

Conference Paper

Consumer Confidence Linkages Among European Union Countries: Which Countries Tend to Be Followers of Others?

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Abstract

In this study we use hierarchical cluster analysis to identify clusters in terms of consumer confidence and test the hypothesis whether Western and non-former-Soviet-Union Northern countries (Sweden, Denmark or Finland) may be “the core”, while Southern and former USSR countries may be considered as “periphery” in terms of consumer confidence (in respect with Krugman’s “core-periphery” model). Results show that consumer confidence similarities define clusters of EU countries, located in the same sub-region of Europe in cases of all Northern Europe countries and almost all Western Europe countries (excluding Netherlands, Luxembourg and Austria). We find that Southern and Central-Eastern EU countries don’t have their united, single socio-economic behaviour pattern, but rather tend to distribute to various clusters in terms of consumer confidence. Our test for hypothesis of possible “core” and “periphery” countries in terms of consumer show that some of Western and non-former-Soviet-Union Northern countries (in this case we identified Sweden, United Kingdom and Luxembourg) may be considered as “the core”, while the rest Southern and former USSR EU countries may be considered as “periphery”.

Keywords: consumer confidence, cluster analysis, core-periphery

JEL Classification: D12/C38/R12

1. Introduction

Consumer confidence is a statistical measure of consumers’ feelings about current and future economic conditions, used as an indicator of the overall state of the economy (Stevenson, 2010). Consumer confidence is an important driving force of business

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cycles as it tends to determine actual consumers economic behaviour. Consumer confidence remains relevant subject: economists discuss its' measurement methodology issues (e.g., [17, 36]), its' influence on various macroeconomic indicators (e.g., [6, 22]), or determinants of consumer confidence (e.g., [26, 27, 29, 30]). However, there are barely no empirical evidence on consumer confidence linkages among countries (consumer confidence linkages have been previously investigated only by [38]).

In this study we identify consumer confidence linkages among 28 European Union countries and test the idea of "core-periphery" model in terms of consumer confidence. Thus far researchers investigate exceptionally macroeconomic linkages among countries. In some of the studies macroeconomic linkages among countries are proved to be determined by countries' historical backgrounds and socio-cultural similarities [8, 12, 37]. We presume it is also the case in the level of consumer confidence. As consumer confidence can define consumers economic behaviour, **this study aims** to reveal clusters of countries with similar socio-economic behaviour patterns to identify possible "core" and "periphery" countries in terms of consumer confidence (in respect with Krugman's "core-periphery" model).

The remainder of the paper is outlined in the following way. Section 2 presents theoretical background of consumer confidence and literature review of previous studies on economic linkages among various sets of countries. Section 3 presents data and explains methodology. In section 4 we empirically examine data and provide the results. Section 5 concludes.

2. Literature Review and Hypothesis

G. Katona was the first economist to capture consumer confidence by creating consumer confidence index (now known as University of Michigan Consumer Sentiment Index). In his research, [18] defined consumer confidence as consumer's "ability and willingness to buy". The index is built on consumers' survey, which questions cover present conditions of US households' finances as well as consumers' expectations. Later, similar indices, based on various surveys in different countries were built and were used in empirical research form 1950s up until now. European Union has its own harmonised consumers survey which results are used to build Consumer confidence indicator. EU harmonised consumers survey covers questions of consumers' expected condition of their own finances, as well as condition of the whole economy.

There are plenty of researches on consumer confidence impact on different macroeconomic factors. For example, [6, 16] examined consumer confidence impact on consumption and economic growth in US and European Union respectively. Others studied consumer confidence impact on stock market (e.g., [4, 24]), interest rates (e.g., [19]) and exchange rates (e.g., [1, 14]).

Some authors [23, 26, 27, 29, 30] investigated determinants of consumer confidence, others [17, 36] tried to resolve consumer confidence measurement methodology issues. However, although there are plenty of research on consumer confidence related issues, there are barely no empirical evidence on consumer confidence linkages among wide set of countries. Empirical evidence on this issue may contribute to analysis of possible consumers socio-economic behaviour shifts which could be later applied developing macroeconomic policies.

Previous studies on linkages among countries focuses mostly on linkages under financial indicators [13, 34], banking sector ratios [5, 8], business cycle co-movements [7], public expenditure [25, 32] and economic indicators (such as output growth and inflation) [12, 20, 31, 35, 37].

Previous studies of some authors (e.g. [8, 12, 34, 37]) show some evidence of considerable geographical linkages across regions and some countries being dominated against others. Their evidence consists with the approach of new economic geography and “core-periphery” model, developed by [21] and later used by [3, 10, 28]. “Core-periphery” model shows that some countries may end up as “followers” of other countries.

Based on previous studies on linkages among countries and new economic geography, we raise 4 questions to be investigated empirically: (1) do consumer confidence linkages exist among EU countries, (2) are these linkages determined by countries’ geographical location, (3) how many groups of countries there are to distinguish in terms of consumer confidence and (4) what countries tend to follow what countries (which countries should be considered as “the core” and which – “the periphery” in terms of consumer confidence)?

In section 3 we present the case of consumer confidence linkages among 28 European Union member states. For our analysis we use Consumer confidence indicator (CCI) of respectively 28 EU countries, which is conducted and issued by European Commission [39] (details on data presented in section 3).

First, we test the idea of consumer confidence linkages being determined by geographical location of EU countries (here we use geographical classification of EU countries, provided by [9] (see table 1)). Second, we test the idea of consumers’ attitudes

transition from one country to others, assuming there exists possible “cores” – countries that may be considered as leading countries in terms of consumer attitudes and possible “periphery” – countries that may be considered as following countries. To test this idea, we use an assumption that Southern and former USSR EU countries partly depend on Western and Northern EU, because of formed banking and production relations among these regions (see [34]).

TABLE 1: EU classification according to sub-regions of Europe (as defined by [9]).

EU countries of Northern Europe	EU countries of Western Europe	EU countries of Central and Eastern Europe	EU countries of Southern Europe
Estonia	Austria	Bulgaria	Cyprus
Latvia	Belgium	Croatia	Greece
Lithuania	France	Czech Republic	Italy
Denmark	Germany	Hungary	Malta
Finland	Ireland	Poland	Portugal
Sweden	Luxembourg	Romania	Spain
	Netherlands	Slovakia	
	United Kingdom	Slovenia	

Source: constructed by the authors

Considering literature review on consumer confidence linkages among countries and new economic geography, we raise and test following **hypothesis: (1)** consumer confidence structure similarities define clusters of EU countries, located in the same sub-region of Europe (Western, Central-Eastern, Northern and Southern Europe); **(2)** Western and non-former-Soviet-Union Northern countries may be considered as “the core”, while Southern and former USSR countries may be considered as “periphery” in terms of consumer confidence.

3. Methodology

This study aims to reveal groups of countries, which are linked together in terms of consumer confidence. Linkages among countries are complex issue to investigate. To make the best possible outcome investigating consumer confidence linkages among countries we use consumer confidence structure, which is explained in this section.

Stage 1. To construct consumer confidence structure, we take elasticities of consumer confidence regression model, which we conducted in our previous work [27]. Consumer confidence regression in [27] was made using Autoregressive Distributed Lag (ADL) model with the same data sample (28 EU countries in period 2005–2016).

Dependent variable in [27] is Consumer confidence indicator (CCI), independent variables are: unemployment rate (Unemp), Income (Inc), Real interest rate (IntR), Harmonized index of consumer prices (Infl), Economic policy uncertainty index (EUI) and "Google search" index on definition "recession" in native language (ESI).

We do not provide regression analysis details in this study, as it was already made in [27]. We use only results of previously made regression analysis. We use elasticities of computed regression equations to make cluster analysis of 28 EU member states. The manner of employing regression elasticities into cluster analysis is specified below.

Stage 2. We transform regression equations to reveal structural impact of determinants of consumer confidence. We start with a simple regression equation:

$$Y_t = \alpha_0 + \sum_{i=1}^n \alpha_i x_{it-j} + \varepsilon_i, \tag{1}$$

where Y_t – dependent variable, x_t – independent variable, n – number of independent variables, $\alpha_i x_{it-j}$ – stationary time series, ε_i – white noise error process; $i, j = 1, 2, \dots, N, t = 1, 2, \dots, T$.

Then we modify regression equations by changing elasticities (α_i), into relative coefficients (A_i) as follows:

$$Y_t = \alpha_0 + \sum_{i=1}^n |\alpha_i| \times \sum_{i=1}^n \frac{\alpha_i}{\sum_{i=1}^n |\alpha_i|} x_{it-j} + \varepsilon_i, \tag{2}$$

or

$$Y_t = \alpha_0 + \sum_{i=1}^n |\alpha_i| \times \sum_{i=1}^n A_i x_{it-j} + \varepsilon_i, \tag{3}$$

where $A_i = \frac{\alpha_i}{\sum_{i=1}^n |\alpha_i|}$. Computed regression equation (3) preserves the same features as the initial equation (1), however separates structural impact of determinants of consumer confidence.

Elasticities of consumer confidence determinants (x_{it-j}) divided by sum of elasticities $\sum_{i=1}^n |\alpha_i|$ give relative elasticities (A_i), which we use in further investigation of consumer confidence linkages among EU countries (table of computed relative elasticities (A_i) is given in appendix 1).

Stage 3. To identify linkages among EU countries we apply cluster analysis. Cluster analysis we apply is based on relative elasticities (A_i) of modified consumer confidence equation (3), regarded as elements of cluster analysis. Modified elasticities A_{1-n} evaluated considering the direction of consumer confidence determinants relationship toward CCI (direct or inverse). However, we do not take in consideration time lags, which is one of the limitations of this study. To cluster countries according to

their consumer confidence structure, we use the strategy of hierarchical joint method (which is usually applied when there is unknown number of clusters). It was previously used by [2, 5, 8, 11, 15, 32].

We evaluate in what manner consumer confidence relative elasticities are connected to each other. The distance $d(U_i, V_j)$ between $U_i \in U$ and $V_j \in V$ of clusters U and V is measured as follows:

$$d(U, V) = \min d(U_i, V_j),$$

where: U_i – element of object U , V_j – element of object V . This measure is called unitary connection (nearest neighbour) measure.

To cluster objects we calculate distances between each value. To calculate distances Euclidean distance formula is used:

$$d(U_i, V_j) = \sqrt{(u_1 - v_1)^2 + (u_2 - v_2)^2 + \dots + (u_n - v_n)^2}, \quad (4)$$

where: d – the distance between hierarchies, u_n – one hierarchy (element n of country U), v_n – other hierarchy (element n of country V). Then we repeat above presented procedure in matrix of distances until we get in advance unknown number of clusters with the maximum distances between them.

Stage 4. We test the hypothesis, raised in section 2. For the hypothesis (1) we compare the composition of EU clusters in terms of consumer confidence with the geographical classification of EU. The criteria for testing hypothesis (1) are as follows: If composition of EU clusters in terms of consumer confidence corresponds the geographical classification of EU, we will confirm raised hypothesis (1). To test raised hypothesis (2) we use cluster analysis test for central objects. The criteria of testing hypothesis (2) are as follows: If central objects of EU clusters in terms of consumer confidence are Western or non-former-Soviet-Union Northern countries, we will confirm raised hypothesis (2).

4. Results and Discussion

Applied 1-3 stages of 3rd section gives us results of initial cluster analysis (see Figure 1). In Figure 1 presented dendrogram we can see that there exist three clusters of EU countries in terms of consumer confidence. Consumer confidence linked countries are: Latvia, Denmark, Finland, Estonia, Lithuania, Portugal, Austria, Sweden, Spain, Poland, Czech Republic, Germany, Belgium, Slovenia, France, Italy, Hungary, Bulgaria, Ireland and United Kingdom (cluster 1); Malta, Greece, Netherlands, Croatia and Luxembourg (cluster 2); Cyprus, Romania and Slovakia (cluster 3).

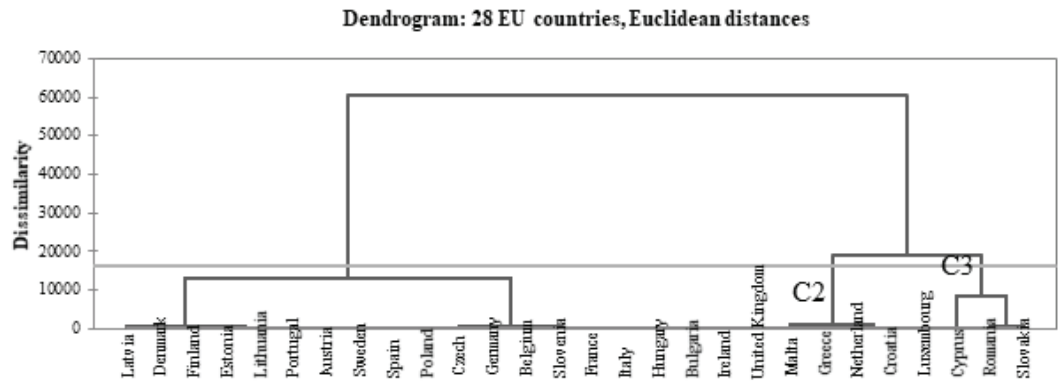


Figure 1: EU countries’ clusters in terms of consumer confidence (cluster 1 – left branch; cluster 2 – middle branch; cluster 3 – right branch) Source: constructed by the authors.

Comparing results with EU geographical classification [9], we test the hypothesis whether country’s belonging to certain cluster is related to its location. Results given in Figure 1 do not allow us to confirm raised hypothesis (1). Although all Northern countries belongs to the same cluster (cluster 1), however other sub-regions of Europe are divided into different clusters: Western countries distribute to clusters 1 and 2, Central and Eastern countries as well as Southern countries distribute to all three clusters.

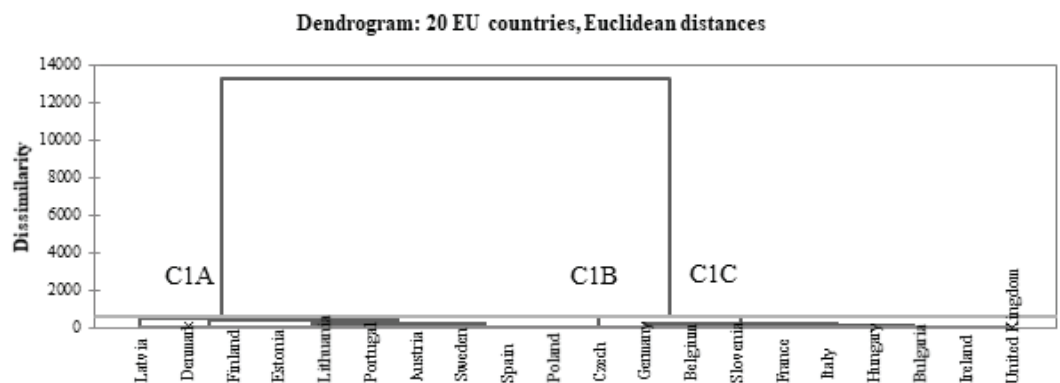


Figure 2: Countries of cluster 1 divided into sub-clusters in terms of consumer confidence (cluster 1A – left branch, cluster 1B – middle branch, cluster 1C – right branch) Source: constructed by the authors.

To make deeper analysis of a biggest EU cluster we diminish our sample to 20 countries, which belong to cluster 1 (although this kind of concentration makes sense in the context of EU integration). Dendrogram of 20 EU countries in Figure 2 shows that cluster 1 contains 3 sub-clusters. Dissimilarity values in left axis shows that there are significant differences between sub-cluster 1A and sub-clusters 1B and 1C. Cluster 1B is quite near to cluster 1C and stands only for Czech Republic. Cluster 1C contains of mostly Western Europe countries (Germany, Belgium, France, Ireland and United Kingdom), also Central and Eastern Europe countries (Slovenia, Hungary and Bulgaria) and one

Southern country (Italy). Cluster 1A contains all Northern countries (Denmark, Sweden, Finland, Latvia, Estonia and Lithuania), also some Central and Eastern countries (Poland and Austria) and Southern countries (Portugal and Spain).

Before testing our hypothesis (1) we look at Class centroids of clusters – centre of values falling into certain cluster (given in table 3) to see which elements of cluster analysis (modified elasticities of consumer confidence) glues identified clusters.

TABLE 2: Class (element) centroids of given clusters.

Class	Unemp	Infl	Inc	IntR	ESI	ENI
Cluster 1	-2.707	-17.624	1.863	-74.552	-0.351	-0.300
Cluster 1A	-3.484	0.000	1.370	-93.329	-0.639	-0.277
Cluster 1B	-2.690	17.070	-2.960	-76.050	-0.310	-0.920
Cluster 1C	-2.009	-36.954	2.788	-57.503	-0.096	-0.259
Cluster 2	-7.848	-84.160	6.566	0.000	-0.236	-1.190
Cluster 3	-8.557	-7.060	-25.243	55.930	-0.123	-0.863

Note: values show elements gluing clusters together: the bigger value shows higher influence on consumer attitudes. Sign (- or +) shows direction of consumers attitudes toward given factors' increase (negative or positive).

Results, given in table 3 shows, that consumers in all identified clusters tend to respond negatively to growing unemployment and both psychological factors ESI and ENI. Consumers in different clusters of countries respond differently to growing inflation, real interest rate and income. Cluster 1 and 2 tend to follow economic theory as consumers of countries in cluster 1 and 2 (except for Czech Republic) tend to lower their confidence when interest rate and inflation increase, and income diminishes. However, consumers of countries in cluster 3, in opposite, tend to increase their confidence, when interest rate and inflation increases, and income diminishes. Economic theory states that effects of increased interest rates are mostly negative to an individual consumer, as well as to the whole economy: negative effects include increased cost of borrowing, reduced investments, slower economic growth and higher risk of unemployment. Most of the consumers in EU follows economic theory lowering their confidence as interest rates increases, however, countries in cluster 3 (Cyprus, Romania and Slovakia) become an exception from the rule. Consumers' negative response to income growth and positive response to increased interest rates may refer to some features, intrinsic to the cluster, for example, a lack of trust in government, which makes economic policy decisions (in case of negative response to income raise), or improved competitiveness of exports (in case of positive effects of growing interest rate). Alternatively, the results, opposite to the theory, may imply that cluster 3 countries data set is not

enough to determine a tendency, rather to assume that countries under investigation had unstable economic development during the period of 2005-2016.

After analysing given results, we confirm **hypothesis (1)** (consumer confidence similarities define clusters of EU countries, located in the same sub-region of Europe (Western, Central and Eastern, Northern and Southern Europe)) only in case of Northern EU countries and partly in the case of Western EU. Countries in other sub-regions of Europe do not follow the given idea (see Figure 3). Whereas we confirmed raised hypothesis (1) only partially, we assume that, however, consumer confidence linkages among countries may develop independently from their location. High development of technologies and people movement without any restrictions among EU states determine easy exchange of experiences among consumers in different parts of EU. Unrestricted capital flow determines changes in output as well as consumers' consumption habits.

Research results of [34] have shown that Baltic countries "follows" Nordic countries regarding output growth. Next, we test the idea whether similar situation may occur in terms of consumer confidence. Raising hypothesis (2) we pre-assumed, that Western and non-former-Soviet-Union Northern countries (Sweden, Denmark and Finland) may be found as "the core", while Southern and former USSR countries – as "periphery".

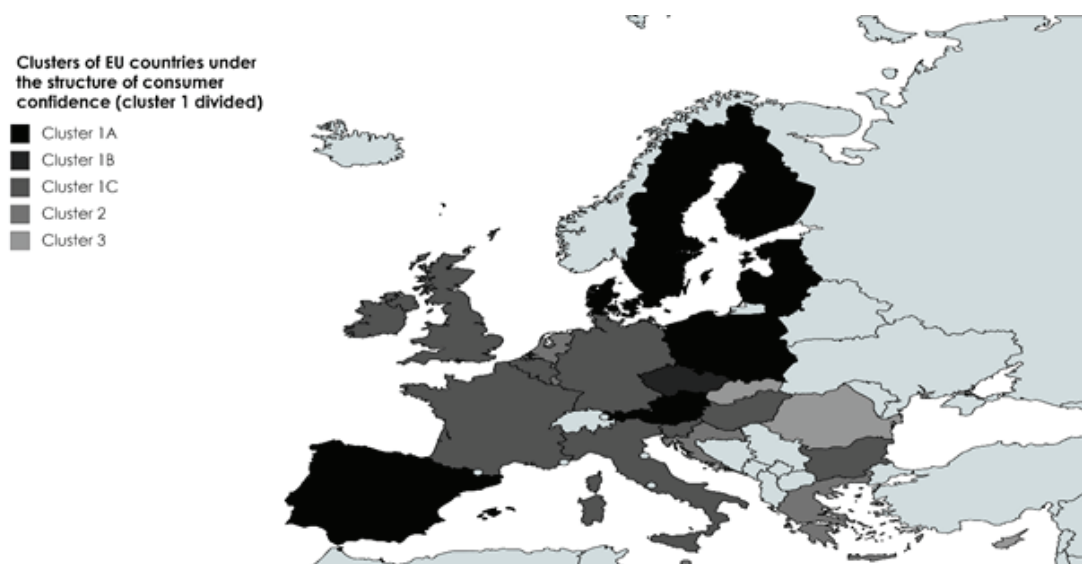


Figure 3: EU map of countries' clusters in terms of consumer confidence. Note: **Cluster 1A:** Denmark, Sweden, Finland, Latvia, Estonia, Lithuania, Poland, Austria, Portugal, Spain; **cluster 1B:** Czech Republic; **cluster 1C:** Germany, Belgium, France, Ireland, United Kingdom, Slovenia, Hungary, Bulgaria, Italy; **cluster 2:** Malta, Greece, Netherlands, Croatia, Luxembourg; **cluster 3:** Cyprus, Romania, Slovakia Source: constructed by the authors.

We note in advance that we can't evaluate cases of cluster 1B and cluster 3 in the context of hypothesis (2), because cluster 1B contains only one country and all 3 countries of cluster 3 do not belong to Western or non-former-Soviet-Union Northern

countries. However, we test the hypothesis calculating central objects of all given clusters (3 initial clusters and 3 sub-clusters of cluster no. 1).

TABLE 3: Central objects of given clusters.

Class	Unemp	Infl	Income	IntR	ESI	ENI
Cluster 1 (Latvia)	-3.790	-22.590	0.000	-73.610	0.000	0.000
Cluster 1A (Sweden)	0.000	-39.240	4.160	-55.880	0.000	-0.710
Cluster 1B (Czech Republic)	-2.690	17.070	-2.960	-76.050	-0.310	-0.920
Cluster 1C (United Kingdom)	-5.250	0.000	0.000	-92.530	-0.770	-1.450
Cluster 2 (Luxembourg)	-8.060	-83.590	7.080	0.000	0.000	-1.260
Cluster 3 (Slovakia)	3.330	-21.180	-1.980	72.680	0.000	-0.820

Note: values show elements of central object of a given cluster (central objects of clusters indicated in brackets): the bigger value shows higher influence on consumer attitudes. Sign (- or +) shows direction of consumers attitudes toward given factors' increase (negative or positive).

In table 4 there are shown central objects of given clusters. Central object is the nearest object to the centroid for each element. In the context of consumer confidence, we assume that central objects of each country may be considered as “the core” of cultural values, which affect consumers’ attitudes not only domestically, but also spread to other countries. Countries, which converge toward “the core”, should be considered as “followers” in terms of consumer confidence. Respectively given results in table 4 we see that Sweden is central object of cluster 1A, United Kingdom is central object of cluster 1C; Luxembourg is central object of cluster 2; and Slovakia is central object of cluster 3. However, we do not evaluate the case of cluster 3 and 1B in the context of hypothesis (2) as all the countries in cluster 3 do not belong to Western or non-former USSR Northern countries of EU (Slovakia and Romania are former USSR, Cyprus is Southern EU country with tumultuous history) and cluster 1B contains only one country (Czech Republic). Cluster 1 is not evaluated also, as we evaluate sub-clusters 1A and 1C instead (the latter are far from each other in respect to calculated Euclidean distances (see Figure 2)).

Evidence for central objects of EU clusters in terms of consumer confidence allows us to confirm our hypothesis (2). Central object of cluster 1A is non-former USSR Northern country – **Sweden**, Central objects of clusters 1C and cluster 2 is Western EU countries – **United Kingdom** and **Luxembourg**. As we noted earlier, countries, which converge toward “the core”, should be considered as “followers” in terms of consumer confidence. In the context of this study, we cannot say if the rest of the countries in given clusters are converging toward “the cores” (Sweden, United Kingdom and Luxembourg). This issue requires another study on consumer confidence convergence in EU countries. However, we pre-assume, Denmark, Finland, Latvia, Estonia, Lithuania,

Poland, Austria, Portugal, Spain are “followers” of Sweden; Germany, Belgium, France, Ireland, Slovenia, Hungary, Bulgaria and Italy are “followers” of United Kingdom; and Malta, Greece, Netherlands and Croatia are “followers” of Luxembourg in terms of consumer confidence.

5. Conclusion

The aim of this study was to reveal clusters of countries with similar socio-economic behaviour patterns and to identify possible “core” and “periphery” countries in terms of consumer confidence. We applied hierarchical cluster analysis based on regression analysis results we conducted in our previous research and found that EU countries form 5 clusters in terms of consumer confidence. Our results suggest that consumer confidence structure determine clusters of countries, located in the same sub-region of Europe in case of all Northern EU countries and almost all Western EU countries (excluding Netherlands, Luxembourg and Austria).

Our evidence also shows that Central-Eastern European countries and Southern European countries tend to link with Western either Northern countries of EU. We find this trend in conformity with the concept of “core-periphery” model at international level. Our evidence confirmed the idea of Western and non-former-Soviet-Union Northern countries being the “core” in terms of consumer confidence. We found that Sweden, United Kingdom and Luxembourg are the central objects of different clusters, containing Southern or ex-communist Central-Eastern countries of EU, which we assume could be considered as “followers” in terms of consumer confidence.

This study contains some limitations. Firstly, we evaluate “the core” countries only by central objects of given clusters, however to have more solid evidence we need to test if considered “periphery” countries converge toward “the core” countries over time. Secondly, we do not take in consideration variation of time lags, which appear in consumer confidence regression equations. Respectively, on-going research should focus on improving cluster analysis by taking in consideration time lags and deepen the research with convergence analysis of EU clusters in terms of consumer confidence.

Appendix 1

TABLE 1: Relative elasticities of consumer confidence regression equations, %.

Country	Unemp	Infl	Inc	IntR	ESI	EUI
Belgium (1)	0.00	0.00	5.06	-94.40	-0.54	0.00
Bulgaria (2)	-4.04	0.00	-4.06	-91.90	0.00	0.00
Czech Republic (3)	-2.69	17.07	-2.96	-76.05	-0.31	-0.92
Denmark (4)	0.00	-49.14	0.00	-50.03	0.00	-0.83
Germany (5)	-12.83	0.00	2.09	-84.33	-0.76	0.00
Estonia (6)	0.00	-36.61	-1.77	-61.62	0.00	0.00
Ireland (7)	-3.36	0.00	0.00	-96.00	-0.64	0.00
Greece (8)	0.00	-90.03	7.37	0.00	0.00	-2.61
Spain (9)	-4.03	-34.98	5.59	-54.91	-0.49	0.00
France (10)	0.00	0.00	0.00	-99.19	-0.81	0.00
Croatia (11)	0.00	-81.62	18.38	0.00	0.00	0.00
Italy (12)	0.00	0.00	0.00	-96.73	-2.23	-1.04
Cyprus (13)	-29.00	0.00	-71.00	0.00	0.00	0.00
Latvia (14)	-3.79	-22.59	0.00	-73.61	0.00	0.00
Lithuania (15)	-2.17	-33.42	0.00	-64.41	0.00	0.00
Luxembourg (16)	-8.06	-83.59	7.08	0.00	0.00	-1.26
Hungary (17)	-5.88	0.00	4.48	-89.64	0.00	0.00
Malta (18)	-31.18	-68.82	0.00	0.00	0.00	0.00
Netherlands (19)	0.00	-96.74	0.00	0.00	-1.18	-2.08
Austria (20)	0.00	-38.06	5.98	-55.48	-0.47	0.00
Poland (21)	-5.01	-35.93	7.81	-50.91	0.00	0.00
Portugal (22)	-5.09	-33.31	0.00	-60.55	0.00	-1.05
Romania (23)	0.00	0.00	-2.75	95.11	-0.37	-1.77
Slovenia (24)	0.00	0.00	4.76	-95.24	0.00	0.00
Slovakia (25)	3.33	-21.18	-1.98	72.68	0.00	-0.82
Finland (26)	0.00	-46.26	6.11	-47.63	0.00	0.00
Sweden (27)	0.00	-39.24	4.16	-55.88	0.00	-0.71
United Kingdom (28)	-5.25	0.00	0.00	-92.53	-0.77	-1.45

Note: Unemp – unemployment rate, Infl – harmonized index of consumer prices, Inc – households' wages and salaries, IntR – 6 months real interest rates, EUI – economic policy uncertainty index, ESI – “Google Trends” index on economic downturn definitions. Source: constructed by the authors

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