „new" EU member states due to the obligation to respect the minimum rate prescribed by the directives of the European Commission. The values of tax revenues in these countries are more similar to each other slightly in the year 2015

than in the year 2000. Living standards are more different among countries in the year 2015.

The development of consumption of the taxed products varies according to the type of product. Data of some states on all economic aggregates are missing in the year 2000 and also in the year 2015. The strength of averages is reduced due to these facts. Consumption increases in passenger cars per 1,000 inhabitants. This is probably due to growth in living standards. A larger number of vehicles may be required in more developed countries. This may limit the consumption of cigarettes. Furthermore, cigarette consumption may be constrained by high rates, high consumer prices, legislation and various anti-smoking campaigns. Lower cigarette consumption in developed countries is evident in the representation of daily smokers in the population as well. Differences between countries are growing in cigarette consumption.

XI: *The changes in the average values of Factors 3 and 4 in the years 2000 and 2015*

	Factor 3	Factor 4
	Revenue governments and EU institutions of excise taxes per capita	GDP per capita in PPS
Average values for indicators of all the states for clustering processes		
Year 2000	541.05	17,833.3
Year 2015	780.3	28,018.5
Coefficient of Variation		
Year 2000	0.903	0.493
Year 2015	0.588	0.667

Source: Eurostat (2017)

XII: *The changes in the average values of consumption indicators and the Gini coefficient between the years 2000 and 2015*

	Economic aggregates of consumption				Income distribution in society
	Consumption of pure alcohol (liters per person per year, age over 15 years)	Number of cars / 1,000 inhabitants	Percentage of daily smokers in the population	Consumption of cigarettes per person per year	Gini coefficient
Average values for indicators of all the states for clustering processes					
year 2000	10.30	386.37	28.93	1702.75	28.80
year 2015	10.3	477.7	20.5	1285.3	30.5
Coefficient of Variation					
year 2000	0.215	0.298	0.170	0.310	0.132
year 2015	0.169	0.201	0.191	0.879	0.133

Source: Eurostat (2017), OECD (2017)

This is confirmed by the coefficient of variation. The situation is reversed in the consumption of alcohol and the number of cars per 1,000 inhabitants.

DISCUSSION

The harmonization process in the field of excise duties was initiated due to the functioning of the EU internal market and the limitations of various administrative, technical, administrative and fiscal barriers. It was necessary to establish rules and simplify trading between Member States and eliminate harmful competition. Specific objectives of the harmonization processes were estimated. It was not possible to determine in advance which moves would ensure cooperation between Member States in the field of excise duties.

The objectives of the harmonization process varied according to Nerudová (2005). The harmonization of the structure and rates of excise duties was the starting idea in the words of the author. Efforts have moved more in the tax structure over time. Mandatory rates were set at the minimum value.

This harmonization process continues even today and it is influenced not only by the changes and needs of States in tax matters, but also by a lot of external influences operating within Member States and outside the European Union.

Svátková (2009) says: „The unification of the fundamental rules of excise tax was initially very difficult, because especially in the taxation of alcoholic and tobacco products to reflect the economic, social and other objectives of individual states, including the deep traditions and attitudes of the society on those products."

The results of its research indicates moderate growth in the number of cars. Cigarette consumption is slightly decreasing. Western European countries (countries of the original EU-15) prefer to use cars. The car is an essential part of everyday life.

Láchová (2007) says the impact of the tax burden of consumption taxes is compounded by the application of the amount of excise duty in the basis for calculating the value added tax. It is understandable that the Member States will prevent tax discrimination against goods delivered to the country of consumption from another Member States by harmonizing excise duties.

CONCLUSION

The share of excise taxes in the tax systems of the Member States degreased slightly between the year 2000 and the year 2015. Application of excise taxes differs based on the fiscal autonomy of each state. Tax policies of the Member States in the field of excise duties monitor the needs, traditions, habits and preferences of each state.

According to the results of clustering, it is possible to identify groups of countries that are relatively stable. Their position is same in the years 2000 and 2015:

Similar countries from the subgroup EU-15 with a low share of revenues from excise taxes in the overall tax to GDP and low consumer spending in relation to GDP: **Austria, Belgium, France, Netherlands, Italy, Germany, Sweden.**

Countries from the subgroup EU-12: **Czech Republic, Estonia, Romania, Slovenia.** These can be described as average states of the EU-12 with higher partial tax quota excise taxes and lower consumption ependitures. **Bulgaria** presents the worst situation of indicators.

States with changed positions in the year 2015:

Members of the subgroup EU-15 with high partial tax quota excise taxes, relation these taxes to GDP or a high proportion of the consumer spending to GDP: **Denmark, Finland, Greece, Ireland,**

Luxembourg, Portugal, Spain, United Kingdom. There are high some of excise tax rates or absolute consumption.

The subgroup EU-12 is presented by **Cyprus, Hungary, Latvia, Lithuania, Malta Poland, Slovakia.** Excise taxes of EU countries are not mutually closer due to the harmonization process. Moderate convergence was observed in the rates of excise taxes only. Compliance with the minimum tax rates is a reason for it.

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