

## COMPARISON OF HOUSEHOLDS' EXPENDITURES STRUCTURES IN SELECTED COUNTRIES OF EUROPEAN UNION

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**Abstract.** The article discusses the problem of similarities and differences of countries with respect to the structure of household expenditure in the European Union. This issue is important due to problem of economic and social and cohesion among member states. Comparative analysis of structures of consumption expenditures of households in EU member countries is performed using distance measure approach taking into account relative differences. For this purpose measure known in Polish language literature as Nowak's measure is applied. Background for analysis is data collected from national sources by the Statistical Office of the European Communities (Eurostat). Using quantitative analysis countries with similar to Poland structures of consumer expenditures are identified.

**Key words:** structure comparison, household expenditures, similarities between countries

### INTRODUCTION

Household expenditures result from budget limitations on one hand and choices based on preferences on the other. They reflect economic and social inequalities as well as cultural differences and social distinctions. According to many economists, consumption expenditures better reflect expected lifetime resources than incomes [Slesnick 2000, Atkinson et al. 2005]. Studying their patterns, similarities and differentiation may provide insights into the standard of living.

Researches on household expenditures have long tradition in economics [Stigler 1954]. They were initiated over 100 years ago by Ernst Engel and others. In recent years these questions have attracted relatively little attention. Therefore this study tries to fill the gap in this field. The major objective of the analysis is to identify European Union countries most similar to Poland with respect to household expenditure structure. This

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issue is important due to promotion by EU economic and social and cohesion among member states. In this regard, the method of distances of structures is applied. This study is based on data from Eurostat.

## DATA

Background for evaluations of households' expenditure structures is data collected from national sources by the Statistical Office of the European Communities (Eurostat). Household consumption expenditure can be classified by consumption purpose according to the COICOP classification (Classification Of Individual CONsumption by Purpose<sup>1</sup>). COICOP categories are the following consumption areas:

- 1) food and non-alcoholic beverages,
- 2) alcoholic beverages, tobacco and narcotics,
- 3) clothing and footwear,
- 4) housing, water, electricity, gas and other fuels,
- 5) furnishings, household equipment and routine household maintenance,
- 6) health,
- 7) transport<sup>2</sup>,
- 8) communication<sup>3</sup>,
- 9) recreation and culture,
- 10) education,
- 11) restaurants and hotels,
- 12) miscellaneous goods and services.

Annual information on average household expenditures structures<sup>4</sup> is drawn from Eurostat (the statistical office of the European Union). The analysis includes only those countries for which data are available. The most recent data from 2011 are used. For that year Eurostat did not publish data concerning such countries as Bulgaria, Lithuania, Romania, Spain, thus comparison of households' expenditures structures involved only 23 EU countries<sup>5</sup>.

## METHOD OF MEASUREMENT

For comparisons of two different structures many approaches can be applied. For this purpose, i.a. cluster analysis [Badach 2012, Stejskal and Stávková 2012], radar method

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<sup>1</sup> The classification of individual consumption by purpose, abbreviated as COICOP, is a nomenclature developed by the United Nations Statistics.

<sup>2</sup> This item includes purchase of new and second hand motor cars, motor cycles, bicycles, animal drawn vehicles, operation of personal transport equipment, transport services, others.

<sup>3</sup> This indicator consists of postal services, telecommunications equipment, telecommunications services, Internet connection services, telephone installation, other services.

<sup>4</sup> The 12 categories of household consumption expenditure are measured by percentage of total household expenditure.

<sup>5</sup> We realize that the lack of these countries may affect the final results, but changes in the last years are so significant that we decided not to replace missing values by those from previous years.

and GCCA – grade correspondence cluster analysis [Binderman, Borkowski and Szczesny 2010] are used. Polish language literature is dominated by applications of simple measures<sup>6</sup> presented in monographs such as [Nowak 1990, Kukuła 1996, Panek 2009]. Some of these measures indicate the level of the absolute differences between the analyzed structures, while others are based on relative differences.

The following formula is example of the first group of measures:

$$d_{ij}^A = 1 - \sum_{k=1}^m \min \{ p_{ik}, p_{jk} \} \tag{1}$$

The formula below is example of the second group of measures:

$$d_{ij}^R = 1 - \frac{1}{m} \sum_{k=1}^m \frac{\min \{ p_{ik}, p_{jk} \}}{\max \{ p_{ik}, p_{jk} \}}, \text{ wherein } p_{ik} \neq 0 \text{ or } p_{jk} \neq 0 \tag{2}$$

where:  $d_{ij}$  – distance between  $i$ -th and  $j$ -th objects;  
 $m$  – the number of the structure component;  
 $p_{ik}, p_{jk}$  – share of  $k$ -th component in the structure of  $i$ -th and  $j$ -th object,  
 $\max \{ p_{ik}, p_{jk} \} \in (0, 1)$ .

Above examples are both measures of distances of structures. From the mathematical point of view, distance is defined as a quantitative degree of how far apart two objects are. Values of distances are included in the range of [0.1]. If both structures are completely different, then  $d_{ij} = 1$ , and if they are identical, then  $d_{ij} = 0$ .

Many distance measures have counterparts in similarity indices [Kompa and Witkowska 2009, Kukuła 2010]. Distances (1) and (2) can be converted into similarity indices respectively:

$$s_{ij}^A = \sum_{k=1}^m \min \{ p_{ik}, p_{jk} \} \tag{3}$$

$$s_{ij}^R = \frac{1}{m} \sum_{k=1}^m \frac{\min \{ p_{ik}, p_{jk} \}}{\max \{ p_{ik}, p_{jk} \}}, \text{ wherein } p_{ik} \neq 0 \text{ or } p_{jk} \neq 0 \tag{4}$$

Greater value of  $s_{ij}$  between pair of objects denotes greater degree of their similarity (proximity).

Among Polish scientists measure (1) is called Chomątowski's and Sokołowski's measure [Panek 2009]<sup>7</sup> and measure (2) is named Nowak's measure [Błaczkowska and Grześkowiak 2009, Panek 2009]<sup>8</sup>. It should be noted, however, that both indices are known for many decades in the English language literature. Measure (3) analyzed in many research, e.g. of Johnston [1976], Wolda [1981], Pontasch, Smith and Cairus [1989], was introduced by Renkonen [1938]. Similarity coefficient (4) considered among

<sup>6</sup> See for example Bożek [2010].

<sup>7</sup> The study [Panek 2009] refers to article of Chomątowski and Sokołowski [1978].

<sup>8</sup> These papers refer to Nowak [1990] and Nowak [1981] respectively.

others in studies of Johnson [1976] and Pontasch, Smith and Cairns [1989] was probably first proposed by Pinkham and Pearson [1976].

It seems that for the international comparison of household expenditure structures one can use measures that are based on the relative differences. In order to explain this, consider two groups or expenditures: one representing a large share of total households' expenditures (i.e. expenditure on food) and the second – small share (i.e. expenditure on communication). Indeed difference of one percentage point in the first case is not as significant as in the second one.

In this study two distances corresponding to each other – absolute and the relative one are used. In the context of analyzed data symbols in formulas (1) and (2) have following meanings:  $p_{ik}$  – share of  $k$ -th group of consumption expenditure in  $i$ -th country,  $i = 1, 2, \dots, n$ ,  $k = 1, 2, \dots, m$ ;  $p_{jk}$  – share of  $k$ -th group of consumption expenditure in  $j$ -th country,  $j = 1, 2, \dots, n$ ,  $k = 1, 2, \dots, m$ ;  $n = 23$  – the number of investigated countries;  $m = 12$  – the number of group of expenditures according to the COICOP classification.

In order to establish discrepancies between Poland and other EU countries measure (2) was applied. In addition distances were measured between structures of countries which joined the EU in 2004 and average structure of pre-2004 member states.

## RESULTS AND DISCUSSION

Analysis of data for the EU-27 in 2011 shows that the most important item on the household budget was housing, water, electricity, gas and other fuels. The next largest items were everyday expenditures, namely food and non-alcoholic beverages and transport. This is illustrated in Figure 1.

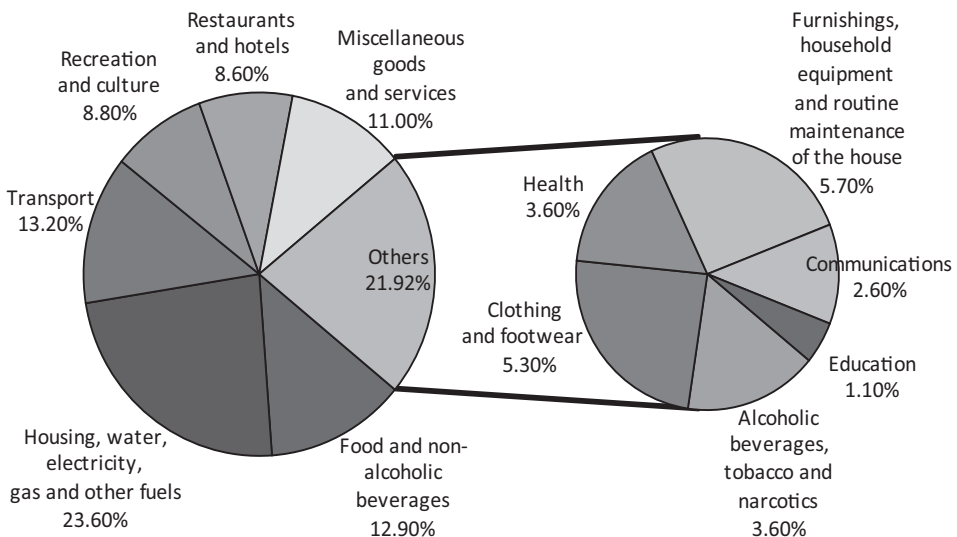


Fig. 1. Breakdown of household consumption expenditure of EU-27 (2011)  
Source: Own elaboration based on Eurostat data.

The proportion of household expenditure devoted to each of the consumption categories varied greatly between member states. For example the highest proportion of total expenditure on housing, water, electricity, gas and other fuels in 2011 was recorded in Denmark (29.1%), which was 2.4 times as high as in Malta (12.2%). The shares of next important item, relating to food and non-alcoholic beverages, ranged from below 10% in Luxembourg, Austria and the United Kingdom to about 20% in the Baltic States. It should also be mentioned that in countries, such as Austria and the United Kingdom, proportions of expenditure on recreation and culture were higher than spending on food and non-alcoholic beverages. Significant differentiation concerns shares of household expenditure devoted to education, alcoholic beverages, tobacco and narcotics, restaurants and hotels. Values of coefficient of variation for above items exceed 40%. For instance, the highest proportion of expenditures on restaurants and hotels was recorded in Cyprus (15.3%) and the smallest – in Poland (2.8%).

In the study the average expenditure structure of households in pre-2004 member states was compared with structures in countries which joined the EU in 2004. Table 1 shows distances calculated using formula (2). The values in first column and first row are shown in ascending order. They indicate the distance from average structure of EU-15 countries.

Table 1. Values of distance measure (2) for new EU members and EU-15<sup>a</sup> average

$d_{ij}^R$	EU-15	SI	MT	CY	SK	HU	PL	CZ	LV	EE
EU-15	0	0.110	0.128	0.205	0.209	0.210	0.219	0.239	0.241	0.242
SI	0.110	0	0.160	0.201	0.146	0.136	0.177	0.198	0.175	0.197
MT	0.128	0.160	0	0.184	0.186	0.191	0.211	0.252	0.257	0.279
CY	0.205	0.201	0.184	0	0.248	0.239	0.245	0.290	0.202	0.249
SK	0.209	0.146	0.186	0.248	0	0.139	0.165	0.220	0.193	0.279
HU	0.210	0.136	0.191	0.239	0.139	0	0.165	0.191	0.156	0.208
PL	0.219	0.177	0.211	0.245	0.165	0.165	0	0.245	0.188	0.263
CZ	0.239	0.198	0.252	0.290	0.220	0.191	0.245	0	0.268	0.156
LV	0.241	0.175	0.257	0.202	0.193	0.156	0.188	0.268	0	0.186
EE	0.242	0.197	0.279	0.249	0.279	0.208	0.263	0.156	0.186	0

<sup>a</sup>CY denotes Cyprus, CZ – Czech Republic, EE – Estonia, HU – Hungary, LV – Latvia, MT – Malta, PL – Poland, SK – Slovakia, SI – Slovenia.

Source: Authors' computation based on Eurostat data.

The results presented in Table 1 show that in 2011 Slovenia and Malta were the most similar, while Estonia with Latvia – the most distant to the EU-15 consumption expenditure structure. Situation of Polish and Czech households was also different than in the countries that formed EU before 2004. Estonia, Latvia and Poland differed in relation to the EU-15 mainly due to high shares of expenditures on food, non-alcoholic and alcoholic beverages, tobacco and narcotics and low share of furnishings, household equipment and

routine maintenance of the house, recreation and culture. There were other causes of dissimilarity in Czech Republic, where the proportion of household expenditure devoted to food and non-alcoholic beverages only slightly exceeded average one in EU-15, but shares of recreation and culture, housing, water, electricity, gas and other fuels were higher than in the average one.

In the next step of the analysis, distances for all considered member states were calculated. Matrix of distances is presented graphically in Figure 2: white colour denotes values under 0.17, light gray – 0.17–0.24, dark grey – 0.24–0.31, black – above 0.31. The lighter colour in Figure 2 indicates greater similarity of structures in the analyzed countries.

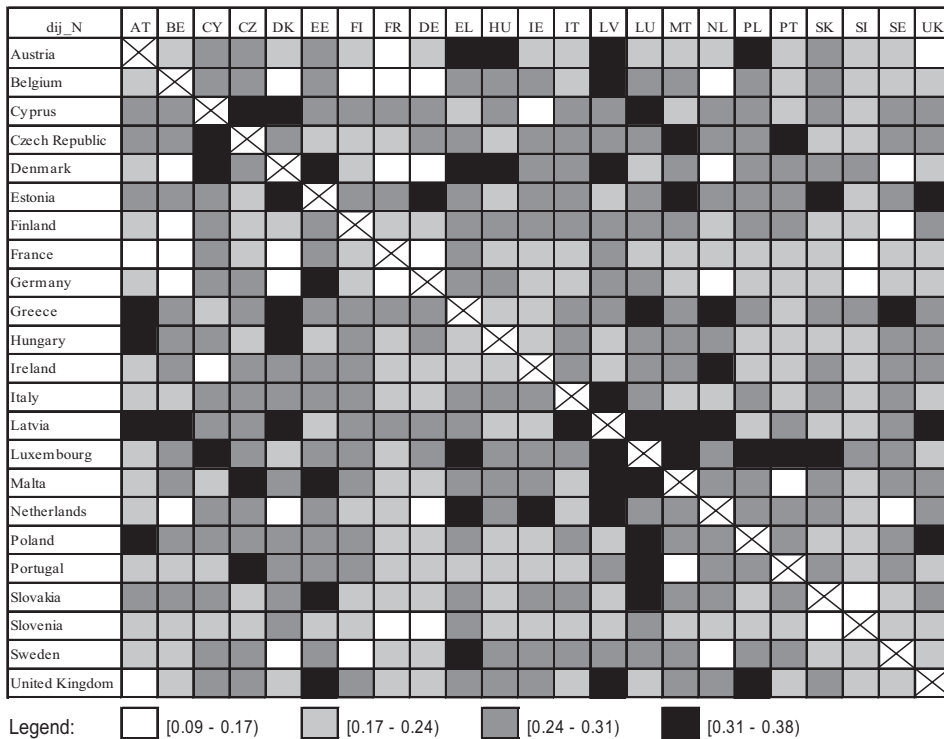


Fig. 2. Matrix of distances between EU member states  
Source: Authors' elaboration based on Eurostat data.

There were found some “anomalies” which offer additional potential for analysis and research. For example Estonia for which the country with the most similar household expenditure structure proved to be the Czech Republic. Both countries displayed similar, highest in EU, proportion of total expenditure on alcoholic beverages, tobacco and narcotics (above 9%). Moreover shares of health, communications, education, restaurants and hotels were almost identical in Estonia and the Czech Republic. South European countries including Cyprus, Greece, Portugal and Malta which displayed similar share of

transport and communication in consumer expenditures bear in this category surprisingly close comparison to Ireland.

The main objective of this study is to determine the countries that are most similar to Poland with respect to household expenditure structure. Therefore, based on the formula (2), calculated distances between Poland and other EU member states are shown on the map presented in Figure 3<sup>9</sup>.

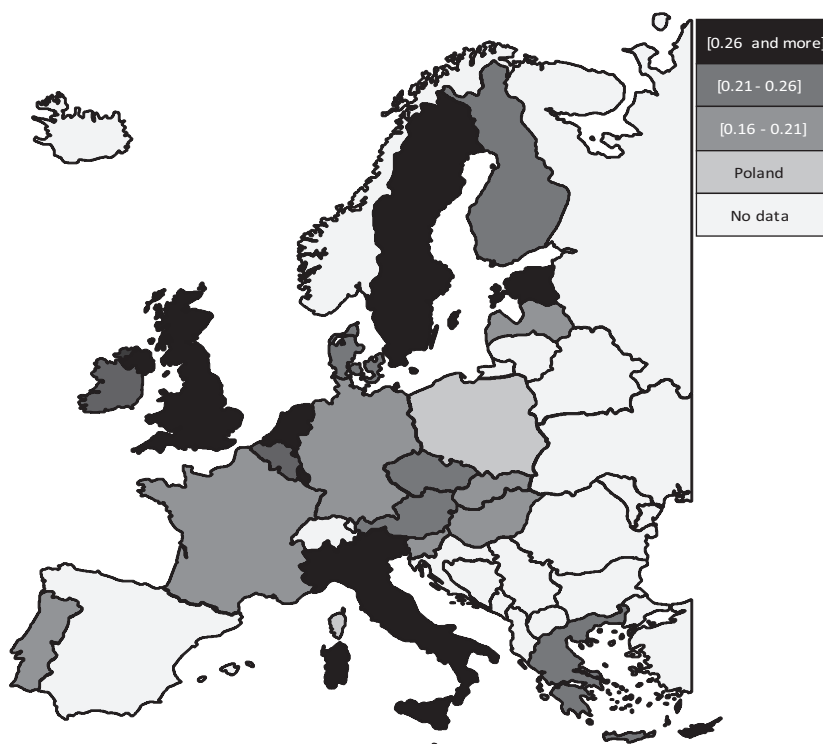


Fig. 3. Map of distances between Poland and other UE member states  
Source: Authors' elaboration based on Eurostat data.

The information provided on the Figure 3 show that most similar to Poland were Hungary and Slovakia. In all these countries proportion of household expenditure for food, non-alcoholic and alcoholic beverages, tobacco and narcotics exceeded the average level in the European Union. The same applies to such COICOP classification items as communication, health and education. Relatively lower than in most member states were expenditures on clothing, footwear, restaurants and hotels. The remaining shares of expenditures in these three countries oscillated around the average one in EU.

<sup>9</sup> Light gray colour concerns countries not included in the research (i.e. Bulgaria, Lithuania, Romania, Spain) and non-EU countries.

The most distant countries in relation to Poland were found to be Austria followed by Luxembourg, United Kingdom, Italy and the Netherlands. The proportion of total expenditure on food and non-alcoholic beverages in Poland was about twice higher than in Austria, Luxembourg and United Kingdom. Moreover shares of expenditures on health, communications, miscellaneous goods and services in Poland exceeded those ones in Austria, Luxembourg and United Kingdom. Proportions of total expenditure on housing, water, electricity, gas and other fuels were very close in those four countries, but Polish households spent relatively less on clothing, footwear, transport, restaurants and hotels than Austrian, British and Luxembourgian. Graphical comparison of household's expenditure structures in Austrian and Polish households are presented in Figure 4.

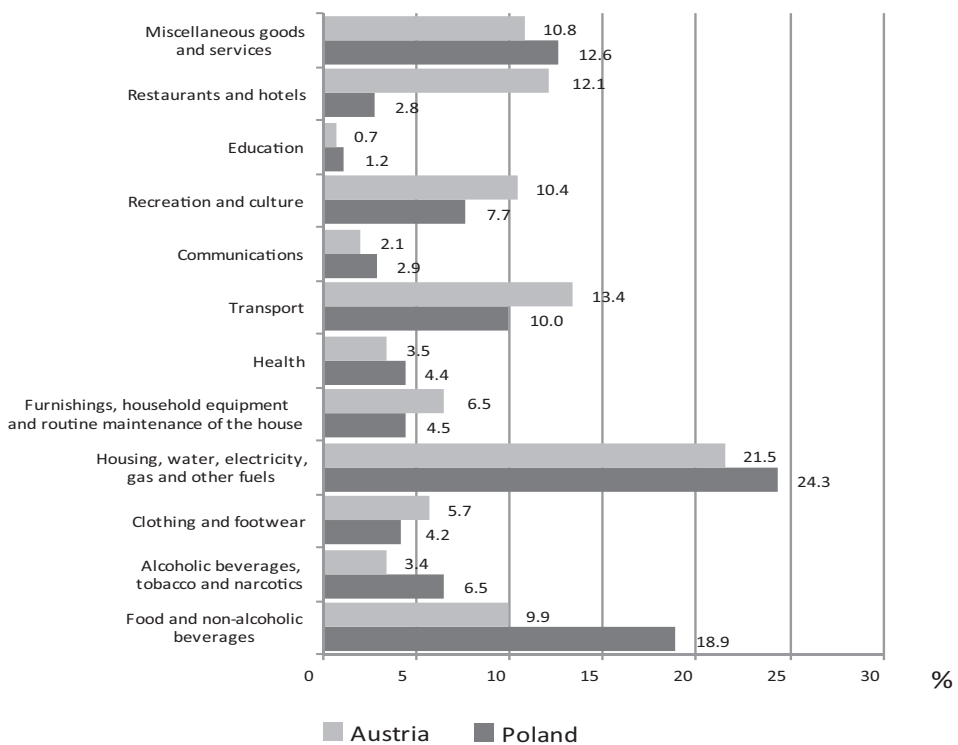


Fig. 4. Structures of expenditures in Austria and Poland

Source: Authors' elaboration based on Eurostat data.

It will be safe to state that certain values shown in Figure 4 can result from various level of income being at disposal of households in analyzed countries. Studies presented by Bartošová and Bína [2011], Utzig [2011], Dudek, Koszela and Landmesser [2012] indicate existing correlation between level of household income and the structure of expenditures. The results of studies conducted by Podolec, Woźniak and Zajac [2003] also indicate that demographical composition of household affect the distribution of spendings. Finally, the prices of goods and services also play important role in shaping the structure of household spendings [Dudek 2011].



## SUMMARY AND CONCLUSIONS

The largest part of household expenditures in most EU countries was distributed for housing, water, electricity, gas and other fuels. Budgets in new members states were also heavily burdened by expenditures on food and non-alcoholic beverages.

The proportion of household expenditure devoted to each of the consumption categories varied greatly between member states. To express the degree of dissimilarity of consumer baskets, the authors have used the distance indices, for which a value closer to zero indicates higher similarity of household expenditure structure.

It was found that among new UE members states Slovenia with Malta were the most similar and Estonia with Latvia were the most distant from the EU-15 consumption expenditure structure. Generally, shares of household expenditure devoted to alcoholic beverages, tobacco and narcotics in post-communist countries were higher than in most old UE members states, whereas Eastern and Central European households did not spend as much on restaurants and hotels as EU-15 average.

The most similar consumer basket structure to Poland was recorded in Hungary and Slovakia followed by the Slovenia and Latvia. A higher share of food, non-alcoholic and alcoholic beverages, tobacco, narcotics, communication, health and education in the consumer basket as compared to the European average is a common feature of these countries. The most differing consumer structures compared to that of Poland were Austria, Luxembourg and United Kingdom. Conducted studies did not allow authors of this article to arrive upon conclusion that structure of household expenditures reflects division for new and old member states of the European Union. Characteristic of households' spendings in Poland bear closer similarity to spendings in Germany, Ireland and France rather than those in Cyprus, Estonia and Czech Republic. It requires further analysis to establish the causes of diversification of households' expenditures structures. Also dynamic analysis of households' spendings makes another interesting issue for further studies.

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## **PORÓWNANIE STRUKTURY WYDATKÓW GOSPODARSTW DOMOWYCH W WYBRANYCH KRAJACH UNII EUROPEJSKIEJ**

**Streszczenie.** W artykule podjęto problem podobieństw i różnic w zakresie struktur wydatków gospodarstw domowych w krajach Unii Europejskiej. Problem ten jest ważny w kontekście wyrównywania poziomu życia krajów członkowskich, co stanowi jeden z elementów realizacji polityki spójności społecznej i ekonomicznej UE. Stwierdzono, że do porównań międzynarodowych powinno wykorzystywać się miary wskazujące na poziom względnych różnic między strukturami. Z tego powodu analizę przeprowadzono na podstawie jednej z tego typu miar, znanej w polskojęzycznej literaturze przedmiotu jako miara Nowaka. Stwierdzono, że do krajów o podobnych do Polski strukturach wydatków konsumpcyjnych należy zaliczyć Węgry i Słowację. Najbardziej odmienne w stosunku do polskich gospodarstw domowych okazały się być zachowania konsumpcyjne w Austrii, Luksemburgu i Wielkiej Brytanii.

**Słowa kluczowe:** porównanie struktur, wydatki gospodarstw domowych, podobieństwa między krajami

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