
ECONOMIC INTERVENTIONISM UNDER PANDEMIC CONDITIONS: SIMILARITIES AND DIFFERENCES ON EU LEVEL

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Abstract: The aim of this article is to classify 25 EU member states into homogeneous groups based on the relative shares of GDP of eight subgroups of government expenditures on economic affairs (according to the Classification of the Functions of Government - COFOG) and thus compare the extent of their governments' intervention in economic affairs. The homogeneous groups were defined by means of a non-hierarchical cluster analysis (K-means) method using the Euclidean distance as a measure of dissimilarity. The results of the clustering of the 25 EU member states by government expenditure by economic function (according to COFOG) reveals the similarities and differences among these countries in terms of their economic interventionism. They also define which economic affairs need government intervention to mitigate the negative effects of the COVID-19 pandemic.

Keywords: economic interventionism, cluster analysis, dynamics of government expenditure on economic affairs, priority sectors of the economy.

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Introduction

Expenditure of the general government sector divided into main COFOG functions and groups is of particular importance for the level of public welfare as it is the means to provide public goods and carry out redistribution policies (Tsoklinova, 2021). The volume of government expenditure by COFOG functions differs at EU level despite the existence of generally accepted rules (Tsoklinova, 2022). Of the ten COFOG I level categories of the highest relative share of GDP is reported for social security and protection, health, education, general public services, and economic affairs.

The aim of this article is, based on the relative shares of government expenditure on economic affairs to GDP (broken down into COFOG II level groups), to classify the EU member states into homogeneous groups (clusters) and on this basis to compare the extent of their governments' intervention in the economy (in terms of financing various economic activities.) It should be noted here that Germany and Austria are not included in the analysis due to the lack of statistical data in Eurostat. A non-hierarchical cluster analysis and more specifically a non-hierarchical K-means approach was used to achieve the research objective. The research hypothesis to be accepted is that regardless of the existence of common economic policies in the EU, there are differences in the extent of government intervention in significant sectors of the national economies, which is a prerequisite for differences in their government spending by economic sectors, in most cases with clearly expressed extraordinary nature. Government expenditure in the category "General Public Services" according to COFOG is an important instrument of fiscal policy. On the one hand, they are used in redistributive mechanisms and on the other, they show the extent of government intervention in areas that are important to the society (Tsoklinova, 2021; Tsoklinova, 2022). Government expenditure in the category "General Public Services" according to COFOG has a strong impact on the economy of each country and its economic growth.

The level of economic interventionism is different in each country and reflects the state of its economy. The role of the government in the economy has grown over the past two years due to the breakout of the Covid-19 pandemic, which has restructured entire sectors of the national economy and called into question their functioning and survival. In this regard, a number of authors have focused their research interest on the impact of Covid-19 on the volume of government expenditure by COFOG functions and especially the expenditure on healthcare and social security and protection (Utz, Mastruzzi, Ahued & Tawfik, 2020; Wieland, 2022; Eltokhy, Funke, Huang, Kim & Zinabou, 2021; Bökemeier & Wolski, 2022; Eissa, 2020; Jina, Lia & Jakovljević, 2022; Chukwudi & Victor, 2022; Blumenau, Hicks & Pahontu, 2022; Abay, Yonzan,

Kurdi & Tafere, 2022; Casquilho-Martinsand & Belchior-Rocha, 2022). Government intervention in the economy is also revealed through the volume of government spending on economic affairs according to COFOG. Government expenditure on economic affairs is related to administration of general economic and commercial affairs and services (including general foreign commercial affairs); formulation and implementation of general economic and commercial policies (including agriculture, forestry, fishing and hunting); fuel and energy; mining, manufacturing and construction; transport; communication; other industries; research and development economic affairs, economic affairs not elsewhere classified (Manual on sources and methods for the compilation of COFOG statistics, 2019, pp. 205-212). This is why our research interest is focused on the study of the economic affairs expenditure of the "Central Government" sub-sector according to the classification of COFOG II level functions. Moreover, these expenditures have not been subjected to detailed scientific research, which further strengthens the research interest in this area. By means of a cluster analysis, the EU member states are grouped according to their government expenditure on economic affairs by COFOG II level functions and the similarities and differences in the conducted economic policy related to state intervention in important sectors of the economy are defined. In this way, the priority economic affairs for each EU member state and the policies implemented for their stimulation and recovery, especially after the outbreak of the Covid-19 pandemic, are determined.

1. Theoretical research framework

Government expenditure on economic affairs is one of the ten COFOG I level divisions of government expenditure. This division is subdivided into nine groups: 04.1 General economic, commercial, and labour affairs, which includes: 04.11 General economic and commercial affairs, and 04.12 General labour affairs; 04.2 Agriculture, forestry, fishing and hunting, which includes: 04.21 Agriculture; 04.22 Forestry, and 04.23 Fishing and hunting; 04.3 Fuel and energy, which includes: 04.31 Coal and other solid mineral fuels; 04.32 Petroleum and natural gas; 04.33 Nuclear fuel; 04.34 Other fuels; 04.35 Electricity, and 04.36 Non-electric energy; 04.4. Mining, manufacturing, and construction, which includes: 04.41 Mining of mineral resources other than mineral fuels; 04.42 Manufacturing, and 04.43 Construction; 04.5 Transport, which includes: 04.51 Road transport; 04.53 Railway transport; 04.54 Air transport, and 04.55 Pipeline and other transport; 04.6 Communication, which includes: 04.60 Communication; 04.7 Other industries, which includes: 04.71 Distributive trades, storage, and warehousing; 04.72 Hotels and restaurants;

04.73 Tourism, and 04.74 Multipurpose development projects; 04.8 R&D economic affairs, which includes: 04.81 R&D general economic, commercial, and labour affairs; 04.82 R&D agriculture, forestry, fishing and hunting; 04.83 R&D fuel and energy; 04.84 R&D mining, manufacturing, and construction; 04.85 R&D transport; 04.86 R&D communication; 04.87 R&D other industries; 04.9 Economic affairs N.E.C., which includes: 04.90 Economic affairs N.E.C. (Manual on sources and methods for the compilation of COFOG statistics, 2019, pp. 205-212). The research covers groups 04.1 through 04.8 and does not cover group 04.9, because the relative share of this function of government intervention in GDP is insignificant.

The study of government expenditure on economic affairs is essential, as this type of expenditure is an important indicator of economic interventionism in terms of government spending by economic sectors (in most cases with clearly expressed extraordinary nature) related to management of general economic and commercial affairs as well as government-business communication, lending, subsidizing and promoting various economic and commercial programs that affect not only certain sectors of the national economy but also consumer protection (Manual on sources and methods for the compilation of COFOG statistics, 2019, pp. 205-212). The Covid-19 pandemic posed serious challenges to governments worldwide, which had to deal with a number of significant problems related not only to the health status of the population, but also to numerous non-functioning industries and job losses due to a contraction in economic activity. The spread of the virus worldwide restructured the budgets of all countries. Governments set aside a large proportion of their budgets for social protection and welfare by means of unemployment benefit expenditures. Due to the effects of the Covid-19 pandemic, government expenditure on healthcare and economic affairs was. According to European statistics, in 2020 total expenditure of general government on economic affairs represented 6.1% of GDP, which is a serious increase compared to 2019, when general government expenditure on economic affairs amounted to 4.4% of GDP. (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_economic_affairs#Expenditure_on_.27economic_affairs.27). The increase of 1.7 percentage points in 2020 is quite logical taking into account that during this period governments introduced special measures such as financial support for paid leave during a quarantine, government subsidies for employers, financial support in the form of capital transfers for the businesses most affected by the pandemic. (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_economic_affairs#Expenditure_on_.27economic_affairs.27) In 2020, the largest share of government expenditure on economic affairs was that related to transport represented (2.3% of GDP) followed by expenditure on

general economic, commercial and labour affairs (1.9% of GDP.) (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_economic_affairs#Expenditure_on_economic_affairs.27) At EU level, government expenditure on economic affairs ranged widely, which is indicative of differences in priority areas of individual countries related to the administration of general economic and commercial activities and policies, as well as support to individual sectors. According to the European statistics, in 2020 government spending on economic activities at the EU level ranged between 3.5% and 11.3% of GDP. Croatia was the country with the largest amount of government expenditure on economic affairs expressed as a ratio to GDP (11.3%), followed by Malta (10.0%), Greece (9.9%), Austria (9.8%), Hungary (9.6%) and Poland (9.1%). The lowest amounts of government expenditure on economic affairs were reported for Ireland (3.5%) and Germany (4.6%). (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_economic_affairs#Expenditure_on_economic_affairs.27)

Government intervention in economic affairs by means of their administration, which includes implementation of comprehensive economic and commercial policies in certain sectors of the national economy, is a subject of research interest by a number of authors. For example, in his publication “The Role of Government Expenditure and Investment for MSME Growth: Empirical Study in Indonesia” Prasetio, P.E. (2020) examines the impact of government expenditure on micro, small and medium-sized enterprises. The author discusses the efforts of government programs in terms of stimulation and support for micro-enterprises and their importance for the socio-economic development of the population (Prasetyo, 2020). Other authors focus on government expenditure in the EU, making an in-depth analysis of expenditure by COFOG functions, including government expenditure on economic affairs (Serban, Stoenoiu & Cristea, 2020). In their article The Analysis of Government Expenditures in the European Union, Serban et al. (2020) examine the trends in government expenditure of the EU member states, devoting a special place to general government expenditure on economic affairs and government expenditure related to the second level functions. The authors note that, on the one hand, the amount of this type of expenditure varies widely in individual EU member states and there are significant differences in the annual amounts over the analysed period on the other (Serban, Stoenoiu & Cristea, 2020). The research focuses on the factors that cause the wide variation in the amount of government expenditure on economic affairs by second-level function, i.e. government intervention with a clearly expressed extraordinary nature related to individual economic affairs; financial support in the category of capital expenditure, subsidizing certain sectors, as well as maintaining specialized

infrastructure (Serban, Stoenoiu & Cristea, 2020). The structure and amount of government expenditures by COFOG function, including expenditures on economic affairs, were analysed by N. Potrafke (2020). In the article “General or central government? Empirical evidence on political cycles in budget composition using new data for OECD countries” the author examines the political business cycle and its influence on the amount of government expenditure by first- and second-level COFOG functions (Potrafke, 2020).

2. Research methodology

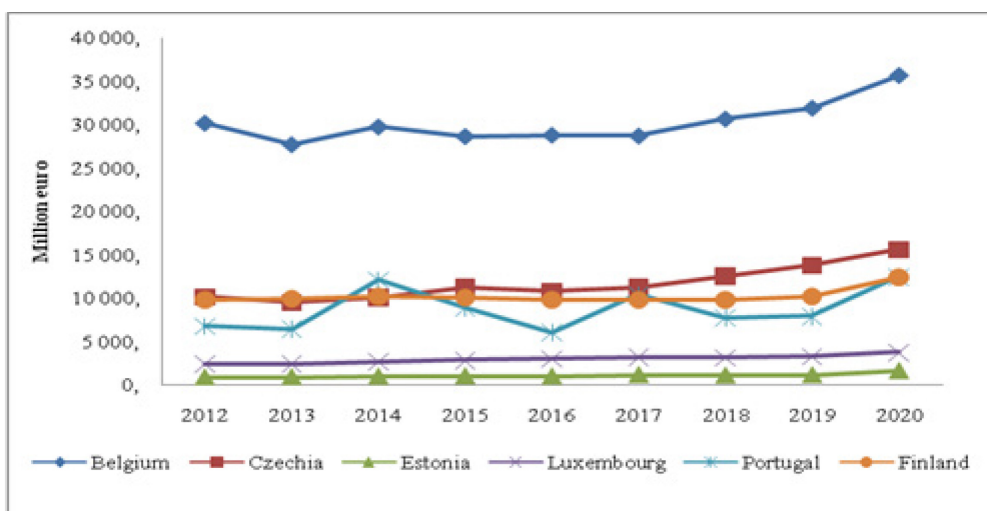
We used the non-hierarchical K-means method to form uniform clusters. Euclidean distance is used as a measure of dissimilarity. The Euclidean distances between the 25 countries were used to create a distance matrix. The distinguishing capacity of the 8 subgroups of government expenditure on economic affairs by functions of COFOG expressed as a ratio to GDP that were used for the clustering are evaluated by calculating the F-ratio (F-criterion). It is calculated as the ratio of inter-sample and intra-sample variances. The greater its value, the greater is the contribution of the corresponding type of expenditure to the differentiation of clusters (Manov, 2002, p. 243).

3. Results and discussion

At this stage, the 25 EU member states in 2020 are clustered in terms of their government expenditures on economic affairs by second-level COFOG functions expressed as a ratio to GDP. The cluster analysis of government expenditure on economic affairs by second-level COFOG functions is carried out on the basis of the 8 types of expenditure on economic affairs making up the second level COFOG functions (indicators). The analysis uses data for 2020. The aim is to classify the 25 EU member states into separate clusters and thus to determine the similarities and differences in state interventionism in 2020, which was earmarked by the outbreak of the Covid-19 pandemic.

The EU member states are grouped into 5 clusters according to the relative share of GDP in 2020 of their government expenditure on economic affairs by second-level COFOG functions. Cluster 1 includes 6 countries – Belgium, the Czech Republic, Estonia, Luxembourg, Portugal, and Finland. Cluster 2 comprises 5 countries – Bulgaria, Croatia, Latvia, Hungary, and Slovakia. Cluster 3 includes Greece and Romania. Cluster 4 includes 9 countries – Denmark, Ireland, Spain, France, Italy, Cyprus, Lithuania, the Netherlands, and Sweden. Cluster 5 includes 3 countries - Malta, Poland, and Slovenia.

The countries in Cluster 1 have high government expenditures on transport affairs (*04.5 Transport*) expressed as a ratio to GDP. The cluster centre value for this indicator is 1.95% of GDP, calculated as an arithmetic mean of the observations of the following countries: Belgium (1.1%), the Czech Republic (3.8%), Estonia (2.3%), Luxembourg (2.9%), Portugal (1.9%), and Finland (1.3%). They also have high government expenditures on economic, commercial and labour affairs (*04.1 Economic, commercial and labour affairs*). The cluster centre value for this indicator is 0.95% of GDP, calculated as an arithmetic mean of the observations of the following countries: Belgium (0.9%), the Czech Republic (0.9%), Estonia (0.7%), Luxembourg (0.9%), Portugal (1.7%), and Finland (0.6%). The member states in this cluster also have very low government expenditure on fuel and energy affairs (*04.3 Fuel and energy*) as a ratio to GDP. The cluster centre value for this indicator is 0.25% of GDP, calculated as an arithmetic mean of the observations of the following countries: Belgium (0.1%), the Czech Republic (0.9%), Estonia (0.1%), Luxembourg (0.1%), Portugal (0.1%), and Finland (0.2%). The countries in Cluster 1 also have very low government expenditure on mining, manufacturing, and construction affairs (*04.4 Mining, manufacturing, and construction*) and on communication affairs (*04.6 Communication*) as a ratio to GDP. The cluster centre value for the former indicator is 0.03% of GDP, calculated as an arithmetic mean of the observations of the following countries: Belgium (0.0%), the Czech Republic (0.0%), Estonia (0.0%), Luxembourg (0.1%), Portugal (0.0%), and Finland (0.1%). The cluster centre value for the “communication” indicator is also 0.03% of GDP, calculated as an arithmetic mean of the observations of the following countries: Belgium (0.1%), the Czech Republic (0.0%), Estonia (0.0%), Luxembourg (0.1%), Portugal (0.0%), and Finland (0.0%). The Covid-19 pandemic has put the budgets of all countries to the test, which is also reflected in the higher relative share in GDP of their government expenditure on economic affairs in the field of transport and on economic, commercial and labour affairs in terms of direct government intervention financing entire sectors affected by the pandemic.

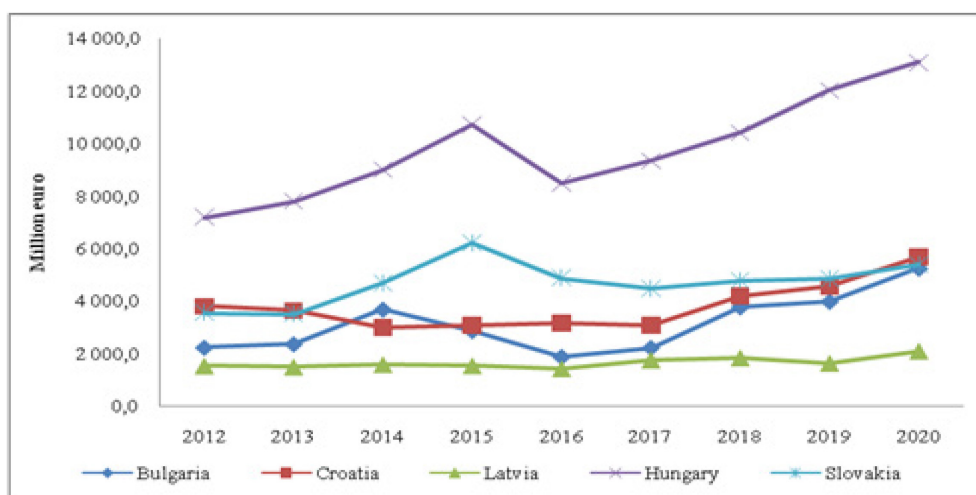


Source: Eurostat (2022)

Figure 1. Dynamics of government expenditure on economic affairs by COFOG functions of the countries comprising Cluster 1 in the period 2012 – 2020

Figure 1 shows the dynamics of government expenditure on economic affairs (4) by COFOG functions of the countries comprising Cluster 1. As can be seen, for the period 2012-2020, Belgium reports the highest average level of government expenditure with a record low in 2013 (EUR 30 117.2 mln.) and record high in 2020 (EUR 35 624.2 mln.) The most insignificant value of this group of expenditure during the analysed period was reported by Estonia, indicating almost constant level varying between EUR 825.9 mln. and EUR 1580.6 mln., except in 2020, when the expenditure slightly increased. The Czech Republic and Finland report almost identical levels of expenditure on economic affairs in the first half of the period. In the second half of the period, the Czech Republic increased its government expenditure on economic affairs at a higher rate than Finland and reported a total expenditure of EUR 15 562.0 mln. in 2020. The trend of increasing the amount of expenditure on economic affairs for the last year (2020) of the analysed period is also characteristic of Finland, which reported EUR 12 325.0 mln., drawing abreast of Portugal (EUR 12 446.0 mln.) Estonia had the lowest level of government expenditure on economic affairs and it remained level over the analysed period with a single increase in 2020 of EUR 1 580.6 mln. from the previous year. The same trend is observed for Luxembourg, whose government expenditure over the period 2012-2020 (varying between EUR 2 357.7 mln. and EUR 3 718.4 mln.) ranks penultimate among the countries comprising Cluster 1. There is a noticeable trend towards increasing the amount of expenditure on economic affairs in 2020 for all countries comprising Cluster 1 is notable.

The countries in Cluster 2 have high government expenditures on transport affairs (*04.5 Transport*) expressed as a ratio to GDP. The cluster centre value for this indicator is 3.5% of GDP, calculated as an arithmetic mean of the observations of the following countries: Bulgaria (3.8%), Croatia (2.8%), Latvia (3.1%), Hungary (3.8%), and Slovakia (4.0%). They also have high government expenditures on economic, commercial and labour affairs (*04.1 Economic, commercial and labour affairs*). The cluster centre value for this indicator is 1.18 of GDP, calculated as an arithmetic mean of the observations of the following countries: Bulgaria (1.2%), Croatia (0.9%), Latvia (0.9%), Hungary (2.3%), and Slovakia (0.6%). The countries in this cluster also have high levels of government expenditures on fuel and energy (*04.3 Fuel and energy*) expressed as a ratio to GDP. The cluster centre value for this indicator is 0.96% of GDP, calculated as an arithmetic mean of the observations of the following countries: Bulgaria (1.7%), Croatia (1.2%), Latvia (0.7%), Hungary (0.4%), and Slovakia (0.8%). The countries in Cluster 2 also have very low levels of government expenditures on communication affairs (*04.6 Communication*) expressed as a ratio to GDP. The cluster centre value for this indicator is 0.02% of GDP, calculated as an arithmetic mean of the observations of the following countries: Bulgaria (0.1%), Croatia (0.0%), Latvia (0.0%), Hungary (0.0%), and Slovakia (0.0%). The countries comprising Cluster 1 and Cluster 2 have similar characteristics in terms of government expenditure on economic affairs, which confirms the thesis of increased state intervention by subsidizing certain economic affairs affected negatively by the Covid-19 pandemic in 2020.



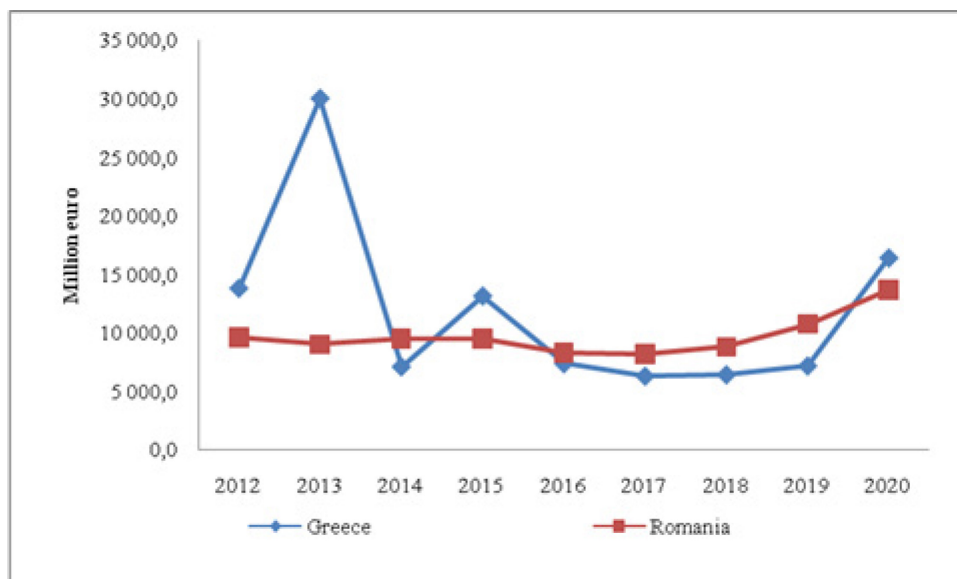
Source: Eurostat (2022)

Figure 2. Dynamics of government expenditure on economic affairs by COFOG functions of the countries comprising Cluster 2 in the period 2012 – 2020

Figure 1 shows the dynamics of government expenditure on economic affairs (4) by COFOG functions of the countries comprising Cluster 2. As can be seen, for the period 2012-2020, Hungary reports the highest average level of government expenditure with a record low in 2012 (EUR 174.2 mln.) and record high in 2020 (EUR 13 096.3 mln.) The most insignificant value of this group of expenditure during the analysed period was reported by Latvia, whose level was constant over the period with an exception in 2020, when the expenditure slightly increased by EUR 2 069.9 mln. Bulgaria and Croatia reported almost identical levels of government expenditure on economic affairs over the period as both countries increased their expenditures on economic affairs after 2017 with peaks in 2020 at EUR 5 239.7 mln. for Bulgaria and EUR 5 666.3 mln. for Croatia. Bulgaria's government expenditure on economic affairs is heterogeneous and this trend is valid not only for the expenditure on economic affairs group but also for the general government expenditure of the country. As N. Velichkov noted in his paper "Dynamics and Structure of Budget Expenditures in Bulgaria" (2020), there are fluctuations in the dynamics of total budget expenditures in Bulgaria, which testifies to the lack of precise parameters for implementation of the fiscal policy on government expenditures (Velichkov, 2020. p. 132). The only country in Cluster 2 whose level of expenditure on economic affairs was highest in 2015 (EUR 6 206.7 mln.) rather than in 2020 (EUR 5 365.3 mln.) is Slovakia, although its expenditure in 2020 was higher compared to 2018 and 2019. The data shows that the countries in both Cluster 1 and Cluster 2 reported higher levels of government expenditure on economic affairs in 2020, which indicates a greater degree of government interventionism due to the negative consequences of Covid-19.

The countries in Cluster 3 have high government expenditures on transport affairs (*04.5 Transport*) expressed as a ratio to GDP. The cluster centre value for this indicator is 1.3% of GDP, calculated as an arithmetic mean of the observations of Greece (1.1%) and Romania (1.5%). Both countries in Cluster 3 have a very low level of government expenditures on other industries (*04.7 Other industries*) expressed as a ratio to GDP. This group of government expenditure includes government support for the sectors of trade, tourism, hospitality, and catering. The cluster centre value for this indicator is 0.0% of GDP, calculated as an arithmetic mean of the observations of Greece (0.0%) and Romania (0.0%). The level of government expenditure on R&D economic affairs and on communications (*04.6 Communication*) is similar. The cluster centre value for the latter indicator is 0.1% of GDP, calculated as an arithmetic mean of the observations of Greece (0.1%) and Romania (0.1%). It is worth noting that the countries in Cluster 3 have extremely high levels of government expenditure on economic, commercial and labour affairs, which testifies to the efforts of their governments to formulate and implement economic and trade

policies and policies to improve the communication between the government and the private sector, as well as to regulate and subsidize various economic affairs.



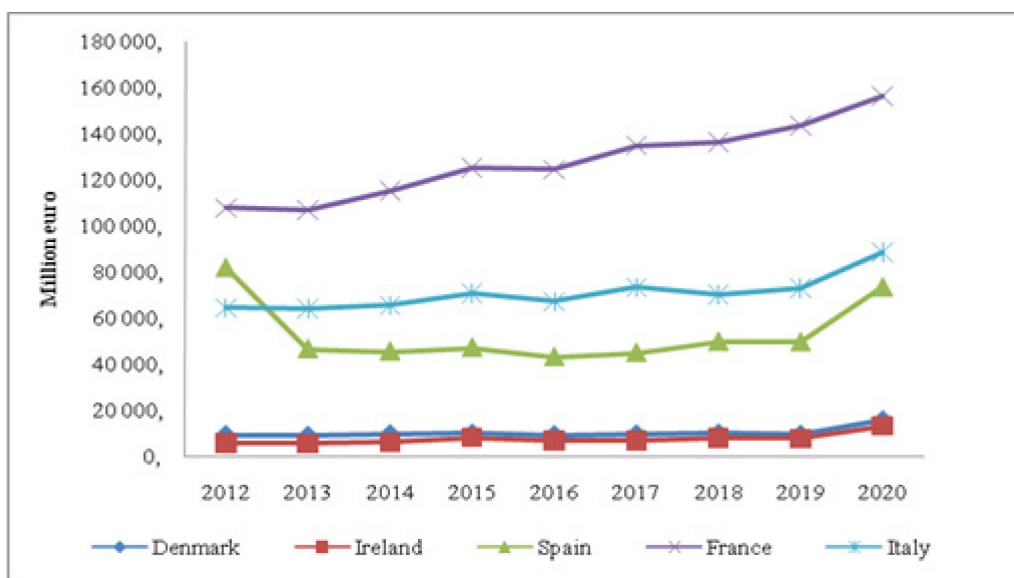
Source: Eurostat (2022)

Figure 3. Dynamics of government expenditure on economic affairs by COFOG functions of the countries comprising Cluster 3 in the period 2012 – 2020

Figure 3 shows the dynamics of government expenditure on economic affairs (4) by COFOG functions of the countries comprising Cluster 3. As can be seen, in 2013, Greece reports extremely high level of government expenditure on economic affairs of EUR 30 029.0 mln. This period is characterized by great difficulties for the Greek economy with several consecutive years of economic recession, growing sovereign debt, and high rates of unemployment (especially among the young people). In order to mitigate the economic crisis, the Greek economy is going through, the government implemented a number of measures aimed to prevent the bankruptcy of the Greek economy. After 2013, the government expenditure on economic affairs of Greece was decreasing rapidly only to increase significantly again in 2020 to EUR 16 406.0 mln. from EUR 7 199.0 mln. in 2019, which was obviously due to the adverse effects of the Covid-19 pandemic on the Greek economy. In contrast to Greece, during the analysed period Romania reported neither a decrease nor an increase of its government expenditure on economic affairs. It increased only in 2020 by approximately EUR 3 000 mln. from 2019

as a result of government efforts to mitigate the negative effects of the coronavirus pandemic on the Romanian economy.

In 2020, the countries in Cluster 4 have high government expenditures on economic, commercial and labour affairs (*04.1 Economic, commercial and labour affairs*) as a ratio to GDP. The cluster centre value for this indicator is 2.09% of GDP, calculated as an arithmetic mean of the observations of the following countries: Denmark (1.9%), Ireland (1.8%), Spain (1.3%), France (2.3%), Italy (1.4%), Cyprus (3.3%), Lithuania (0.9%), the Netherlands (2.7%), and Sweden (2.1%). Moreover, these countries have low government expenditure on mining, manufacturing, and construction affairs (*04.4 Mining, manufacturing, and construction*) as a ratio to GDP. The cluster centre value for the former indicator is 0.05% of GDP, calculated as an arithmetic mean of the observations of the following countries: Denmark (0.0%), Ireland (0.0%), Spain (0.0%), France (0.0%), Italy (0.5%), Cyprus (0.0%), Lithuania (0.0%), the Netherlands (0.0%), and Sweden (0.0%). The countries in Cluster 4 also have low levels of government expenditures on communication affairs (*04.6 Communication*) expressed as a ratio to GDP. The cluster centre value for this indicator is 0.02% of GDP, calculated as an arithmetic mean of Denmark (0.0%), Ireland (0.0%), Spain (0.0%), France (0.0%), Italy (0.0%), Cyprus (0.1%), Lithuania (0.1%); the Netherlands (0.0%), and Sweden (0.0%). In this cluster is comprised by the largest number of countries (9) and the obtained results show almost the same government policy in the field of economy in relation to the other three clusters. The government schemes of the countries comprising Cluster 4 aim to provide government support for economic, commercial and labour affairs (similar to Cluster 1, Cluster 2, and Cluster 3), as well as to economic affairs in the sector of transport (similar to Cluster 1, Cluster 2, and Cluster 3). They ensure less government expenditure on economic affairs in the field of communication (similar to Cluster 1 and Cluster 2) as well as on mining, manufacturing and construction affairs (similar to Cluster 1). This implies that the government schemes of the countries in clusters 1, 2, 3, and 4 are focused on supporting the transport sector, which was affected most by the Covid-19 pandemic, as well as ensuring government intervention in the field of economic, commercial and labour affairs.

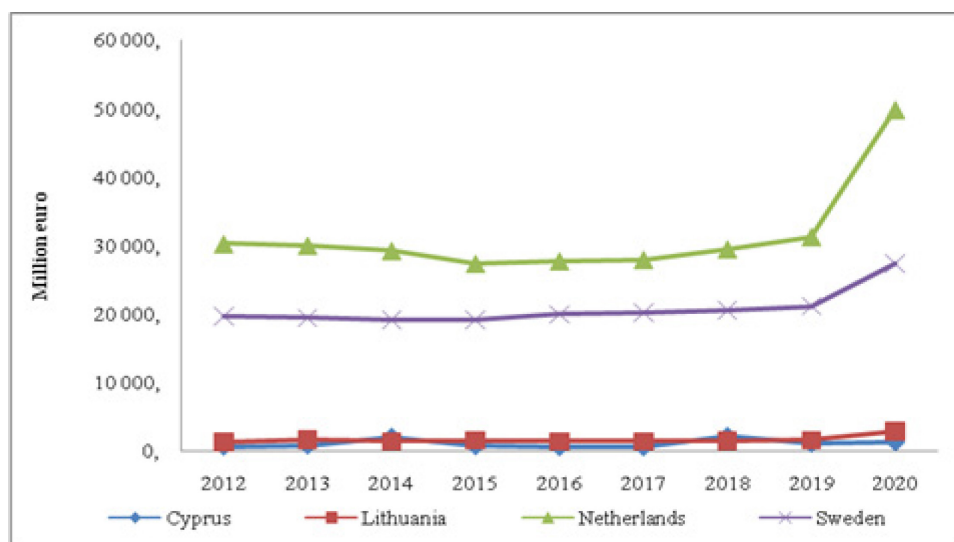


Source: Eurostat (2022)

Figure 4. Dynamics of government expenditure on economic affairs by COFOG functions of the countries comprising Cluster 4 in the period 2012 – 2020

Figure 4 shows the dynamics of government expenditure on economic affairs (4) by COFOG functions of the countries comprising Cluster 4, including Denmark, Ireland, Spain, France, and Italy. As can be seen, between 2012 and 2020 France reported the highest level of government expenditure with a record low in 2012 (EUR 107 888.0 mln.) and a record high in 2020 (EUR 156 641.0 mln.) The most insignificant amounts of expenditure on economic affairs over the analysed period were reported by Denmark and Ireland, whose levels remained level with the exception of 2020, when an increase of EUR 15 579.5 million was reported for Denmark and of EUR 13 178.2 million - for Ireland. It is worth noting that in 2012 Spain reported the highest level of government expenditure on economic affairs of EUR 82,142.0 million, which is more than the level in 2020 (EUR 73 615.0 million), which in turn is significantly higher (on average by EUR 26 000 million) compared to the other years during the analysed period. Both years in which Spain reported the highest levels of expenditure on economic affairs are marked by difficulties for the Spanish economy - in 2012 as a result of the financial and economic crisis, and in 2020 as a result of the Covid-19 pandemic. In both cases, the amount of expenditure on economic affairs shows higher degrees of government intervention in the economy. In Italy, the average level of expenditure on economic affairs do not

account for the peaks over the considered period, and only in 2020 an increase of EUR 15 468 million from 2019 is observed.

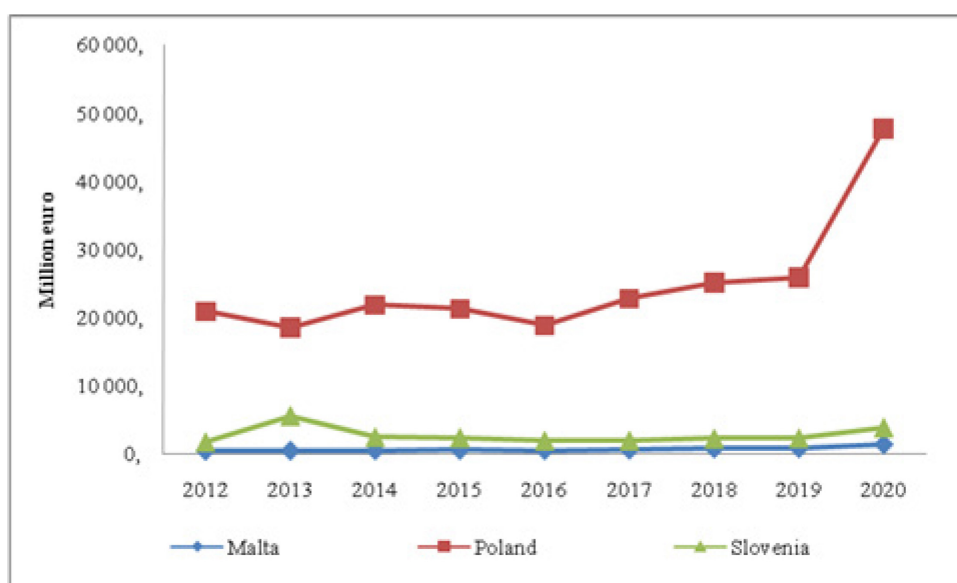


Source: Eurostat (2022)

Figure 4. (continued) Dynamics of government expenditure on economic affairs by COFOG functions of the countries comprising Cluster 4 in the period 2012 – 2020

Figure 4 (continued) shows the dynamics of government expenditure on economic affairs (4) by COFOG functions of the remaining countries comprising Cluster 4 - Cyprus; Lithuania; Netherlands and Sweden. As can be seen, between 2012 and 2020 France reported the highest level of government expenditure with a record low in 2012 (EUR 107 888.0 mln.) and a record high in 2020 (EUR 156 641.0 mln.) The highest level (ranging between EUR 30 195.0 million in 2012 and EUR 49 856.0 million in 2020) of government expenditure on economic affairs was reported by the Netherlands. It sharply increased in 2020 with ca. EUR 8 500 million from the level in 2019 as a result of the measures taken by the government in relation to the Covid-19 pandemic. The situation with Sweden's government expenditure is similar - a sharp increase of EUR 7 300 million in 2020 from the level in 2019. Lithuania and Cyprus reported the lowest levels of this type of expenditure, with Lithuania's expenditure in 2020 showing a slight increase of EUR 1 311.1 million, and Cyprus's with EUR 198.5 million. All countries (except Cyprus) that fall into cluster 4 report an increase in their expenditure on economic affairs reflecting greater government intervention in a range of economic activities as a result of the Covid-19 pandemic.

In 2020, Cluster is comprised of 5 member states with high government expenditures on economic, commercial and labour affairs (*04.1 Economic, commercial and labour affairs*) as a ratio to GDP. The cluster centre value for this indicator is 4.4% of GDP, calculated as an arithmetic mean of Malta (4.8%), Poland (4.6%), and Slovenia (3.8%). Some of the countries in Cluster 4 also have high government expenditures on transport affairs (*04.5 Transport*) expressed as a ratio to GDP. The cluster centre value for this indicator is 2.2% of GDP, calculated as an arithmetic mean of Malta (2.7%), Poland (2.1%), and Slovenia (1.9%). The countries in Cluster 5 also have low levels of government expenditures on communication affairs (*04.6 Communication*) expressed as a ratio to GDP. The cluster centre value for this indicator is 0.0% of GDP, calculated as an arithmetic mean of Malta (0.0%), Poland (0.0%), and Slovenia (0.0%). The countries in Cluster 4 have low government expenditure on mining, manufacturing, and construction affairs (*04.4 Mining, manufacturing, and construction*) as a ratio to GDP. The cluster centre value for this indicator is 0.1% of GDP, calculated as an arithmetic mean of the observations of Malta (0.3%), Poland (0.0%), and Slovenia (0.0%). The results calculated for the countries in Cluster 5 are similar to those for the countries comprising clusters 1, 2, 3, and 4.



Source: Eurostat (2022)

Figure 5. Dynamics of government expenditure on economic affairs by COFOG functions of the countries comprising Cluster 5 in the period 2012 – 2020

Figure 5 shows the dynamics of government expenditure on economic affairs (4) by COFOG functions of the countries comprising Cluster 5. Poland reported the highest level of government expenditure on economic affairs, which increased sharply by EUR 21 861.8 million in 2020 compared to 2019. The other two countries in cluster 5 have almost the same levels of government expenditure on economic affairs. It is worth noting that Malta reported an increase in this type of expenditure in 2019 (EUR 759.8 million) and 2020 (EUR 1 311.8 million). Slovenia reported the highest level of expenditure on economic affairs in 2013 (EUR 5 517.8 million) followed by another peak of EUR 3 799.4 million in 2020. The results show that all three countries increased their government expenditure on economic affairs in 2020 as a consequence of government intervention in sectors heavily affected by the Covid-19 pandemic.

Table 1 presents the final cluster centres of general government expenditure on economic affairs by second-level groups of the EU member states in 2020. The countries comprising the five clusters differ significantly in terms of their government policies on individual industries, which is proved by the differences in their government expenditure on different groups of economic affairs expressed as a ratio to GDP.

Table 1.

Final cluster centres of general government expenditure on economic affairs by second-level groups of the EU member states in 2020

Final cluster centres					
	Clusters				
	1	2	3	4	5
04.1 Economic, commercial, and labour affairs	0.9500	1.1800	4.9500	2.0889	4.4000
04.2 Agriculture, forestry, fishing and hunting	0.3500	0.6400	0.6500	0.2667	0.4667
04.3 Fuel and energy	0.2500	0.9600	0.1500	0.3333	0.3333
04.4 Mining and manufacturing, construction	0.0333	0.2200	0.3000	0.0556	0.1000
04.5 Transport	1.9500	3.5000	1.3000	1.0778	2.2333
04.6 Communication	0.0333	0.0200	0.1000	0.0222	0.0000
04.7 Other industries	0.1500	0.2000	0.0000	0.1444	0.4667
04.8 R&D economic affairs	0.3500	0.0800	0.0500	0.2556	0.1667

Source: Eurostat (2022) and author's calculations.

The values of the calculated F-ratios (criteria) show that the most significant variables for defining the 5 clusters are: government expenditure on

economic, commercial and labour affairs, government expenditure on agriculture, forestry, fishing and hunting affairs, government expenditure on fuel and energy, and government expenditure on transport. They have the highest F-test values (34.474, 3.310, 4.624, and 18.604) of all the variables used, with respective levels of significance (Sig.) of 0.000, 0.031, 0.008, and 0.000, i.e. less than the risk of a first-order error ($\alpha = 0.05$), which means that these indicators have discriminating power.

Conclusion

The results of the clusterization (classification into homogeneous groups) of the EU member states in terms of their government expenditure on economic affairs by second-level COFOG functions expressed as a ratio to GDP in 2020, lead to the following conclusions:

➤ The outbreak of the Covid-19 pandemic and its adverse effects for the global and the European economy resulted in an increase of government expenditure on economic affairs. In this context, all EU member states (except Slovakia, Spain, Cyprus and Slovenia) reported higher amounts of this type of expenditure in 2020 compared to previous years within the period 2012-2020.

➤ All EU member states comprising the five clusters reported highest ratios of government expenditure to GDP in 2020 on two types of economic affairs: economic, commercial and labour affairs (group 04.1), which is indicative of active government intervention in the administration of general policies in the field of economic, commercial and labour affairs to compensate the reduced volume of economic activity in a number of economic sectors due to the Covid-19 pandemic; and, secondly, expenditure on economic affairs in the field of transport (04.5), which shows that, as a result of the Covid-19 pandemic, transport was one of the most affected sectors.

➤ Although all EU member states report the highest GDP ratios of government expenditure on economic, commercial and labour affairs (04.1) and on economic affairs in the field of transport (04.5) in 2020, these ratios vary widely. The average value of the cluster centre of the "expenditure on economic, commercial, and labour affairs" indicator ranges from 0.95% of GDP for the countries in Cluster 1 to 4.95% of GDP for the countries in Cluster 3. The same situation was observed regarding the "expenditure on economic affairs in the field of transport" indicator. The average value of the cluster centre for this indicator ranges from 1.08% of GDP for the countries in Cluster 4 and 3.5% of GDP for the countries in Cluster 2.

➤ The countries comprising clusters 1, 2, 4, and 5 reported the lowest GDP ratios of government expenditure on economic affairs in the field of

communications (04.6), which is indicative of lower levels of government intervention in the field of communications at EU level, in contrast to economic affairs in the field of transport, fuels and energy, and economic, commercial and labour activities, which in 2020 were characterized by the greatest need for government intervention due to the adverse effects of the Covid-19 pandemic.

➤ In contrast to the countries in Cluster 3 (Greece and Romania), the countries in cluster 5 (Malta, Poland and Slovenia) reported high levels of government intervention in other economic affairs, including: trade, tourism, hospitality and catering.

➤ The countries in Cluster 2 (Bulgaria, Croatia, Latvia, Hungary, and Slovakia) reported high levels of government intervention in the field of fuels and energy (04.3).

➤ Government expenditure on agriculture, forestry and fishing (04.2) in all EU member states has a low GDP ratio, which indicates that government programs are not focused on these industries. This is quite logical, since in the EU a large part of this type of expenditure is within the competences of the European institutions.

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YEAR LXXVI, BOOK 1 – 2023

CONTENTS

Mariam Voskanyan

Funded Pension System of Armenia: Problems, Development Prospects, Role in Economic Growth /3

Mariya Pavlova, Rayna Petrova

The Emerging Changes in the Accounting Profession and the Accounting Practice Under the Influence of Technology /24

Cordelia Omodero

Information Communication Technology Taxation and Tax Earnings in a Low-Income Economy /41

Konstantin Kolev, Maya Tsoklinova

Economic Interventionism Under Pandemic Conditions: Similarities and Differences on EU Level /55

Rousalin Rousalinov

Customer-Centric Approach for Financial and Economic Surveys of Private Security Companies /75

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