# Changes of the Consumption Structure in European Countries Considering Its Modernization Process

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#### Abstract

The aim of the article is to assess the diversity and changes in the structure of household consumption of European countries, with particular emphasis on the division into consumption of necessity goods and luxury goods in the years 1995-2015. The progressive process of modernizing consumption in Europe causes a change in the consumption pattern. According to this process, the consumption of luxury goods plays a more and more significant role in the consumption structure. The conducted study is the basis for checking whether this process is reflected in all European countries. In particular, this analysis is to check whether and to what extent there was an increase in the share of consumption of luxury goods in total consumption in each of the countries in the analyzed period. The analysis of the diversification of the consumption structure in the countries in the entire period is carried out using the cluster analysis method that allows the identification of territorial units with similar characteristics in this matter. The study is supplemented with the analysis of the consumption structure in the consumption structure in the European countries over the period 1995-2015, with the particular emphasis on the location factor.

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### 1 Introduction

Consumption is a very important element of generating GDP in every country. It is determined by economic, demographic, cultural or biological factors. However, the most important consumption factor is the disposable income of households. Based on this income, households decide what goods and what quantities they are able to acquire. Richer households can afford to buy more luxury goods than poorer households. This affects the structure of consumption in a country. Increasing the share of expenditures on the consumption of luxury goods is defined in the literature as modernization of consumption.

The economies of European countries have been converging for a long time (Carnicky et al., 2016; Corrado et al., 2005; Dall'Erba and Le Gallo, 2008; López-Bazo et al., 1999; Quah, 1996; von Lyncker and Thoennessen, 2017). The progressing process of economic convergence in the European Union (EU) countries seems to be the reason for the leveling off of consumption and assimilating to its structure. The consumption structure points towards a pattern in which the share of consumption of luxury goods in total consumption increases.

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This means that poorer countries should strive to achieve a consumption structure that characterizes wealthier countries.

In the current research, the issues of diversification of consumption structure (Kuśmierczyk and Piskiewicz, 2012; Grzega, 2015) and modernization of consumption (Kusińska, 2009) in the European countries have already been discussed. There were also many studies conducted on the expenditure of the inhabitants of European countries on various categories of goods (Berbeka, 2014; Hoszman, 2013; Piekut, 2014). The convergence process of consumption patterns in Europe was also analyzed (Nowak and Kochkova, 2011).

The main objective of this study is to assess the variation and changes in the structure of household consumption in EU countries (excluding Croatia) in the years 1995-2015. An additional aspect raised in the study is the assimilation of the consumption structure on the European continent. Previous studies show structure of the consumption in European countries from 2004 to 2012. Moreover convergence of the consumption was analyzed only to 2007. In this paper time range in both investigations is expanded to 2015. Moreover another method to choose number of clusters is used. This study is the preview to the wider look at the consumption problem in Europea.

#### 2 Subject and range of the study

The study focuses on the consumption structure in the European countries in the years 1995-2015. The consumption of groups of goods in total consumption was analyzed according to the Classification of Individual Consumption According to Purpose (COICOP). According to the above classification, consumer goods are divided into the following groups: food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics; clothing and footwear; housing, water, electricity, gas and other fuels; furnishing, household equipment and routine household maintenance; health; transport; communication; recreation and culture; education; restaurants and hotels; miscellaneous goods and services. In the case of longer group names, only the first word describing a given group of consumer goods was used in the study.

In order to examine the similarity of the consumption structure between countries, methods of cluster analysis were used. The agglomeration method of hierarchical clustering was used - the Ward's method using the Euclidean distance as a measure of similarity of objects. The objects were divided into three groups with similar properties regarding the consumption structure. Then, the consumption structure was modeled using the  $\beta$  convergence model in the classical approach.

The study verifies the hypothesis of a modern consumption structure in the countries of Western and Northern Europe as well as the hypothesis about the blurring of differences in the consumption structure between the EU countries.

### 3 Data

The data applied in this study come from the European Statistical Office database. Variables regarding the consumption of individual categories of goods were taken directly from the database. The values of disposable income per capita were calculated – the values of disposable income in each countries were divided by the number of population.

Fig. 1 shows the development of disposable income per capita value in the EU countries (except for Croatia) in 2000, 2005, 2010 and 2015 respectively. The highest values of that variable were observed in the countries of Western and Northern Europe. In contrast, disposable income per capita in the Central-Eastern part of the continent was below the median. This trend has continued throughout the considered period. This means that the inhabitants of Northern and Western Europe have the opportunity to consume not only goods that allow them to meet basic needs but also they can consume more luxury goods than the others in Europe.



**Fig. 1.** Spatial distribution of disposable income per capita in Europe in 2000 (a), 2005 (b), 2010 (c) and 2015 (d).

Fig. 2 shows the average share of individual groups of consumer goods in the countries belonging to the EU-27 group in the analyzed period. The highest share of consumption was noted in goods related to housing, water, electricity, gas and other fuels has been recorded (more than 20% in each year of the study). The share of consumption between 10 and 15 percent was the consumption of goods related to food and non-alcoholic beverages, recreation and culture, transport and miscellaneous goods and services. The consumption of other groups of goods accounted for less than 10% of total consumption. The largest fluctuations in the consumption structure were noted in the consumption of non-alcoholic beverages.



Fig. 2. Average share of consumption of particular groups of goods in total consumption.



Fig. 3. The structure of consumption in Europe in selected years of the study.

Fig. 3 shows changes in the structure of consumption in 1995, 2000, 2005, 2010 and 2015. There is a noticeable drop in the share of consumption of food and non-alcoholic beverages

(from 19.77% to 15%) and clothing and footwear (from 5.87% to 4.75%), which may result from the enrichment process of European countries over the period 1995-2015. In addition, there was an increase in the average share of consumption related to housing, water, electricity, gas and other fuels (from 19.41% to 22.22%), recreation and culture (from 7.91% to 8.24%) and restaurants and hotels (from 8.32% to 8.79%).

### 4 Methodology

Clustering of objects with a similar consumption structure was made using the hierarchical agglomeration method – the Ward's method. It's motivated by uncertainty as to the number of clusters to choose. It is helpful to establish number of clusters. In the future studies clustering can be done with non-hierarchical agglomeration methods. The purpose of using this method is to minimize the sum of squared deviations of two arbitrarily selected clusters (Ward, 1963). The Euclidean distance was used as a measure of the distance between the objects. The number of clusters has been specified using the average silhouette method for hierarchical clustering.

In order to verify the hypothesis of inequalities reduction in the consumption structure, the traditional model of  $\beta$ -convergence for cross-sectional data given by formula (Arbia, 2006) was used:

$$ln\left(\frac{y_{T,i}}{y_{0,i}}\right) = \alpha + \beta \ln(y_{0,i}) + \varepsilon_i, \qquad (1)$$

where  $y_{0,i}$  and  $y_{T,i}$  are the values of the share of consumption of the chosen groups of goods in total consumption the *i*<sup>th</sup> region in the first and last survey period respectively.

The  $\beta$  parameter is used to calculate the t<sub>half-life</sub> value, which presents the time needed to reduce the difference by half. It is expressed as follows:

$$t_{half-life} = \frac{\ln(2)}{b},\tag{2}$$

where *b* expresses the convergence rate and is evaluate with the use of the following formula:

$$b = -\frac{\ln \overline{\alpha} 1 + \beta}{T}.$$
(3)

# 5 Empirical results of research

# 5.1 Grouping countries with a similar consumption structure

The analysis of the similarity of the structure of consumption in the European Union countries began with their grouping into three clusters using the Ward's method of objects agglomeration. Table 1 presents the results obtained on the basis of that grouping.

Table 1. Concentration of countries obtained by the Ward's method in selected years of the

	study.						
Year	Cluster 1	Cluster 2	Cluster 3				
1995	Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden, United Kingdom	Cyprus, the Czech Republic, Greece, Hungary, Ireland, Italy, Malta, Portugal, Slovenia, Spain	Bulgaria, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia				
2000	Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden, United Kingdom Austria, Belgium, the Czech	Cyprus, Greece, Ireland, Malta, Portugal, Spain	Bulgaria, the Czech Republic, Estonia, Hungary, Italy, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia				
2005	Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Sweden, United Kingdom	Cyprus, Greece, Malta, Portugal, Spain	Bulgaria, Estonia, Latvia, Lithuania, Romania				
2010	Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden, United Kingdom	Austria, Cyprus, Greece, Ireland, Italy, Malta, Portugal, Slovenia, Spain	Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia				
2015	Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden, United Kingdom	Austria, Cyprus, Greece, Ireland, Malta, Spain	Bulgaria, the Czech Republic, Estonia, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia				

The countries that remained in the first group throughout the entire period considered were Belgium, Denmark, Finland, France, Germany, Luxembourg Netherlands, Sweden and United Kingdom. The core of the second cluster that remained in each year of the study were: Cyprus, Greece, Malta and Spain. The third cluster always included the following countries: Bulgaria, Estonia, Latvia, Lithuania and Romania. In the majority of the analyzed period, Poland, Slovakia and Hungary also remained in the third cluster.

Fig. 4 shows the characteristics of individual clusters. It provides a relation of the average group consumption structure of particular groups of goods to the average consumption structure of all EU-27 countries.



Fig. 4. The relation of the average share of individual categories of consumer goods to the European average.

The first cluster is characterized by a low share of consumption of food and non-alcoholic beverages in total consumption compared to the European average. This category of goods has a very large impact on the composition of groups. The second cluster is characterized by a higher than average European share of the consumption of goods related to restaurants,

hotels and education. In other groups, the calculated ratios are at a level below 1. In addition, the third group is characterized by a lower than average share of consumption of goods related to recreation, culture, transport and miscellaneous goods. In turn, the residents of third group of countries consume relatively more alcoholic beverages compared to the inhabitants of the countries included in the other two groups.

### 5.2 Convergence of consumption structure in the European countries

In order to analyze the consumption structure, the  $\beta$  convergence model for cross-sectional data (classical approach) was used. Table 2 presents the results of its estimation and verification for the consumption of particular groups of goods.

α	Speed of convergence	Half-life	p-value
			I
-0.3335	0.0203	34.1642	0.0000
-0.2468	0.0142	48.9082	0.0292
-0.5521	0.0402	17.2586	0.0017
-0.4765	0.0324	21.4181	0.0006
-0.7140	0.0626	11.0760	0.0000
-0.2606	0.0151	45.9104	0.1061
-0.6547	0.0532	13.0364	0.0000
-0.7332	0.0661	10.4916	0.0005
-0.6456	0.0519	13.3642	0.0000
-0.4110	0.0265	26.1878	0.0117
-0.0448	0.0023	302.7661	0.6651
-0.4690	0.0317	21.8994	0.0000
	α -0.3335 -0.2468 -0.5521 -0.4765 -0.7140 -0.2606 -0.6547 -0.7332 -0.6456 -0.4110 -0.0448 -0.4690	αSpeed of convergence-0.33350.0203-0.24680.0142-0.55210.0402-0.47650.0324-0.71400.0626-0.26060.0151-0.65470.0532-0.73320.0661-0.64560.0519-0.41100.0265-0.04480.0023-0.46900.0317	αSpeed of convergenceHalf-life-0.33350.020334.1642-0.24680.014248.9082-0.55210.040217.2586-0.47650.032421.4181-0.71400.062611.0760-0.26060.015145.9104-0.65470.053213.0364-0.73320.066110.4916-0.64560.051913.3642-0.41100.026526.1878-0.04480.0023302.7661

**Table 2.** Results of the estimation and verification of the convergence model for the groups of consumer goods.

The results of the assimilation of the consumption structure analysis indicate a blurring of differences in the share of consumption in most categories of goods in the total consumption of countries. The only categories of consumption in which convergence does not occur are: health, restaurants and hotels. In other cases, the  $\alpha$  parameter of the  $\beta$ -convergence model was statistically significant. The fastest rate of convergence based on the classical convergence analysis was observed in communication; furnishing, household equipment and routine household maintenance, which translates into the least amount of time needed to reduce by

half the differences in the consumption of goods belonging to this category. However, the most time is needed to align the consumption of food and non-alcoholic beverages and also alcohol beverages, tobacco and narcotics.

### Conclusion

The consumption structure in the EU-27 countries is very diverse. The greatest disproportions are observed in the consumption of food and non-alcoholic beverages, as well as consumption related to restaurants and hotels. The countries in which the share of food consumption in total consumption is the largest are the countries with lower disposable income, located in the Central-Eastern part of the continent. These are also countries where alcohol consumption is higher than in other European countries. Throughout the studied period, they belonged to the same focus, characterized by the largest share of consumption of goods satisfying basic life needs. The second cluster was dominated by countries that are a destination for many tourists - this is why this concentration was characterized by the largest share of goods consumption from the restaurants and hotels category. The richest countries (with the highest level of disposable income), located in the Western and Northern parts of Europe belonged to a group with a relatively high level of consumption of luxury goods (voluntary, which are not necessary to meet basic life needs). Nevertheless, the European countries are striving to unify the structure of consumption in the direction of its modernization. The consumption of luxury goods is increasingly contributing to the total consumption of poorer countries. A certain spatial tendency has emerged in the consumption structure of European countries, the identification of which will be the subject for further research. The study should also be enriched with a more in-depth analysis of the convergence of the expenditure structure - using the conditional convergence approach or panel data models. The model should be extended with influence of additional determinants of consumption such as consumer expectations and credits. Both of them have a significant impact on volume and structure of households expenditures. Moreover in further investigation some of the non-hierarchical clustering methods can be used.

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