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EVALUATION STRUCTURE OF LOCAL PUBLIC EXPENDITURES IN THE EUROPEAN UNION COUNTRIES

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Abstract

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The public sector plays a significant role in securing public needs in a number of countries. The paper aims to evaluate the local public sector by the structure of local public expenditures, emphasizing similarities and differences in EU countries. Attention is paid to the evaluation of local public expenditures by eight functions (general public services, public order and safety, economic affairs, housing and community amenities, recreation and culture, social protection, health, education) in years 2005 and 2015. Local public expenditures by function in the EU are evaluated in connection to lower government levels and fiscal decentralization of expenditures. The evaluation shows that no countries demonstrate similarity of local public expenditures by function, which is associated also with an identical size of fiscal decentralization of expenditures and the number of lower government levels. By contrast, both similarities and differences were proved with respect to the evaluated local public expenditures by the application of multidimensional scaling and cluster analysis. The results have shown that Scandinavian countries represent the most marked differences in the structure of local public expenditures, in comparison to Malta and Cyprus in terms of local public expenditures on social protection, health and education.

Keywords: public finance, public expenditure, local public expenditure by function, evaluation, EU countries, multidimensional scaling, cluster analysis

INTRODUCTION

In the majority of advanced countries, competences of expenditures allocated on the procurement of public products and services are delegated to the individual levels of local self-governments. The volume of local budgets therefore grows constantly, which results from increased autonomy and responsibility of local self-governments for the procurement and financing of the public sector in the given area, as well as the growth of the public sector as a whole. The dynamics of public expenditures and the analysis of changes in their structure are measured by indicators which reflect the essential proportions within total public expenditures. For a more exact classification of public expenditures from the functional point of view, the Classification of the functions of the government (COFOG), important for international comparison of policies on expenditures, which helps to overcome organizational and methodological differences, is used. Public expenditures and their evaluation is dealt with in many studies and pieces of research, e.g. Szarowska (2011); Dexia-Cemr (2012); Oplotnik and Finžgar (2013); Connolly and Mason (2016); Rusu (Cigu) and Petrișor (2016); Sacchi and Salotti, 2016); Halaskova and Halaskova, 2017; Kopańska (2017).

The present paper aims to evaluate local public sector by the structure of local public expenditures, emphasizing similarities and differences in EU countries. Quantitative research presumes a selection of selected tools of the public sector and public finances. Attention is paid to the evaluation of local public expenditures by eight functions (general public services, public order and safety, economic affairs, housing and community amenities, recreation and culture, social protection, health, education). Two research questions (RQs) are tested in the light of the given aim: RQ 1: Are there any significant differences in the extent and structure of local public expenditures between EU countries? RQ 2: Are similarities of local public expenditures by function in EU countries associated with the same number of lower levels of government and the rate of fiscal decentralization of expenditures?

Theoretical Background and Literature Review

Theory of fiscal federalism is part of the theory of public finances and functioning of its system (Samuelson, 1954). The analysis and application of theoretical knowledge is mainly thanks to economists from Anglo-Saxon countries Tiebout (1956); Musgrave (1959); Stiglitz (1988); Brown, Jackson (1990); Oates (1999), among others, such as Boadway and Shah (2009); Blöchliger and Vammalle (2012). In recent decades, however, attention has been paid to fiscal federalism also in European countries Frossati and Panella (1999); Vaneecloo *et al.* (2007) or Hinarejos (2013). A transition is taking place in the use of the stabilizing function of public financing at the decentralized level in advanced European countries. The central topic of fiscal federalism is the analysis of financial relations between the central government and lower administrative levels, and in broader context fiscal federalism deals with the use of the functions of public finances by the government levels. The theory of fiscal federalism also analyzes the increase of the efficiency of fiscal decentralization in connection to a more effective use of financial means to provide financing of the public sector. Dexia-Cemr (2012) analyzes closely the sub-national public finance in the European Union, local budgets, investment potential of local governments and the structure of local public revenue and expenditure by function. COFOG classify public services in the form of ten categories that represent functional areas of the government (central and local). The COFOG definition of aggregate public expenditure has only been studied in different contexts, such as those related to efficiency/government size (e.g. Shelton 2007; Ashworth *et al.* 2009). Szarowska (2011) analyzed annual data on government spending in compliance with the COFOG international standard in the Czech Republic and provided a relationship between government spending by function and economic growth.

Local budgets and their structure, matters of fiscal decentralization or controlling and regulatory mechanisms of local self-governments are currently dealt with in many comparative studies and pieces of research. Dafflon (2002) and Zimmermann (2004) deal with local public finance in Europe and current questions of fiscal federalism. The authors solve local public budget, financing of local government investment, balancing the budget and controlling debt and structure of local public expenditure and revenues by economic function in selected EU countries. Sevic (2008) explores the system of financing local governments in selected countries of Central and Eastern Europe. This book encompasses both modern local public finance theory and specific applications structure of local public expenditures and revenues and fiscal decentralization in the target countries. Connolly and Mason (2016) deal with priorities of local public expenditure on various types and levels of public services. They closely investigate causes and factors that influence ideology of local governments related to decision-making in financing of public services. Rusu (Cigu) and Petrișor (2016), address the structure of local public expenditures according to the economic function in EU countries in year 2014. This study analyzes indicators characterising local public expenditures in EU countries with a focus on the comparison of local public expenditures on education and social protection. Other authors solve financing of local government, fiscal autonomy and local budgetary aggregate in the conditions of individual EU countries e.g. Varja (2016) solves the composition of local government expenditures in Sweden and analyze whether there is a possibility of enhancing the average income growth rate at the local level by redistributing expenditures between main functional areas of local governments, while keeping the budget restriction fixed. Kopańska (2017) defines expenditure and revenue decentralization indicators for Polish rural municipalities. She studies, by using statistical analysis in years 2000–2014, if and how these indicators explain local spending policy. Zárska and Rafaj (2017) deal with current questions of financing local self-governments, using the example of Slovak municipalities. They focus on financial indicators, which have an impact on the structure of public budgets and specify differences in expenditures of self-governments.

In relation to local budgets, a number of authors currently address the European and international dimension of fiscal decentralization and its role in procuring public products and services. Sacchi and Salotti (2016) investigate the causes of the decentralization of different categories of public expenditure by function in 19 developed countries over the period 1980–2006. The results confirm findings on the negative link between

regional income disparities and expenditure decentralization. A similarly negative relationship is found for a set of demographic variables, leading to the conclusion that macroeconomic and political factors are responsible for the increase in decentralization. Cassette and Paty (2010) analyze the effect of decentralization in the EU – 15 countries on aggregate, national and subnational government sizes by separating the long-run effects of decentralization from its short-run dynamics. Rodríguez-Pose and Krøijer (2009) summarize arguments in favor of fiscal decentralization, claiming it promotes higher effectiveness, better public service, greater transparency and, eventually, economic growth. It is often argued that decentralization increases economic efficiency because local governments are better positioned than the national government to deliver public services as a result of proximity and informational advantage. Aristovnik (2012) assesses the degree of fiscal decentralization and attempts to provide an overview of the fiscal decentralization process in emerging market economies in Eastern Europe in the last 20 years. He also examines the effects of fiscal decentralization on growth and public sector size in Eastern European countries (EECs). According to other authors e.g. Sow and Razafimahefa (2015) fiscal decentralization thus contributes to an efficient provision of services, mainly because expenditures are more in line with local priorities and preferences, which motivates local governments to improve mobilization of resources, thus a better transparency and responsibility for allocated expenditures.

MATERIALS AND METHODS

The paper makes use of secondary statistical data obtained from Eurostat statistics database (Annual government finance statistics). More specifically, the paper focuses and analyzes local government expenditures by selection function (COFOG), i.e. General public services (GENPUB), public order and safety (PUBOS), economic affairs (ECONAF), housing and community amenities (HOCAM), recreation and culture (RECUL), social protection (SOCPRO), healthcare (HEALTH), education (EDUCAT). The analysis does not include local public expenditures on defense, which are provided centrally in each country, and local public expenditures on environmental protection, which correlate with expenditures on housing and community amenities. The selected set comprises 28 EU countries (Belgium – BE, Bulgaria – BG, 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, Netherlands – NL, Austria – AT, Poland – PL, Portugal – PT, Romania – RO, Slovenia – SI, Slovakia – SK, Finland – FI, Sweden – SE, United Kingdom – UK).

On the basis of specialized literature, content analysis is used in the creation of the theoretical framework of the given issue; the empirical part of the paper uses analytical methods, including multidimensional scaling, comparison, and synthesis and partial induction, in making the conclusions. In evaluating the similarities and differences in the EU (28) and EU countries by local public expenditures by function in years 2005 and 2015, multidimensional scaling was applied. The year 2015 renders the last available data, and 2005 represents the one-year period after ten countries joined the EU. Multidimensional scaling *(MDS)* depicts objects, characterized by multidimensional profiles, in an area (or a multidimensional space), which enables their clear comparison (Hendl, 2012). This method is suitable to compare objects when the basis of the dimensions compared is unknown. The aim of multidimensional scaling is to determine the number of dimensions and the position of an object (object coordinates). The higher the similarity between two objects (in our case EU countries) is, the closer the points representing these are. The output of multidimensional scaling is a scatter diagram (perception map), where individual axes represent basic dimensions, and individual points the objects compared. Numerical outputs form the basis for the construction of the image. Multidimensional scaling has a strong interpretative potential. However, it is also used as the basis for clustering and typology. Multidimensional scaling was used in research e.g. Halaskova and Halaskova (2017a:41) or Machado and Mata (2015). Two factors are decisive in the evaluation of the validity of multidimensional scaling according to Ersoz and Bayrak (2008):

1. s – stress (good – compatibility rate) of the difference between distances calculated through multidimensional scaling and real distances prior to the calculation. The lower the s – stress value, the better the compatibility of the model and data. S – stress value is expressed according to Ersoz and Bayrak (2008: 95) as > 0.20 incompatible presentation; 0.10 <= 0.20 low compatibility; 0.05 <= 0.10 good compatibility; 0.025 <= 0.05 perfect compatibility; 0.00 <= 0.025 full compatibility. Kruskal's stress formula is considered an appropriate index:

$$\text{s-stress} = \sqrt{\frac{\sum_{k=1}^{m}\left(d_{ij} - \hat{d}_{ij}\right)^2}{\sum_{k=1}^{m} d_{ij}^2}} \quad (1)$$

d_{ij} – real distance between two objects; d_{ij} – distance of two objects predicted by the model
m – number of variables.
The individual steps are repeated until the stress reaches a small value (within the interval 0.05–0.10).

2. correlation coefficient squared (RSQ) of input distances of the distances of objects and distances that are calculated and determined based on coordinates of the individual objects in the perception map. RSQ also demonstrates the level of compatibility between data and the model. A valid result is considered the RSQ >= 0.60.

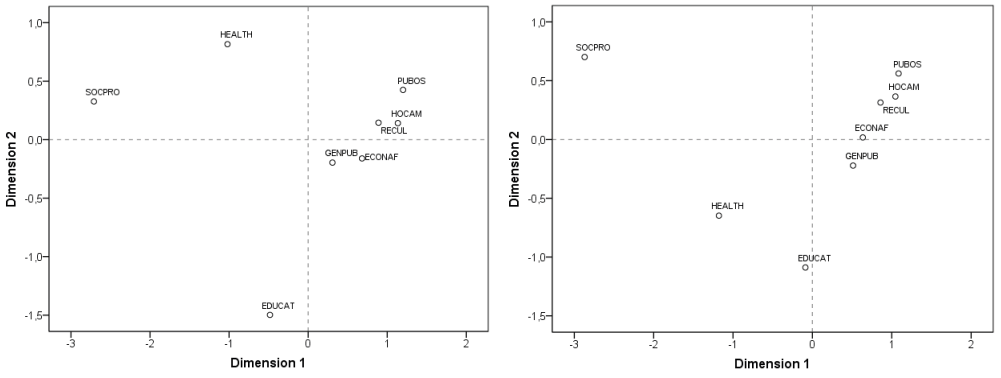
The second method applied to evaluate similarities and differences of EU countries by local public expenditures by function in 2015 is *cluster analysis*. Method of cluster analysis, a multidimensional statistical method used for classification of objects. It sorts units (EU 28 countries without Denmark, in the present example) into groups (clusters) so that units belonging in the same group are more similar then objects from other groups. Denmark was excluded from the cluster analysis and was evaluated separately due to markedly higher expenditures on social protection and health. In the present study, hierarchic clustering was applied, which generates a system of sub-sets: branching, softening of the classification (Everitt, Landau and Leese *et al.*, 2011). *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 (Tukey, 1977). Cluster analysis and box-plot were used in the analysis of the range of public expenditures and the size of public expenditures by function in EU countries in research by e.g. Ferreiro, Garcia-Del-Valle and Gomez *et al.* (2013). The calculations in the following part are the output of the SPSS Statistics 24.0 software.

RESULTS

Evaluation of local public expenditures by function in EU by using multidimensional scaling

This section provides further details regarding the similarity of local public expenditures in EU (28) by function as % GDP (General public services, public order and safety, economic affairs, housing and community amenities, recreation, culture and religion, social protection, health, education) by means of multidimensional scaling in years 2005 a 2015. The Euclidean Distance Model, computed according to distances of local public expenditures in EU countries, is presented below in a two-dimensional form (k = 2). In year 2005 for matrix: Stress 0.08714 and the RSQ = 0.97348. In year 2015 for matrix: Stress = 0.08180 and the RSQ = 0.97992. In 2005 and 2015 the values of the Stress show a good compatibility, but not a complete match of the model with the input data, and RSQ is adequately high.

Results of the similarities (differences) of local public expenditures as % of GDP by function in EU (28) in 2005 and 2015 are depicted in the perception map (Fig. 1). The evaluation in the first dimension shows the highest similarity between the values of public order and safety, recreation and culture; housing and community amenities, confirmed by both the shortest distances in Fig. 1. In the second dimension in 2005 similarity is seen in local expenditures on health, public order and safety, social protection, recreation and culture, housing and community amenities. In 2015, similarity is seen in social protection, public order and safety, housing and community amenities, recreation and culture and economic affairs. By contrast, the most marked differences in 2005 and 2015 in the first dimension is seen in the largest distances (expenditures on social protection against public order and safety),



1: *Perception map of local public expenditures by function for the EU (28)*
Note: GENPUB – General public services, PUBOS – Public order and safety, HOCAM – housing and community amenities, ECONAF – Economic affairs, HEALTH – Healthcare, SOCPRO – Social protection, EDUCAT – Education, RECUL – Recreation and culture
Source: Authors using program SPSS

in the second dimension in 2005 (expenditures on health compared to expenditures on education), and in 2015 (expenditures on social protection against expenditures on education), (Fig. 1).

Evaluation of similarities and differences of EU countries by local public expenditure by function

This section deals with the evaluation of local public expenditures by function in EU countries, applying multidimensional scaling in 2005 and 2015, followed by cluster analysis in 2015.

Similarities and differences of EU countries by local public expenditure by using multidimensional scaling

Next, the EU countries are evaluated by their structure of similarities (differences) of local public expenditures by function in 2005 and 2015. The Euclidean Distance Model, computed on the basis of distances of countries is presented below in a two-dimensional form (k = 2). In 2005, for matrix: Stress 0.10264 shows that low compatibility model with the input data, and the RSQ = 0.98365 is adequately high. For 2015, matrix: Stress = 0.08520 shows a good compatibility, but not a perfect match of the model with the input data, and RSQ = 0.98968 is adequately high. Results of the division of EU countries by local expenditure by function into two dimensions is captured in Tab. I.

The graphic form of the results of similarities/differences of EU countries by local public expenditures in 2005, where a larger dispersion of values is in the first dimension (values –6 to 2) and smaller in the second dimension (values –1 to 2). In 2015 EU countries show a high similarity according local public expenditure by function, which is also supported by shorter distances between countries than in 2005 (Fig. 2 and Tab. I).

I: *I Values in EU countries by local public expenditures in two dimensions*

Country	2005		2015	
	Dimension		Dimension	
	1	2	1	2
Belgium	0.5179	–0.3156	0.4418	–0.3486
Bulgaria	0.5342	0.0296	0.5005	0.0763
Czech Republic	0.4143	–0.1172	0.3521	0.3189
Denmark	–5.5766	–0.9705	–5.7666	–1.0055
Germany	0.1924	–0.5144	0.1467	–0.4472
Estonia	0.3147	0.3795	0.3778	0.2782
Ireland	0.7638	–0.3590	0.6739	–0.4856
Greece	0.8808	–0.3938	0.8290	–0.3510
Spain	0.8171	–0.2800	0.7803	–0.2716
France	0.3134	–0.3828	0.2283	–0.3707
Croatia	–0.1410	0.8649	–0.0138	0.7838
Italy	–0.4335	1.8184	–0.3622	1.5816
Cyprus	1.0792	–0.3405	0.9814	–0.3890
Latvia	0.4678	0.1981	0.3786	0.2444
Lithuania	0.0192	0.3347	0.3253	0.1512
Luxembourg	0.8108	–0.1643	0.7191	–0.3110
Hungary	–0.1562	0.4327	0.5520	–0.1458
Malta	1.1090	–0.4258	0.9911	–0.4377
Netherlands	–0.3102	–0.6457	–0.0718	–0.4706
Austria	0.1601	0.0411	0.1004	0.0305
Poland	–0.1373	0.3407	–0.0045	0.3795
Portugal	0.8214	–0.0358	0.6853	0.0827
Romania	0.5446	–0.2462	0.3569	0.0507
Slovenia	0.3559	0.1648	0.3411	0.1294
Slovakia	0.6303	–0.0699	0.6444	–0.0350
Finland	–1.5410	0.7522	–1.8590	0.9233
Sweden	–2.3259	0.6441	–2.1407	0.7468
United Kingdom	–0.3253	–0.7335	–0.1873	–0.5427

Source: Authors using program SPSS

Division of EU countries by internal similarities of local public expenditures is captured in Tab. II.

Concentrating on clusters by local public expenditures by function, similarity can be observed in both dimensions (Fig. 2) in the countries of the second, fourth, fifth and sixth cluster in 2005, and the second, fourth and fifth cluster in 2015 (see Tab. II and Fig. 2). As regards local public expenditures by function, the shortest distances in dimensions 1 and 2 represent the most similar countries in Fig. 2. The biggest similarity of local public expenditures by function in both 2005 and 2015 was seen in Greece, Spain, Malta and Cyprus (by health and education), another group of the most similar countries comprises Ireland, Luxembourg, Belgium and France (by health and public order safety), and the group of countries (Estonia, Lithuania, Latvia and Slovenia) by public order safety, social protection and education.

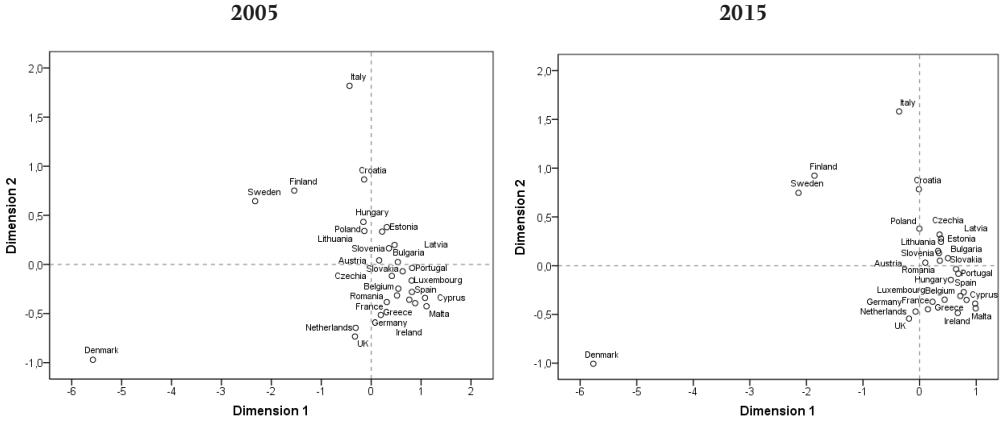
The biggest differences by local public expenditures in the *first dimension* in both 2005 and 2015 was seen in Denmark, compared to Malta and Cyprus. Denmark, in 2005 and 2015, has the highest local expenditures on social protection and health, and a high rate of decentralization of expenditures. By contrast, Malta and Cyprus show no local expenditure on these services and the lowest decentralization of local public budgets.

The biggest differences by local public expenditures in the *second dimension* in both 2005 and 2015 were seen in Italy, compared to Denmark, in local public expenditure on social protection and education, and Italy also compared to the United Kingdom by local public expenditure on health, education and social protection.

Denmark typically demonstrates the highest local public expenditures on social protection (20%), whilst Italy low (0.7%), and compared to other countries, Denmark and Italy show a relatively high local public expenditures on health (DK 8.5%, IT 7%). Other marked differences were found in Italy (the highest local public expenditures on health and low expenditures on social protection and education) in comparison to the United Kingdom (the lowest local public expenditures on health and high local public expenditures on education). These results reflect different trends of local public policy in the individual countries and priorities of local government in financing public needs.

Evaluation of similarities and differences of EU countries by local public expenditures by using cluster analysis

Local public expenditure by function failed to show marked dynamic changes in the individual countries in 2015 compared to 2005. Therefore, local public expenditures by selected function are evaluated by means of hierarchic cluster analysis only in 2015. In this case, the set of EU 28 was selected for evaluation, excluding Denmark. Denmark, due to markedly higher expenditures on social protection and health, was evaluated separately and was not included in the cluster analysis. Results of the cluster analysis by local public expenditures



2: *Perception map of EU countries by local public expenditures by function*
Source: Authors calculation using program SPSS

II: *Division of EU countries by local public expenditures by function in 2005 and 2015 by use of multidimensional scaling*

year	Division of EU countries by local public expenditures by function					
2005	cluster 1	cluster 2	cluster 3	cluster 4	cluster 5	cluster 6
	IT	FI, SE	DK	NL, UK	AT, BG, CZ, DE, EE, HR, HU, LV, LT, PL, SI, SK	BE, CY, EL, ES, FR, IE, LU, MT, PT, RO,
2015	cluster 1	cluster 2	cluster 3	cluster 4		cluster 5
	IT	FI, SE	DK	AT, BG, CZ, EE, HR, HU, LV, LT, PL, RO, SI, SK		BE, DE, CY, EL, ES, FR, IE, LU, MT, NL, PT, UK

Source: Authors

by function enabled the division of EU countries (excluding Denmark) into three clusters according to their internal similarity, seen in Fig. 3.

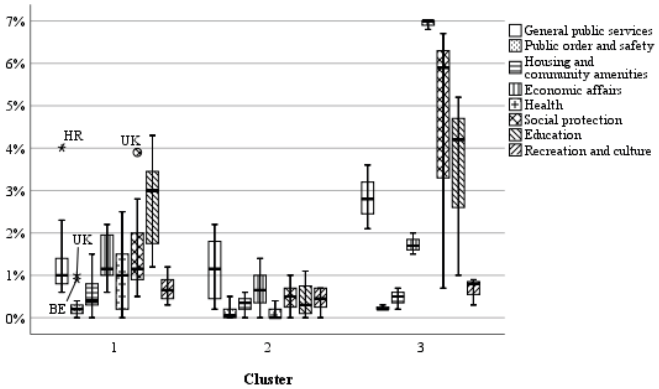
Cluster 1 comprises 16 EU countries evaluated by their local public expenditures. The four most similar countries are BE, DE, FR, AT, other similarities can be observed in a group of ten countries (BG, CZ, EE, HR, LV, LT, PL, RO, SI, SK) and two countries, NL and UK. This cluster of countries shows the lowest expenditures (% GDP) on public order and safety (median of 0.2) and expenditures on housing and community amenities (median of 0.4), but the highest expenditures on education (mean of 3.0 and the dispersion of values from 1.2 for DE to 4.3 for NL). Regarding expenditures on general public services, HR represents an outlier, and in the case of expenditures on social protection – an outlier for UK. Cluster 2 comprises eight countries (IE, EL, ES, CY, LU, HU, MT, PT) which demonstrate a strong similarity and the lowest local public expenditures (% GDP) compared to the other EU countries. Only expenditures on general public services in % of GDP (median of 1.15) reach a higher value compared to the other countries in the first cluster. Cluster 3 is the smallest grouping, consisting of three countries (IT, FI, SE), with the highest similarity between Finland and Sweden. This cluster shows the highest local public expenditures for all evaluated functions (services). Countries in this cluster reach the highest expenditures in % GDP on health (median of 7.0), highest expenditures on social protection (median of 5.9, dispersion from 0.7 in IT to 6.7 in SE) and the highest expenditures on education (median of 4.2 and dispersion of values from 1.0 in IT to 5.2 in SE), compared to the countries in the first and second cluster (Fig. 3).

The analysis of local public expenditures by function in EU countries (Tab. III) shows that the highest similarity is between the countries of the first and second cluster by the expenditures on housing and community amenities, public order and safety, general public services, recreation and culture. By contrast, the biggest differences by expenditures on health, social protection and education are seen between the countries of the second cluster (Cyprus and Malta with zero expenditures) compared to the countries in the third cluster (FI, SE with the highest expenditures).

Denmark, evaluated separately, shows, in terms of the items of local public expenditures by function as % of GDP, the dominance of extremely high local public expenditures on social protection (20%), health (8.5%) and education (3.2%). By contrast, the lowest local public expenditures are seen on public order safety (0.1%) and housing and community amenities (0.1%). As regards the other compared expenditures, Denmark shows a moderately above-average expenditures on economic affairs and recreation and culture, compared to other EU countries, and moderately below-average local public expenditures on general public services.

The evaluation failed to show the existence of the similarity of local public expenditures by function, which is associated also with an identical size of fiscal decentralization of expenditures and the number of lower government levels. However, there is similarity in some EU countries both in local public expenditures by function (as % of GDP) and the rate of fiscal decentralization of expenditures in lower levels of government (Tab. IV). As some authors show, e.g. Oplotnik and Finžgar (2013) EU countries can be divided into countries those with a high level of fiscal decentralization (above 30%), medium level of fiscal decentralization (between 20–30%) and low fiscal decentralization (below 20%). Tab. IV. presents results of fiscal decentralization of expenditures in EU countries in 2015.

Sweden and Finland are the most similar in the structure of local public expenditures by function, two lower levels of government and a high rate of fiscal decentralization of expenditures. Other significant similarities of local public expenditures by function are seen in Cyprus and Malta, which have one lower level of government and the lowest fiscal decentralization of expenditures. Another group of countries is, for example, Belgium, France, Germany, Austria, which follow the continental



3: *Box – plot of clusters of EU countries by local public expenditures by function in 2015 (as % of GDP)*
Source: Authors

model of public administration with three lower levels of government (except Austria, with two levels of government) and all countries demonstrate a relatively low rate of fiscal decentralization of expenditures (except France). Other considerable similarities of the structure of local public expenditure by function, number of lower levels of government and fiscal decentralization of expenditures were found mainly in CZ, RO, LV, the pair of countries of IE and EL and three countries of HU, ES, PT. Or in the case of NL and UK, these are similar in local public expenditures by function, with two lower levels of government, which, however, have a different rate of fiscal decentralization of expenditures.

DISCUSSION

Economic literature has often emphasized that the size of the government sector may have an impact on potential growth, employment and private investments (Pench and Governatori, 2012). Total level of public expenditures as a percentage of GDP is used as the indicator to define the size of the public sector in the EU for the sake of international comparison. However, the sheer size of the public sector is not per se a good indicator, as it may not be indicative of the quality of these expenditures. Indeed on the one hand a part of the literature points to a negative correlation between the size of the government sector and potential growth (e.g. Afonso and Furceri, 2008). However, other studies point to a non-linear or hump-shaped relationship between expenditures and long-term growth as up to a certain point an expansion of the public sector may act as a support to growth by providing the right institutional environment for economic transactions via ensuring the rule–of law, enforcing property rights and providing essential public services (Rodríguez-Pose and Krøijer, 2009; Szarowska, 2011).

For a more exact classification of public expenditures from the functional point of view the Classification of the functions of the government (COFOG) is used, which was used in the present paper. The results confirmed the major differences in the volume of local public sector and in the volume by evaluated local public expenditures by function (as % of GDP) in EU countries (by using multidimensional scaling and cluster analysis) in expenditures on social protection, health and education. Both methods revealed the biggest differences in local public expenditures (as % of GDP) on social protection, health and education in Denmark (and other Scandinavian countries), compared to Malta and Cyprus. Malta and Cyprus are small countries characterized by a high rate of centralization of most services (except, for

III: *Median of local public expenditures by clusters of countries*

Median	Local public expenditures (% GDP)							
	GENPUB	PUBOS	HOCAM	ECONAF	HELTH	SOCPRO	EDUCAT	RECUL
Cluster 1	1.00	0.20	0.40	1.15	1.00	1.15	3.00	0.65
Cluster 2	1.15	0.10	0.35	0.65	0.00	0.50	0.30	0.45
Cluster 3	2.80	0.20	0.50	1.70	7.00	5.90	4.20	0.80

Note: GENPUB – General public services, PUBOS – Public order and safety, HOCAM – housing and community amenities, ECONAF – Economic affairs, HEALTH – Healthcare, SOCPRO – Social protection, EDUCAT – Education, RECUL – Recreation and culture
Source: Authors calculation

IV: *Clusters of countries by the similarity of local public expenditures by function, the number of lower levels of government and fiscal decentralization of expenditures*

cluster 1						cluster 2			cluster 3 + Denmark		
country	NLLG	FD exp. (%)	country	NLLG	FD exp. (%)	country	NLLG	FD exp. (%)	country	NLLG	FD exp. (%)
BE	3	13.4	LT	1	22.5	IE	2	7.6	SE	2	49.6
BG	1	25.5	NL	2	31.8	EL	2	6.5	FI	2	40.4
CZ	2	27	AT	2	16.7	ES	2	13.7	IT	3	28.9
DE	3	17.8	PL	3	30.8	CY	1	4.0	DK	2	63.7
EE	1	23.4	RO	2	27.2	LU	1	10.8			
FR	3	20.1	SI	1	18.6	HU	2	15.5			
HR	2	25.4	SK	2	16.4	MT	1	1.2			
LV	2	24.1	UK	2	24.7	PT	2	12.2			

Note: NLLG – Numbers lower levels government; FD exp. – Fiscal decentralization of expenditures
Source: Authors

example, general public services). In Malta and Cyprus, the structure of local expenditures is related to their small area, comparable to the size of a municipality, where the decentralized form of the procurement of most public services is uneconomical and inefficient for these countries. Denmark is Scandinavian country, have a specific position, represent the North-European system and has the highest local expenditures on social protection and health. The structure of local public expenditures in Scandinavian countries reflects increased autonomy of local budgets, strong fiscal decentralization of expenditures and responsibility of local self–governments in securing the required quality of public services.

Other considerable differences were found in Italy, compared to Denmark, in local public expenditure on social protection and education, and Italy also compared to the United Kingdom by local public expenditure on health, education and social protection.

Differences between countries EU can be explained by different trends in the structure and amount of the local public sector, but also the structure and number of lower levels of governments, the rate of fiscal decentralization of expenditures and spending competences in procuring public services. As stems from the rule of difference of fiscal federalism, fiscal arrangement should respect differences in the preferences of inhabitants and the structure of public services. In connection to the allocation function, the majority of functions should be ensured at the local level in case its effect also has a local nature. Such services should be procured at the local level whose nature is above the local level and during which market takes place, but which are required by the society.

The results confirm the first research question (RQ 1), regarding the existence of any significant differences in the extent and structure of local public expenditures between EU countries. The results proved the existence of considerable differences in the volume of the local public sector by function in EU countries, thus confirming the rule of difference of fiscal federalism. The results confirm the difference of fiscal federalism, and similar results as the present research are confirmed by other pieces of research, e.g. Dexia-Cemr (2012); Oplotnik and Finžgar (2013); Rusu (Cihu) and Petrison (2016); Halásková and Halásková (2017b). Differences in expenditure competences of local public sector in the individual EU countries can be explained by reform tendencies in the structure of local governments, forms of allocated local public expenditures, influenced mainly by economic, political and demographic factors, the forms of financing of local self-governments or by increasing the efficiency of local public sector in the case of the provision of some public services.

The second research question (RQ2), whether similarities in local public expenditure by function in EU countries are connected with identical number of lower levels of government and the extent of fiscal decentralization of expenditures, was confirmed only partially (Table IV). The study is also supported by the research carried out by Oplonik and Finžgar (2013), who evaluate local public expenditures by function in 27 EU countries, indicators of fiscal decentralization and mutual relation between fiscal decentralization of expenditures and the number of lower levels of government. Their the results of the analysis have shown that there are significant differences between EU–27 countries, both in terms of the number of lower levels of government as in terms of the fiscal power and autonomy of financing. The countries compared thus have from one (municipalities) and all the way up to three levels of local self–government (municipalities, provinces, regions and federal states, etc.). The scope of funds they allocate to local issues is also significantly different from country to country. As Aristovnik argues (2012), few empirical surveys have measured the impact of fiscal decentralization on the size of the public sector in EECs. Whether fiscal decentralization leads to a reduction or an increase in the size of the public sector is a well–researched question within the field of fiscal federalism. On one hand, Oates (1999) and Rodden (2003) find that decentralization generally has a negative impact on the growth of governments. For instance, Ebel and Yilmaz (2002) find that subnational tax autonomy has a negative and significant impact on public sector size in ten transition countries for the 1997–1999 period. On the other hand, e.g. Jin and Zou (2002) conclude that fiscal decentralization leads to an expansion of the public sector and that fiscal autonomy leads to 'smaller states' while grants have a positive impact on public sector size. Cassette and Paty (2010) show that in the long run, tax autonomy reduces central expenditure but increases and to a greater extent size of public sector (sub–national public expenditure as % of GDP), leading to higher aggregate public expenditure. Authors also show that vertical imbalances tend to increase the sizes of public sector (sub–national, national and aggregate governments).

The similarity of the structure of local budgets is also affected by demographic or political factors and economic situation in general. The structure and volume of expenditures of local budgets is also determined by the type and nature of public services. The similarity of the structure of local expenditures in some groups of countries can be explained through idential priorities of local public policies, but also the extent of competences of local public sector.

CONCLUSION

The paper aimed to evaluate local public sector by the structure of local public expenditures, emphasizing similarities and differences in EU countries. The structure of similarities and differences in local public expenditures was evaluated by means of two methods of multidimensional analysis. The results of multidimensional scaling in the EU (28) in the given years, 2005 and 2015, showed similarities in the structure of local public expenditures mainly in expenditures on public order and safety, housing and community amenities, recreation and culture. By contrast, the most marked differences were observed in local public expenditures on social protection, health and education. The results achieved by means of multidimensional scaling between EU countries in 2005 and 2015 showed the biggest similarity in the structure of local public expenditures mainly in the countries of South Europe by expenditures on health and education; another group of similar countries is represented by selected countries of continental Europe by local public expenditures on health and public order and safety and Baltic states and Slovenia by expenditures on public order safety, social protection, education. Conversely, the most marked differences in the structure of local public expenditures in years 2005 and 2015 was seen in Denmark (with the highest local expenditures on social protection and health, and a high rate of decentralization of expenditures), in comparison to Malta and Cyprus (no local expenditures on these service and the lowest decentralization of local public budgets). Other differences were observed in Denmark (the highest expenditures on social protection) compared to Italy (no local expenditures on social protection). Cluster analysis for 2015 between EU countries also confirmed similarities and differences in the structure of local public expenditures. The biggest similarities were found in the countries of the first and second cluster by expenditures on housing and community amenities, public order and safety, general public services, recreation and culture. The results demonstrate that there are considerable difference in the scale of the individual lower levels of governments and their preferences, how they allocate public expenditures, which is also confirmed by the differences in the rate of fiscal decentralization of expenditures. In all countries similar in terms of the local public expenditures by function, no similarities were confirmed in the number of lower levels of government nor the rate of fiscal decentralization of expenditures.

Evaluation of the structure of local public expenditures in the European or international context represents an wide area for further research. The topic for further research can be not only an in–depth analysis over a longer period, but also an evaluation of sub–categories of local public expenditures by function in EU countries or the correlation between the size of the public sector and other indicators for the evaluation and measurement of the quality and efficiency of the public sector.

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