Structure of General Government Expenditure on Social Protection in the EU Member States

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ABSTRACT

The subject of research are the main areas of social policy in relation to general government expenditure on social protection. The article aim to evaluate the volume and structure of general government expenditure on social protection, accentuating similarities and differences in EU member states. Research byl proveden for the period 2007-2016 using the method of cluster analysis and boxplot. In connection to the goal have been verified three research questions. RQ1: Are the largest differences in the volume of general government expenditure on social protection present between Nordic countries compared to Eastern European countries and Baltic states? RQ2: Does expenditure on old age account for the most significant share and on sickness and disability the second most significant share in the structure of general government expenditure on social protection? RQ3: Do the differences in the volume and structure of general government expenditure on social protection in EU member states depend on the character of welfare states and the type of social protection? The results confirmed the largest differences in the volume of general government expenditure on social protection between Nordic countries compared to Eastern European and Baltic states (RQ1). The most significant share in the structure of general government expenditure on social protection is represented by expenditure on old age and sickness and disability in the majority of EU countries (RQ2). Research question (RQ3) confirmed the largest differences in government expenditure on old age and survivors (two countries of the second cluster, compared to the countries of the fourth cluster) and in government expenditure on sickness and disability (countries of the third cluster, compared to the countries of the fourth cluster). Nevertheless, these differences between groups of expenditure on social protection failed to confirm for all EU member states representing the respective welfare state and social model. Differences between countries expenditure levels partly reflect diverse levels of wealth, but also diversity in social protection systems, welfare policy, demographic trends, unemployment rates and other social, institutional and economic factors.

INTRODUCTION

The variety of systems of social protection in the European Union comprises several aspects and depends upon the nature of welfare states. A welfare state is based on the idea that a country has a certain range of redistribution processes, defined by the amount of public expenditure on social protection, in order to set equal opportunities at the beginning of one's life and to use social policy to create an environment of adequate welfare (Sinn, 1995; Adnet and Hardy, 2005; Pestieau, 2006; Leon, 2012; Diamond and Lodge, 2013; Kvist, 2013). All European systems of social protection implemented in EU countries contain certain elements from the basis of each system (Bismarck and Beveridge model). Differences between systems of social protection can be found in a) the cover of risks and the authorization to pay contributions, b) the structure of provided contributions, c) financing, and d) organization (Spicker, 2014).

Social protection systems can be financed according to the European Commission (2015, p. 9) in two major ways: "through social contributions or general government contributions. Social contributions are payments by employers on behalf of their employees or by the protected persons themselves (employees, self-employed persons, retired persons and others) to secure entitlement to social benefits. General government contributions consist of a) the cost to general government of running government-controlled non-contributory schemes; as well as b) financial support provided by general government to other resident social protection schemes, and are broken down into earmarked taxes (the proceeds from taxes and levies which, by law, can be used only to finance social protection) and general revenue (general government contributions from sources other than earmarked taxes)". According to the source of financing, European countries can be divided into countries with a strong tax structure, countries with strong contributions (payments), or countries with mixed financing.

A number of studies have already dealt with social protection and sources of financing or the efficiency of social protection (Cornelisse and Goudswaard, 2002; Cichon et al., 2004; Pestieau, 2006; European Commission, 2015; Gavurova and Soltes, 2016; Kim and Kim, 2017), trends and evaluation of expenditure on social protection in a wider context were addressed by Izak and Dufkova, 2006; Adema et al., 2011; Clemente et al., 2012; Bontout and Lokajickova, 2013; Freysson and Wahrig, 2013; Sucur, 2016, expenditure on social protection in connection to redistribution effects were dealt with by Goudswaard and Caminada, 2010; Van Kersbergen and Hemerijck, 2012; Wang, et al., 2012.

The subject of research are the main areas of social policy in relation to general government expenditure on social protection. The paper, with respect to our understanding, aims to analyze the structure of general government expenditure on social protection COFOG by selected groups (old age and survivors, sickness and disability, unemployment, housing, social exclusion) in the EU member states. The goal is to evaluate the volume and structure of general government expenditure on social protection, accentuating similarities and differences in EU member states. Three research questions are verified in the 28 EU member states in connection to the goal:

RQ1: Are the largest differences in the volume of general government expenditure on social protection present between Nordic countries compared to Eastern European countries and Baltic states?

RQ2: Does expenditure on old age account for the most significant share and on sickness and disability the second most significant share in the structure of general government expenditure on social protection?

RQ3: Do the differences in the volume and structure of general government expenditure on social protection in EU member states depend on the character of welfare states and the type of social protection?

1. LITERATURE REVIEW

Public expenditure, which include public social expenditure, are quite important for all countries considering its effects and functions in the economy. A number of authors deal with public expenditure in broader context in their research (Shelton, 2007; Ferreiro at al., 2013; Szarowska, 2014; Leitner and Stehrer, 2016; Halaskova and Haláskova, 2017). Authors Leitner and Stehrer (2016) analysed the changes in public spending structures in the EU Member States over the period 1995 to 2013 based on data on government expenditure by function (COFOG) with a focus on the social expenditure categories health, education and social protection. Halaskova and Halaskova (2017) carried out research into public expenditure in EU countries according to selected COFOG functions, namely social protection, health, education, culture and recreation, in years 2005 and 2014. By using of method multidimensional scaling, dissimilarities and similarities in the volume of allocated public resources in EU countries were evaluated with respect to COFOG functions (% of GDP in 2005 and 2014). Public expenditure is also dealt with from the viewpoint of their effectiveness and efficiency. Selected categories of public expenditure and human development index were analyzed by Aysu and Bakirtas (2016), who carried out efficiency analysis focused on the public education, health and social protection expenditure as inputs and human development index as output in OECD countries. Merickova et al. (2017) analyzed the relation between the levels and structures of public expenditure and the Human Development Index using the Data Envelopment Analysis (DEA) to identify countries that effectively use public spending to achieve the highest socio-economic development of society.

Also public social expenditure is dealt with from different perspectives (Izak and Dufkova, 2006; Clemente et al., 2012; Bontout and Lokajickova, 2013; Sucur, 2016). In relation to the development and trends of general government expenditure on social protection Bontout and Lokajickova (2013) reviewed social protection expenditure developments in the crisis, focusing on expenditure trends in volumes following the peak of the crisis (2009), on changes in the distribution of incomes and, notably, on the distributional impact of austerity packages. Also Sucur (2016) examined the role of social protection and social expenditure in the financial and economic crises and analyzed the trends in social expenditure developments in EU countries since the beginning of the last economic crisis (2008). His results confirmed that social protection expenditure has increased in almost all EU countries since the beginning of the crisis and that in the crisis most countries rely on redistributive effects of the so-called automatic stabilizers (Sucur, 2016).

The evaluation of social protection expenditure in connection to redistribution effect was dealt with by Goudswaard and Caminada (2010) or Wang et al. (2012), who analyzed the redistributive effect of social expenditure with focus on public and private social programs and social transfer programs and taxes. De Simone et al. (2010) addressed public social expenditure. These authors applied a more traditional analysis of convergence (sigma and beta convergence) in public social expenditure for a sample of 16 European OECD countries plus the USA and analyzed public social expenditure allocation pro classification of the countries by means of a multivariate approach.
Social expenditure in relation to selected socio-economic indicators were dealt with by, for instance, Molina-Morales et al. (2013); Rozensky (2014); Visser et al. (2014); Kim and Kim (2017). The analysis the economic and institutional factors influencing, to a greater or lesser degree, social spending in the 27 European Union countries was performed by Molina-Morales et al. (2013). The level of social expenditure in 30 European countries, (EU 27 states, Norway, Iceland and Switzerland) was analyzed by Rozensky (2014), who explains the development of social expenditure levels in the period 1990-2010 a tries to estimate its sensitivity to basic economic, social, political and institutional determinants. His results confirm the theory of socio-economic determination of the level of social expenditure. Social expenditure levels seem to depend on unemployment, GDP growth, population ageing, GDP per capita and the openness of an economy (Rozensky, 2014).

Visser et al. (2014) investigated to what extent macro-economic circumstances and social protection expenditure affect economic deprivation. Their results of linear multilevel regression anal-

yses indicate that in countries that perform worse economically, individual experiences of economic deprivation are more prevalent, the stronger the rise in the unemployment rate and the lower a country's wealth, the more economic deprivation individuals experience.

2. DATA AND METHODOLOGY

2.1 Data

Data were collected from the available database Eurostat - Government finance statistics and General government expenditure by function (COFOG). The Classification of the Functions of Government (COFOG) classifies government expenditure into ten main categories (divisions known as the COFOG I level breakdown). The COFOG categories classify government expenditure by function of government. At the most aggregate level ten different categories are identified (European Commission, 2011; Leitner and Stehrer, 2016). Regarding the structure of general government expenditure by function (COFOG), attention is paid to general government expenditure on social protection (GF10), which include contributions and support provided for individual services to individuals and households, and expenditure on collective services. The structure of general government expenditure on social protection (COFOG 2nd level) is seen in Table 1.

Table 1. General government expenditure on social protection by groups (COFOG)

GF 10 Social protection	GF1005 Unemployment
GF1001 Sickness and disability	GF1006 Housing
GF1002 Old age	GF1007 Social exclusion n.e.c. (not elsewhere classified)
GF1003 Survivors	GF1008 R&D Social protection
GF1004 Family and children	GF1009 Social protection n.e.c. (not elsewhere classified

Source: Eurostat (2018).

For the purposes of the analysis of general government expenditure on social protection was selected the period 2007-2016, with 2007 as the default year and 2016 as the last year when data on all EU member states were available. The object of the quantitative analysis is a set of 28 EU Member States, comprising: Belgium (BE), Bulgaria (BG), the Czech Republic (CZ), Denmark (DK), Germany (DE), Estonia (EE), Ireland (IE), Greece (EL), Spain (ES), France (FR), Croatia (HR), Italy (IT), Cyprus (CY), Latvia (LV), Lithuania (LT), Luxembourg (LU), Hungary (HU), Malta (MT), the Netherlands (NL), Austria (AT), Poland (PL), Portugal (PT), Romania (RO), Slovenia (SI), Slovakia (SK), Finland (FI), Sweden (SE), the United Kingdom (UK).

The structure of general government expenditure on social protection (COFOG II level) represents the basis for the analysis of (Table 1) a) sickness and disability (GF 1001), b) old age and survivors (GF1002 + GF1003), c) family and children (GF1004), d) unemployment, housing and social exclusion (GF1005+GF1006+GF1007). The correlation analysis (the Pearson correlation coefficient) was applied to test correlations of the observed variables (selected groups of expenditure on social protection) in the period 2007-2016 for the following cluster analysis (Table 2).

Table 2. Intercorrelation matrix of variables (expenditure by groups) in EU Member States in period 2007-2016

	GF 1001	GF1002 + F1003	GF1004	GF1005 + GF1006+ GF1007
GF 1001	1			
GF1002 + GF1003	-0.142	1		
GF1004	0.405*	-0.061	1	
GF1005 + GF1006+ GF1007	0.644**	-0.066	0.594**	1

Note: * Correlation is significant at the 0.05 level (2-tailed), ** Correlation is significant at the 0.01 level (2-tailed).
Source: Author

2.2 Methods

Key methods of the scientific paper are analysis, comparison and abstraction, in creation of the theoretical framework and the review of literature, content analysis and synthesis and partial induction in drawing conclusions are used.

The analysis of similarities and differences between EU member states by groups of general government expenditure on social protection was performed through cluster analysis. **Cluster analysis** is a multi-dimensional statistical method used for classification of objects. It sorts units (EU member states the present example) into groups (clusters) so that units belonging in the same group are more similar then objects from other groups. Cluster analysis can be performed on a set of objects each of which must be described using an identical set of signs worth observing in the particular set, as well as a set of signs characterized through a specific set of objects - carriers of these signs. Hierarchic clustering was applied, which generates a system of sub-sets: branching, softening of the classification. Hierarchic clustering brings about a multitude of alternative solutions how to cluster objects on the basis of their distance or similarity, its outcome can be expressed by means of a dendrogram (Garson, 2014). In this article, the furthest neighbor method (the determining factor is the maximum distance between objects) was applied. The distances of objects are measured by squared Euclidean distance (Rezankova et al., 2009). A dendrogram indicates that the larger the size on the horizontal axis (x), the less similar, in the present case, the EU member states are. Conversely the smaller the distance on the x axis, the larger the similarity between countries. **Box plot** is one way of visualizing numerical data by means of their quartiles. The middle "box" part of the diagram is delineated by the third quartile from the top, and the first quartile from the bottom, whilst the mean is expressed by a line in-between. Box plots can also contain lines beginning in the middle part of the diagram vertically up and down, the so-called whiskers, which express variability of data below the first and above the third quartile (Pavlik, 2005). The interquartile range is the difference between the 75th and 25th percentile and is depicted by the length of the box. An outlier (indicated by the circle) is a value that is found between the 1.5 and 3 quartile range from the end of the box. An extreme value (indicated by an asterisk) is higher than 3 quartile range from the end of the box. Cluster analysis was applied in papers by, for instance, Fenger (2007); Skuodis (2009); Draxler and van Vliet (2010).

The calculations in the following part are the output of the SPSS Statistics 24.0 software.

3. RESULTS AND DISCUSSION

In the present analysis, the focus is on 1) the position and structure of general government expenditure on social protection in EU28, 2) the volume and structure of general government expenditure on social protection in EU member states, 3) similarities and differences between EU member states according to selected groups of general government expenditure on social protection using cluster analysis.

3.1 Position and structure of general government expenditure on social protection in EU-28 in period 2007-2016

General government expenditure on social protection account for the largest share in the structure of general government expenditure by function (COFOG). General government expenditure on social protection for EU-28 in 2007-2016 as the average accounted for 18.9% GDP. The next most important areas were health (7.1%), general public services such as external affairs and public debt transactions (6.6%), education (5.0%) and economic affairs (4.5%). Public order and safety (1.8%), defense (1.4%), recreation, culture and religion (1.1%), environmental protection (0.8%) and housing and community amenities (0.8%) had more limited weights. However, these EU-level data mask significant differences between the Member States in the share of GDP dedicated to each function of general government expenditure (Figure 1).

Figure 1. Social protection in the structure of general government expenditure (COFOG) in EU28, the average of 2007-2016

Source: Author based on Eurostat (2018).

General government expenditure on social protection include benefits and support provided for services of individual nature to individuals and households and expenditure on services of collective nature. These divisions are further broken down into groups (COFOG II level). All benefits and support on services of individual nature are classified by COFOG into groups 10.1 through 10.7 (GF1001 Sickness and disability, GF1002 Old age, GF1003 Survivors, GF1004 Family and children, GF1005 Unemployment, GF1006 Housing, GF1007 Social exclusion n.e.c.). Expenditure on service of collective nature are classified in groups 10.8 and 10.9 (GF1008 R&D Social protection, GF1009 Social protection n.e.c.) (European Commission, 2011). Total general government expenditure on social protection and by groups (COFOG II level) in the EU over the period 2007-2016 is captured in Table 3.

Table 3. General government expenditure on social protection total and by groups as % of GDP, EU-28

year	Total ex-penditure on social pro-tection GF 10	Government expenditure on social protection by groups (COFOG II level)							
		GF 1001	GF 1002	GF 1003	GF 1004	GF 1005	GF 1006	GF 1007	GF 1009
2007	17.0	2.5	8.9	1.3	1.7	1.4	0.4	0.6	0.3
2011	19.0	2.7	10.0	1.1	1.8	1.5	0.5	0.8	0.3
2016	19.1	2.7	10.2	1.0	1.7	1.3	0.5	0.5	0.3

Note: GF1001 Sickness and disability, GF1002 Old age, GF1003 Survivors, GF1004 Family and children, GF1005 Unemployment, GF 1006 Housing, GF1007 Social exclusion, GF1009 Social protection n. e. c., GF 1008 R&D Social protection is not stated in the table (null values).

Source: Eurostat (2018).

The most significant group of general government expenditure on social protection (COFOG II level) in the EU average is the old age, with 10.2% of GDP in 2016. Other significant groups of social protection are sickness and disability, 2.7% GDP, and family and children, 1.7% GDP. Set beside the expenditure on old age, expenditure on sickness and disability reach around 1/3 and on family on children around 1/5 of it. Other groups of expenditure on services of individual nature (unemployment, survivors, housing, social exclusion) and expenditure on collective services (social protection n.e.c.) accounted for 0.3 to 1.5% GDP, and showed a stable level over the period 2007-2016.

3.2 VOLUME AND STRUCTURE OF GENERAL GOVERNMENT EXPENDITURE ON SOCIAL PROTECTION IN EU MEMBER STATES, 2007-2016

The form of financing social protection in EU member states is evaluated simultaneously from three perspectives each of which respects 1) the volume of public expenditure on social protection expressed in % of GDP, 2) the share of social financial contributions, 3) the structure of sources of financing (Spicker, 2014). The volume of general government expenditure on social protection and the share of general government expenditure by groups in 2007-2016 as average of the 28 EU member states is captured in Table 4.

Table 4. Total general government expenditure on social protection and by groups in the EU Member States as % of GDP, average 2007- 2016

country	Total ex-penditure on social pro-tection GF 10	Government expenditure on social protection by groups (COFOG II level)							
		GF 1001	GF 1002	GF 1003	GF 1004	GF 1005	GF 1006	GF 1007	GF 1009
BE	19.0	2.9	8.3	1.9	2.3	2.3	0.2	1.0	0.2
BG	12.4	0.6	8.8	0.0	2.2	0.1	0.2	0.1	0.5
CZ	12.8	2.4	7.4	0.6	1.3	0.3	0.2	0.4	0.2
DK	23.7	5.0	7.8	0.0	4.9	3.0	0.7	1.7	0.6

DE	19.1	2.9	9.3	1.9	1.6	2.2	0.2	0.4	0.7
EE	12.6	2.1	6.9	0.1	2.1	1.1	0.0	0.1	0.2
IE	14.4	2.9	5.2	0.9	2.0	1.8	0.9	0.7	0.1
EL	19.2	1.6	14.1	1.6	0.7	0.8	0.1	0.1	0.1
ES	16.3	2.3	8.0	2.2	0.7	2.5	0.1	0.2	0.3
FR	23.6	2.7	13.0	1.5	2.5	1.8	0.9	1.0	0.2
HR	15.0	2.0	8.6	1.4	2.1	0.5	0.0	0.0	0.5
IT	20.0	1.8	13.2	2.6	1.1	0.9	0.0	0.2	0.0
CY	12.4	0.6	5.1	1.3	2.3	0.8	0.0	2.1	0.1
LV	11.6	2.0	7.1	0.2	0.9	0.5	0.1	0.4	0.3
LT	12.3	3.1	6.1	0.4	1.4	0.6	0.1	0.5	0.1
LU	18.0	1.7	10.3	0.0	3.5	1.6	0.0	0.7	0.1
HU	16.5	3.4	7.4	1.2	2.2	0.6	0.5	0.9	0.3
MT	13.4	1.5	7.7	1.7	1.1	0.5	0.2	0.3	0.4
NL	16.2	4.6	6.3	0.2	1.1	1.6	0.4	1.9	0.0
AT	20.9	1.9	12.5	1.5	2.5	1.4	0.1	0.9	0.2
PL	16.2	2.7	9.2	1.7	1.4	0.7	0.1	0.3	0.1
PT	17.4	1.4	11.1	1.7	1.2	1.2	0.1	0.3	0.6
RO	11.9	1.0	8.9	0.1	1.1	0.2	0.0	0.2	0.4
SI	17.4	2.4	9.5	1.5	2.1	0.7	0.0	0.7	0.4
SK	14.7	2.4	7.1	0.9	1.3	0.2	0.0	0.5	2.3
FI	23.2	4.2	11.0	0.8	3.2	2.3	0.3	0.8	0.6
SE	20.7	4.7	10.3	0.4	2.5	1.4	0.3	1.0	0.1
UK	16.2	2.4	8.4	0.1	2.0	0.3	1.3	1.5	0.3

Note: GF1001 Sickness and disability, GF1002 Old age, GF1003 Survivors, GF1004 Family and children, GF1005 Unemployment, GF1006 Housing, GF1007 Social exclusion, GF1009 Social protection n. e. c., GF 1008 R&D Social protection is not stated in the table (null values).

Source: Author based on Eurostat (2018).

In EU member states, differences can be observed in not only the volume but also the structure of general government expenditure on social protection by groups (Table 4). The highest total government expenditure on social protection (over 23% GDP) was allocated by DK, FI and FR, as opposed to countries with the lowest general government expenditure on social protection, where belong LV and RO with less than 12% GDP followed by BG, LT (12.4% GDP) or EE (12.6% GDP). Consequently, RQ1 has been confirmed, namely that the largest differences in the volume of general government expenditure on social protection exist between Nordic countries (DK, FI) compared to Eastern European countries (BG, RO) and Baltic states (LV, LT, EE).

RQ2 tested whether the dominant share in the structure of general government expenditure on social protection is represented by expenditure on old age, followed by sickness and disability. The results showed that the dominant in the structure of general government expenditure on social protection (COFOG II) in EU member states in the period 2007-2016 as average is the group old age (GF1002) in all EU countries, followed by sickness and disability (GF1001). The share of expenditure on old age and sickness and disability accounts for more than a half of government expenditure on social protection in all countries. Compared to other EU countries, it can be seen,

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however, that DK, FI, SE, LU, FR, AT allocated also a higher share of expenditure as % of GDP on family and children (GF1004) and DK, FI, ES, BE, DE also a higher share of expenditure on unemployment (GF1005). First part of RQ2, whether expenditure on old age constitute the dominant part in the structure of general government expenditure on social protection, has been proven in all 28 EU member states, second part of RQ2, that expenditure on sickness and disability are the second most dominant in the structure of social protection, has been proved partially (in 19 out of 28 EU member states).

3.3 SIMILARITIES AND DIFFERENCES BETWEEN EU MEMBER STATES BY GENERAL GOVERNMENT EXPENDITURE ON SOCIAL PROTECTION USING CLUSTER ANALYSIS

Applying the method of cluster analysis and box-plot, 28 EU member states are analyzed by selected groups of general government expenditure on social protection (sickness and disability, old age and survivors, family and children, unemployment, housing and social exclusion) in period 2007-2016 as average.

The 28 EU member states by the evaluated groups of general government expenditure on social protection is seen in Figure 2. The dendrogram (Figure 2a) shows the results of the cluster analysis, and the box-plot (Figure 2b) presents the division of countries into four clusters by similarity (dissimilarity) of the evaluated groups of government expenditure on social protection.

Figure 2. EU member states by selected groups general government expenditure on social protection as average in 2007-2016

a) Dendrogram   b) Box-plot
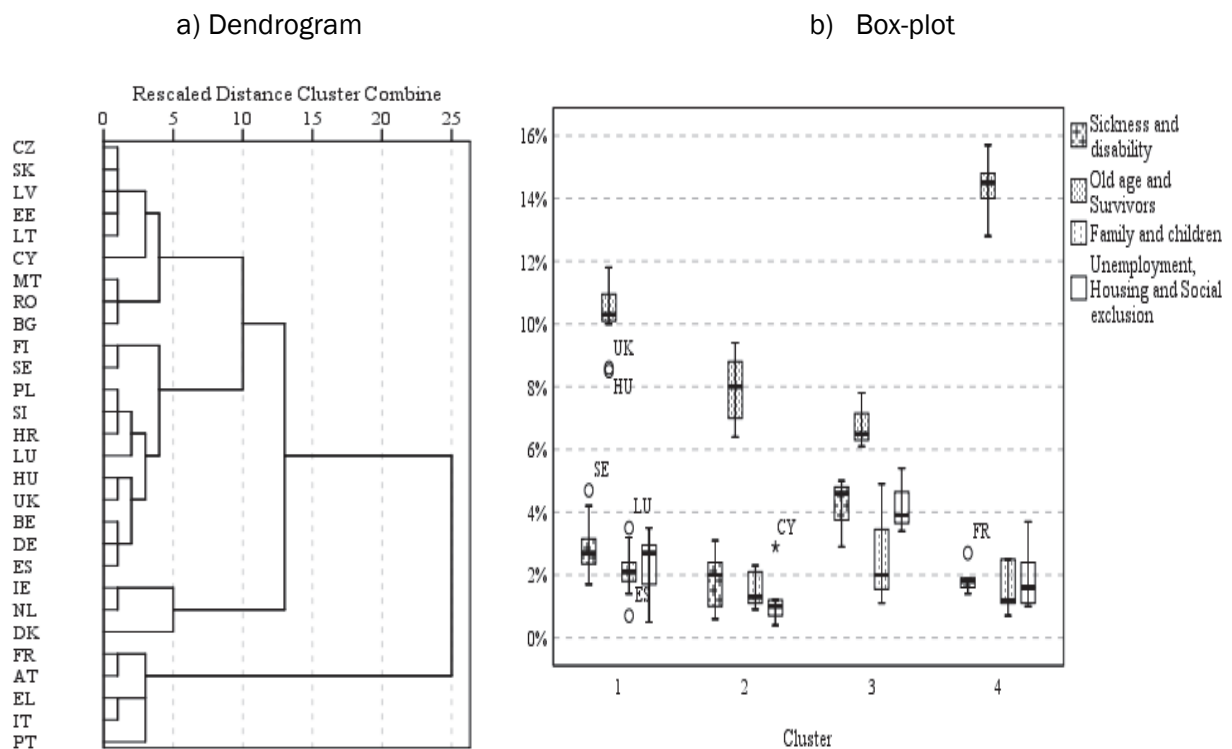
Source: Author

Cluster 1 – comprises eleven countries (BE, DE, ES, HR, LU, HU, PL, SI, FI, SE, UK). Identical internal similarity is seen in the pairs of countries FI and SE, PL and HR, BE and ES, a lower internal similarity is seen between SI and LU, or HU and DE. In the structure of government expenditure on social protection, these countries attach primary importance to expenditure on old age and survivors as % of GDP, with the median 10.30. Among the most significant expenditure in the structure of government expenditure on social protection is expenditure on unemployment, housing and social exclusion (median 2.70). Compared to other clusters in the structure of government expenditure on social protection, these countries also have a higher share of expenditure on family and children (with the median value 2.10 as % GDP). Concerning expenditure on sickness and disability, SE, with 4.7% GDP, represents an outlier of expenditure on old age and survivors (outliers HU, 8.6% GDP and UK 8.5% GDP), and concerning expenditure on family and children, the outliers are ES, 0.7% GDP, and LU, 3.5% GDP.

Cluster 2 – comprises nine countries (BG, CZ, EE, CY, LV, LT, MT, RO, SK). Identical internal similarity is seen between CZ and SK, EE and LT, MT and BG. A lower similarity is seen between LV and CY. These are countries with the lowest volume of general government expenditure. In the structure of government expenditure on social protection, the prominent group is expenditure on old age and survivors as % GDP (median value 8.0), followed by expenditure on sickness and disability (median 2.0 as % GDP). By contrast, the lowest share in the structure of social protection expenditure as % of GDP is expenditure on unemployment, housing and social exclusion (median 1.0), even when compared to other clusters of countries. The largest dispersion is seen in values of expenditure on sickness and disability as % of GDP, from 0.6 in BG, CY through 3.1 in LT, and expenditure on old age and survivors, from 6.4 in CY through 9.4 in MT. As regards the aggregately evaluated expenditure on unemployment, housing and social exclusion, CY represents the outlier, with 2.9% GDP.

Cluster 3 – consists of three countries: DK, IE, NL. A higher internal similarity is seen between IE and NL, lower between IE and DK. In the structure of government expenditure on social protection, expenditure on old age and survivors have a significant share (median 6.50), expenditure on sickness and disability (median 4.60) and expenditure on unemployment, housing and social exclusion as % of GDP. The widest dispersion of values is seen in expenditure on family and children as % of GDP, ranging from 1.1 in NL through 4.9 in DK. Compared to other clusters, countries from the third cluster show the lowest volume of social protection expenditure on old age and survivors as % of GDP, but the highest representation of aggregately evaluated expenditure on unemployment, housing and social exclusion (median value 3.90 as % of GDP).

Cluster 4 – is composed of five countries (EL, FR, IT, AT, PT). Identical internal similarity is seen between FR and AT, EL and PT, lower between FR and PT. These countries show the highest volume of government expenditure on old age and survivors as % of GDP (the median 14.50), along with a low volume of expenditure on family and children as % of GDP (median 1.20) compared to other clusters. The widest dispersion of values is seen in expenditure on old age and survivors as % of GDP, from 12.8 in PT through 15.7 in EL, and expenditure on unemployment, housing and social exclusion as % of GDP, from 1.0 in EL through 3.7 in FR. The outlier regarding expenditure on sickness and disability is FR (2.7% GDP).

Table 5 shows median values of general government expenditure on social protection (COFOG II level) by selected groups in clusters EU member states.
Results of the cluster analysis and box-plot, on dividing the EU member states into four clusters, showed similar features, but also marked differences by groups of general government expenditure on social protection (Figure 2, Table 5). If focusing on the similarities between EU member states in the structure of general government expenditure on social protection by the evaluated groups, the results showed that the largest similarity in the volume of general government expenditure on social protection is seen in countries of the second and fourth cluster in expenditure on sickness and disability (GF 1001), expenditure on family and children (GF 1004) and partially also in terms of aggregately evaluated expenditure on unemployment, social exclusion and housing.

Table 5. Median of groups of general government expenditure on social protection in 2007-2016 as average of EU member states by clusters

Country by cluster	Median /Expenditure on social protection by selected groups (as % of GDP)			
	GF 1001	GF1002 + GF1003	GF1004	GF1005+ GF1006+ GF1007
cluster 1	2.70	10.30	2.10	2.70
cluster 2	2.00	8.00	1.30	1.00
cluster 3	4.60	6.50	2.00	3.90
cluster 4	1.80	14.50	1.20	1.60

Note: GF 1001 Sickness and disability, GF 1002 Old age, GF1003 Survivors, GF 1004 Family and children, GF 1005 Unemployment, GF 1006 Housing, GF 1007 Social exclusion.

Source: Author

RQ3 verified whether the differences in the volume and structure of general government expenditure on social protection in EU member states depend on the character of welfare states and the type of social protection. From results of analysis of general government expenditure on social protection in the EU member states showed the most marked differences in the volume of expenditure on sickness and disability between countries of the third cluster (DK, NL - *Nordic model)* compared to the countries of the fourth cluster (EL, IT, PT - *Mediterranean (Southern European) model*). The most marked differences in the volume of expenditure on old age and survivors were proven between two countries of the second cluster (CY- *Mediterranean (Southern European model), LT - *Central/Eastern European model*), compared to the countries of the fourth cluster (FR, AT - *Continental (Bismarckian) model*). Differences in the volume of aggregately evaluated general expenditure on unemployment, housing and social exclusion show also countries of the second cluster (BG, RO, SK, CZ - representing the *Central/Eastern European model* with the volume of expenditure below 1% GDP) compared to countries of the third cluster (DK, NL representing the *Nordic model*, with the volume of expenditure between 3.9-5.5% GDP). Table 6 captures results of cluster analysis of EU member states by selected groups of general government expenditure on social protection and the placement of EU member states by clusters into social welfare models - Continental (Bismarck), Anglo-Saxon, Nordic, Mediterranean (Southern European), Central/Eastern European. The division of countries by specific features into five European social models was also used in papers (Social Welfare Systems Across Europe (without year); Izquierdo and Gonzalez, 2017; Scaratti et al. 2018).

Table 6. EU Member States by general government expenditure on social protection (results of cluster analysis) and welfare state models

EU Member States by selected groups of general government expenditure on social protection (results of cluster analysis)	EU Member States by results of cluster analysis and by welfare state models (European social models)
First cluster: BE, DE, ES, HR, LU, HU, PL, SI, FI, SE, UK	Nordic model - FI, SE
	Continental (Bismarckian) model – BE, DE, LU
	Central/Eastern European model - HR, SI, HU, PL
	Mediterranean (Southern European model) - ES
	Anglo-Saxon model - UK

Second cluster: BG, CZ, EE, CY, LV, LT, MT, RO, SK	Central/Eastern European model - BG, CZ, EE, LV, LT, RO, SK
	Mediterranean (Southern European) - CY, MT
The third cluster: DK, IE, NL	Nordic model - DK, NL
	Anglo-Saxon model - IE
Fourth cluster: EL, FR, IT, AT, PT	Continental (Bismarckian) model - AT, FR
	Mediterranean (Southern European) model - EL, IT, PT

Source: Author and Social Welfare Systems Across Europe (without year)

The results partially confirmed RQ3. Differences in the volume and structure of general government expenditure on social protection have been confirmed, but they do not represent a particular social model in all EU member states. It can thereby be argued that EU member states can not be clearly placed in a specific social model merely by the volume and structure of allocated public social expenditure. On the other hand, the same share of public social expenditure from GDP can have a different bearing in two different countries (priorities of countries in respective policy areas) and can also be an expression of another institutional structure of a welfare state.

In relation to the results, Sapir (2006) claims the concept of the European social model does not apply everywhere in Europe. Regardless of any differences, the models are designed to protect people against the risks related to unemployment, parental responsibilities, health care, old age, housing and social exclusion. The Members states are responsible for organizing and financing their social protection systems. Also Mossuti and Asero (2012) argue that differences between countries expenditure levels partly reflect diverse levels of wealth, but also diversity in social protection systems, welfare policy, demographic trends, unemployment rates and other social, institutional and economic factors and specificities of each country. The differences that can be observed in these areas across Europe are often significant. By contrast, Buhigas Schubert and Martens (2005) argue that the social and welfare models applied in the European countries also have common characteristics (similarities): emphasis on social protection, ex-post benefits for traditional risks/needs, large role for 'passive' transfers during non-employment (pensions, unemployment, disability, sickness, maternity, family dependents etc.), residual safety nets (against poverty).

CONCLUSION

Economists discuss the limits of the share of public social expenditure from GDP which is still bearable for national economies. The range of public social expenditure from GDP differs across countries depending on the rate of the public sector, range of tax burden and the level of redistribution. Public social expenditure is a sum of structured expenditure, where a marked increase of one item may not necessarily lead to significant changes in social policy.

The article aimed to evaluate the volume and structure of general government expenditure on social protection, accentuating similarities and differences in the selected set of 28 EU member states. The results of the research into EU member states showed similarities and differences in the volume and structure of general government expenditure on social protection. On the basis of the defined research questions, the results confirmed the largest differences in the volume of general government expenditure on social protection between Nordic countries (DK, FI) compared to Eastern European countries (BG, RO) and Baltic states (LV, LT, EE). In terms of the structure of general government expenditure on social protection, the most significant share in all EU member states represent expenditure on old age and in most countries expenditure on sickness and disability. Results of the cluster analysis of EU member states revealed the most marked differences in the volume of government expenditure on old age and survivors between countries of the second

cluster (CY, LT- the lowest expenditure), compared to the countries of the fourth cluster (FR, AT- the highest expenditure), and the largest differences in the volume of government expenditure on sickness and disability between countries of the third cluster (DK, NL – the highest expenditure), compared to the countries of the fourth cluster (EL, IT, PT - the lowest expenditure). Nevertheless, these differences between groups of expenditure on social protection failed to confirm for all EU member states representing the respective welfare state and social model.

Apart from the level and structure of expenditure on social protection, the topic for further research can also be an evaluation of expenditure on social protection with an accent on priorities of selected policies (pension, family, employment and housing policy) or evaluation of general government expenditure on social protection and selected indicators of welfare state (GDP per capita, income inequality, unemployment rate, poverty rate).

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