Diversity of Capitalism in Central-Eastern and Western European Countries: Robustness of Results Based on Different Coefficients of Similarity

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Abstract:

Purpose: the paper compares the institutional environment of product market competition of 11 Central and Eastern European (CEE) countries against 4 Western European models of capitalism (continental, Mediterranean, Scandinavian, and Anglo-Saxon).
Design/Methodology/Approach: The analysis covers 24 variables and the 2005-2018 period. The aim is to analyze the robustness of results against a specific Western European country, which is a reference point, and the exact method of calculating the similarity coefficient. The analysis shows that the CEE countries are the most similar to the Mediterranean model of capitalism. The continental model ranks second.
Findings: The results are highly robust to the assumptions made. High institutional convergence of the CEE countries was seen in both Spain and Italy. The classification of Western European models of capitalism in terms of proximity to the CEE countries is also robust to the exact method of calculating the similarity coefficient.
Practical Implications: The study yields practical implications for policymakers as it indicates the institutional development of given CEE countries against the background of Western Europe. On this basis, policymakers can choose actions according to their peers in the given reference country, which is the most akin.
Originality/Value: The originality of the research lies in the assessment of the model of capitalism prevailing in the CEE countries and the way of comparing institutional environment of the two countries based on our original concept of the similarity coefficient, which is constructed according to the mathematical measures of distance between the objects.

Keywords: Models of capitalism, varieties of capitalism, product market competition, capitalism, Central and Eastern Europe.

JEL Classification: P4, P5.

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1. Introduction

In this article, we compare selected elements of the Central and Eastern European (CEE) countries with the countries of Western Europe, recognized as ideal representatives of a given model of capitalism. The analysis concerns one of the institutional areas, namely, the product market competition. The study covers 11 CEE countries that are new members of the European Union (EU).

In the studies on the models of capitalism, the countries are characterized based on several variables covering various political, social, and economic aspects. Based on the values of these indicators, countries can be classified. Within one group, some countries share standard features and can be treated as the same model of capitalism. There are different ways of classifying varieties of capitalism in economic literature (Amable, 2003; Coates, 2000; Hall and Soskice, 2001; Nölke and Vliegenthart, 2009). The research on models of capitalism in post-socialist countries is relatively rarely conducted. The following analyzes can be mentioned among the few studies on this group of countries (Knell and Srholec, 2007; Hanson, 2007; Babos, 2010; Farkas, 2011; 2016; Ahlborn, Ahrens, and Schweickert, 2016; Rapacki (ed.), 2019; Rapacki *et al.,* 2019; 2020).[3]

In the study by Próchniak *et al.* (2017), the authors proposed a new method of calculating the similarity coefficient, which allows for a comparison of the institutional system of different countries based on variables taking values from a different numerical range. In this article, we analyze the robustness of the results in two aspects. Firstly, we check how robust the results are, depending on the parameter's value representing the cut-off point in the similarity coefficient. Secondly, one of the conclusions of the quoted article is that the CEE countries are the most similar to the Mediterranean model of capitalism, but in some areas, the Mediterranean model of capitalism is represented by Spain, and in others - by Italy. In this article, we verify whether it matters which country will be considered representative of a given model of capitalism.

The article refers to the research conducted by Amable (2003), who used a principal component analysis and a cluster analysis to identify groups of countries representing a given model of capitalism in well-developed market economies. Amable considered five institutional areas, including the product market competition. The current study also extends previous studies on the CEE countries (Próchniak *et al.,* 2017), in which the analysis of various institutional areas, including the product market competition, was carried out on a much smaller number of variables. In this study, we use 24 variables.

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[3]*This paper does not focus on the review of the literature and for the sake of conciseness we do not describe in detail the cited works on the models of capitalism. For a detailed review of the research on emerging varieties of capitalism in Central and Eastern Europe, see the article by Rapacki et al. (2018).*

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The paper consists of four parts. The following section presents the data used in the analysis and the research methodology, including the original concept of calculating the similarity coefficient. Part 3 presents and interprets the results, focusing on assessing the degree of robustness of the results to the assumptions made. The last point concludes the study.

2. Research Methodology

The study covers 11 CEE countries and the 2005-2018 period (for some variables, the number of observations is lower due to the lack of data). We compare each of these countries to the following Western European reference countries representing four models of capitalism: Germany and France (continental model), Spain and Italy (Mediterranean model), Sweden and Finland (Scandinavian model), United Kingdom (Anglo-Saxon model). Some models of capitalism are represented by two countries, making it possible to analyze the robustness of the results.

The choice of the models of capitalism as a point of reference results from previous research in this field, carried out, among others, by Amable (2003). The quoted author distinguished five models of capitalism existing in the Western world: the Anglo-Saxon model, the continental European model, the social-democratic model (otherwise: Scandinavian or Nordic), the Mediterranean model, and the Asian model. In this study, we consider the first four models of capitalism as reference points, as the Asian model is not appropriate here due to its different geographical scope.

The similarity between the CEE country and the reference country of Western Europe is assessed based on the original concept of the similarity coefficient. The similarity coefficient takes values ranging from 0 to 100. The value 100 means a situation where the CEE country and the reference country achieve precisely the same results in terms of a given feature (variable). This is a reflection of the complete similarity. The value 0 means total lack of similarity and occurs when the difference between the value of the feature in the CEE country and the reference country exceeds a specific critical value (regardless of the direction). The critical value equals three standard deviations of a given variable in the total sample in the basic variant. In this study, we analyze the robustness of the results to other critical values.

The coefficient of similarity for the variable x (WPx) between two countries k and l in year t is calculated according to the following formula:

$$WP^x_{klt} = \left(1 - \frac{|x_{kt}-x_{lt}|}{\psi \times \text{s.d.}(x_t)}\right) \times 100 \quad \text{if} \quad |x_{kt} - x_{lt}| < \psi \times \text{s.d.}(x_t), \quad (1)$$
$$WP^x_{klt} = 0 \quad \text{otherwise.}$$

In formula (1), s.d.(x_t) is the standard deviation of a given feature in the full sample of 18 countries. The similarity coefficient of the economies (*WP*) is the arithmetic mean

of the similarity coefficients for individual variables. It means that the similarity index of two countries (*k* and *l*) in year *t* is calculated according to the following formula:

$$WP_{klt} = \frac{1}{24} \sum_{n=1}^{24} WP_{klt}^n,$$ (2)

where WP^1, WP^2 ,…, WP^{24} are the similarity coefficients for each of the 24 variables (in a few cases where data are not available, the average is calculated on a smaller number of variables).

In the basic variant, the parameter ψ is equal to 3. In this study, we analyze the robustness of the results to alternative values of the parameter ψ : 1, 2, 4, 5 and 100. In theoretical and empirical research, several variables relating to competition in the product market may be considered. The indicators can be divided into three categories:

- microeconomic variables at the level of individual companies (e.g., Boone index, Lerner index, number of competitors, price mark-up on costs, profit margin);
- microeconomic variables at sectoral level (e.g., concentration ratio, Herfindahl-Hirschman index (HHI));
- macroeconomic variables (e.g., product market regulation indicators).

Alexeev and Song (2013), in their analysis of the relationship between the product market competition and corruption in around 60 countries, take into account six indicators of competition in the product market: consumer reaction to a hypothetical price increase, cost mark-up, HHI index, number of competitors, share in the domestic market and share in the local market.

The list of variables used in the study and basic descriptive statistics in the whole group of countries is presented in Table 1. This study covers two groups of variables. We consider the variables representing both the determinants of the product market competition (i.e., the institutional architecture of competition in the product market) and the variables showing the effects of competition. The indicators can be called input and output variables (the latter group mainly includes variables relating to the number of enterprises).

Table 1. *Variables used in the analysis*

No.	Variable	Average	Min.	Max.
Variables from the World Bank database				
1	Time needed to start a business (days)	20.9	3.5	137.0
2	Time needed to enforce the contract (days)	142.3	55.0	330.0
3	Time required to register property (days)	59.4	3.5	956.0
4	Time needed to prepare and pay taxes (hours)	232.1	50.0	866.0
5	Cost of procedures necessary to start a business (% of GNI per capita)	5.1	0.0	22.4
6	Number of tax payments	16.7	6.0	113.0

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	Variables from the World Economic Forum database			
7	Total tax rate (% of profits)	46.0	18.8	76.2
8	Economic impact of the law on FDI	4.7	2.6	6.3
9	Institutions	4.3	3.2	6.2
10	Intensity of local competition	5.3	4.0	6.4
11	Competition	4.7	3.9	5.4
12	Domestic competition	4.5	3.7	5.4
13	Foreign competition	5.1	3.8	5.9
14	Effectiveness of antimonopoly policy	4.4	3.2	6.1
15	Extent of market dominance	4.3	3.0	6.2
16	Market size	4.5	2.9	6.0
17	Global Competitiveness Index (GCI)	4.7	3.9	5.7
18	Existence of trade barriers	4.9	3.8	6.2
19	Existence of foreign ownership	5.1	3.2	6.5
	Variables from the Heritage Foundation database			
20	Business freedom	77.0	53.7	96.1
21	Fiscal freedom	69.6	32.7	94.0
22	Freedom from government spending	39.5	0.0	71.0
	Variables from the Eurostat database			
23	Number of enterprises in the economy with the exception of the financial and insurance sectors (per million inhabitants)	48,711	11,611	96,503
24	Number of enterprises in the manufacturing sector (per million inhabitants)	5,496	1,495	16,622

Source: *Own elaboration based on World Bank, World Economic Forum, Heritage Foundation and Eurostat data.*

3. Results and Discussion

Tables 2 and 3 present the coefficients of similarity between 11 CEE countries and the reference countries of Western Europe in 2007 and 2016. The initial year is 2007, and the final year - 2016, i.e., the years for which most variables are available. The similarity coefficients in Tables 2 and 3 were calculated in the basic variant for which the parameter ψ equals 3.

In 2007, all the CEE countries, except Estonia, showed the most significant similarity to the Mediterranean model of capitalism, represented by Spain or Italy. For the six CEE countries, the highest similarity coefficient was recorded about Spain: Czechia 74.8%, Lithuania 73.5%, Latvia 73.9%, Slovakia 69.1%, Slovenia 74.2%, and Hungary 79.6%. In the case of four other CEE countries, the highest resemblance was noticed towards Italy with similarity coefficients equal to 66.6% (Bulgaria), 67.8% (Croatia), 75.0% (Poland), and 66.5% (Romania). The only outlier in terms of the institutional architecture of the product market competition was Estonia, which gravitated towards the Anglo-Saxon model of capitalism (a similarity coefficient to the UK stood at 70.8%).

The aggregated data in the last row of Table 2 suggest that when comparing the institutional system of post-socialist countries and countries recognized as ideal-typical models of capitalism, it does not matter whether we adopt Spain or Italy as the Mediterranean model. In 2007, the CEE group showed the most remarkable resemblance to the Mediterranean model of capitalism represented by both Spain and Italy. The average similarity coefficient towards Spain was 68.8%, and it stood at 64.5% towards Italy. These were the highest averages in the CEE11 group.

Table 2. *Coefficients of similarity between the CEE countries and the reference countries of Western Europe in product market competition in 2007 ($\psi = 3$)*

CEE country	Reference country of Western Europe						
	Continental model		Mediterranean model		Nordic model		Anglo-Saxon model
	Germany	France	Spain	Italy	Sweden	Finland	UK
Bulgaria	31.4	33.3	56.7	66.6	24.5	33.2	32.4
Croatia	38.8	47.8	58.1	67.8	33.4	41.5	39.9
Czechia	61.7	61.3	74.8	58.9	55.3	61.0	60.9
Estonia	68.1	65.8	70.4	49.9	67.4	69.8	70.8
Lithuania	53.4	58.8	73.5	66.1	50.8	55.2	55.3
Latvia	53.5	58.6	73.9	66.9	49.9	56.7	57.9
Poland	37.0	45.1	66.9	75.0	29.2	37.1	39.7
Romania	38.9	45.7	59.1	66.5	35.5	39.6	41.0
Slovakia	62.2	57.5	69.1	53.4	62.3	67.7	62.1
Slovenia	47.9	58.6	74.2	68.4	43.0	49.8	49.0
Hungary	62.5	61.2	79.6	70.6	56.2	61.4	56.8
AVERAGE	50.5	54.0	68.8	64.5	46.2	52.1	51.4

Note: In each row, the reference country with the highest similarity coefficient is marked in dark gray, and the reference country with the second highest degree of similarity is marked in light gray.
Source: Own calculations.

The data in Table 3, concerning the last year of the analysis for which we have most observations, confirm the correctness of the approach that it does not matter whether we choose Italy or Spain as the reference country for the Mediterranean model of capitalism. Nevertheless, in 2016, most of the CEE countries were more similar to Spain than to Italy. The resemblance to Italy was lower, although, in average terms for the whole group, Italy still ranked the 2nd.

The detailed data in Table 3 demonstrate that nine CEE countries showed the most significant institutional similarity in terms of the product market competition to Spain. These were the following countries (counting from the most similar): Latvia (the similarity coefficient equal to 78.2%), Poland (77.9%), Lithuania (75.4%), Romania (72.9%), Slovakia and Hungary (72.1%), Czechia (70.3%), Bulgaria (67.8%) and

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Slovenia (67.7%). The country that maintained the most excellent proximity to Italy in 2016 was Croatia (60.0%), although the country's similarity to Spain was also high (58.7%). Only Estonia, as in 2007, recorded different institutional patterns. Unlike in 2007, in 2016, the institutional architecture of the product market competition in Estonia was the closest to the Scandinavian model represented by Sweden (74.8%), although the similarity to the Anglo-Saxon model was also high (73.9%).

Table 3. *Coefficients of similarity between the CEE countries and the reference countries of Western Europe in product market competition in 2016 (ψ = 3)*

CEE country	Reference country of Western Europe						
	Continental model		Mediterranean model		Nordic model		Anglo - Saxon model
	Germany	France	Spain	Italy	Sweden	Finland	UK
Bulgaria	47.9	52.5	67.8	59.8	39.8	50.9	42.0
Croatia	46.3	45.2	58.7	60.0	31.5	46.4	35.2
Czechia	59.0	55.3	70.3	54.0	57.2	53.7	54.8
Estonia	64.8	65.8	68.3	47.7	74.8	68.8	73.9
Lithuania	60.2	65.2	75.4	59.9	59.6	56.5	54.7
Latvia	61.3	63.7	78.2	61.3	61.5	62.5	60.0
Poland	67.5	63.4	77.9	70.3	51.7	55.4	54.0
Romania	57.4	57.6	72.9	64.0	48.8	54.9	51.8
Slovakia	49.1	54.4	72.1	57.8	54.5	52.1	48.8
Slovenia	57.7	64.1	67.7	67.2	53.2	57.3	49.3
Hungary	54.4	55.5	72.1	68.4	48.4	52.1	43.7
AVERAGE	56.9	58.4	71.0	60.9	52.8	55.5	51.7

Note: As in Table 2.
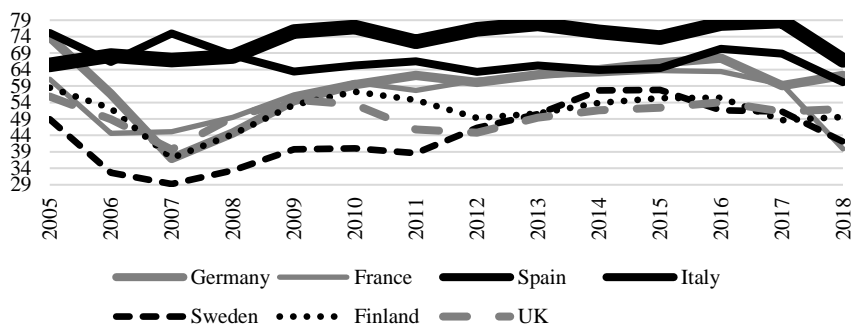*Source: Own calculations.*

The aggregated data for the CEE11 group demonstrates that the results are relatively robust to the reference country, representing a given model of capitalism. The above regularity applies to the Mediterranean, continental, and Scandinavian models. The two reference countries are representing the Mediterranean model of capitalism rank first and 2nd in terms of the degree of similarity to the CEE11 group as a whole in 2016 (with coefficients of 71.0% and 60.9%, respectively). The following two ranks (third and fourth) belong to France and Germany (58.4% and 56.9%), i.e., countries with the continental model of capitalism. The following two positions are occupied by two Nordic countries: Finland (55.5%) and Sweden (52.8%). The country representing the Anglo-Saxon model of capitalism ranks last (51.7%).

Therefore, we can indicate the following order of the models of capitalism to which the CEE11 group showed the most significant similarity in 2016 (starting from the model most akin): the Mediterranean, continental, Scandinavian, and Anglo-Saxon. It is worth emphasizing that these results were relatively stable in the analyzed year and

did not depend on a specific Western European country of reference. The values of the coefficients of similarity between Poland and the reference economies in all subsequent years covered by the analysis are presented in Figure 1. It allows assessing whether the situation observed in the initial period of the analysis (Table 2) and the final period (Table 3) is relatively stable or whether the degree of similarity of the institutional system shows large fluctuations in individual years.

The data show that the institutional architecture of the product market competition was relatively stable, and changes over time, both in Poland and the reference countries, were slow. As a result, the coefficients of similarity between Poland and individual reference countries revealed small fluctuations in subsequent years, illustrated by the relatively flat curves in Figure 1.

Figure 1. *Coefficients of similarity between Poland and the reference countries (ψ = 3)*

Source: *Own calculations.*

Figure 1 also confirms that in the area of product market competition in all the years covered by the analysis, Poland was the most akin to the Mediterranean model of capitalism. In the majority of years, the highest resemblance was recorded towards Spain. Only in some initial years, Italy was the country the most similar to Poland. At the same time, Poland showed, especially after 2010, a stable institutional similarity to the continental model represented by Germany and France. The curves for these two reference countries for 2010-2017 almost overlap and are relatively flat during this period, with a similarity coefficient standing at around 60-65%.

At the same time, the curves for France and Germany are below the curve for Spain (and for most years also for Italy), which suggests that the continental model of capitalism, as a reference point for Poland, occupied a well-established second position. On the other hand, the similarity of Poland towards Sweden, Finland, and the UK was much smaller, implying that the solutions adopted in Poland in the area of product market competition were relatively different from those observed in the countries with the Nordic Anglo-Saxon models of capitalism.

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Table 4 shows the robustness of the results to different values of the parameter ψ, representing the cut-off point. In the basic variant, $\psi = 3$. This means that the complete lack of similarity (value 0 of the similarity coefficient) is assigned when the difference between the CEE country and the reference country exceeds 3 standard deviations of a given feature in the full analyzed group of countries (18 countries). In the case of $\psi = 1$ and $\psi = 2$, the cut-off point appears faster - if the difference exceeds one or two standard deviations, respectively, the similarity coefficient for a given variable takes the value 0. As a result, the values of the aggregated similarity coefficients given in Table 4 for $\psi = 1$ and $\psi = 2$ are lower than for the basic variant. Similarly, in the case of $\psi = 4$, $\psi = 5$ and $\psi = 100$, the cut-off point is further away, and the similarity coefficients are higher.

It should be emphasized that different cut-off points, i.e., different values of the parameter ψ, do not only mean that the aggregated similarity coefficients will be from a different numerical range. The order of the reference countries may also change (which occurs in some cases in Table 4). The analysis of the robustness of the results to the parameter ψ is therefore not only a technical operation.

Table 4. *Coefficients of similarity between the four CEE countries and the reference countries of Western Europe for different values of the parameter ψ in 2016*

Parameter ψ	Reference country of Western Europe						
	Germany	France	Spain	Italy	Sweden	Finland	UK
Poland							
$\psi = 1$	26.6	28.1	45.8	36.2	18.5	21.2	15.6
$\psi = 2$	53.5	48.9	67.5	57.9	33.7	37.9	36.3
$\psi = 3$	67.5	63.4	77.9	70.3	51.7	55.4	54.0
$\psi = 4$	75.6	72.3	83.5	77.7	63.8	66.6	65.3
$\psi = 5$	80.5	77.8	86.8	82.1	71.0	73.3	72.3
$\psi = 100$	99.0	98.9	99.3	99.1	98.6	98.7	98.6
Czechia							
$\psi = 1$	25.0	19.2	39.3	13.7	20.6	12.5	17.8
$\psi = 2$	44.1	39.4	59.0	37.9	41.6	37.1	38.5
$\psi = 3$	59.0	55.3	70.3	54.0	57.2	53.7	54.8
$\psi = 4$	67.6	65.7	77.1	64.9	67.8	64.6	64.5
$\psi = 5$	74.1	72.6	81.7	71.9	74.3	71.7	71.6
$\psi = 100$	98.7	98.6	99.1	98.6	98.7	98.6	98.6
Slovakia							
$\psi = 1$	16.2	18.9	35.2	24.2	26.6	18.0	18.2
$\psi = 2$	32.2	35.7	59.8	43.3	39.9	36.9	33.2
$\psi = 3$	49.1	54.4	72.1	57.8	54.5	52.1	48.8
$\psi = 4$	61.9	65.8	79.1	67.9	65.9	64.0	61.3
$\psi = 5$	69.5	72.6	83.3	74.3	72.7	71.2	69.0
$\psi = 100$	98.5	98.6	99.2	98.7	98.6	98.6	98.5
Hungary							
$\psi = 1$	22.9	16.1	35.7	40.2	22.6	12.3	13.8
$\psi = 2$	38.9	37.2	60.3	56.7	35.5	35.4	28.4
$\psi = 3$	54.4	55.5	72.1	68.4	48.4	52.1	43.7

$\psi = 4$	64.7	66.3	79.1	76.3	60.5	62.8	56.4
$\psi = 5$	71.7	73.1	83.3	81.1	68.4	70.1	65.1
$\psi = 100$	98.6	98.7	99.2	99.1	98.4	98.5	98.3

Source: *Own calculations.*

In the case of Poland, regardless of the value of the parameter ψ, the highest degree of similarity was recorded in relation to Spain, and in the second place - to Italy. Hungary achieved similar results to Poland. For Hungary, the two Mediterranean reference countries also took the first two places for each parameter ψ, with the only difference that for $\psi = 1$, Hungary revealed the greatest similarity to Italy.

Czechia and Slovakia were characterized by the greatest institutional similarity to Spain for each parameter ψ. These countries differed by the reference country that ranked the 2nd in terms of the institutional proximity. For Czechia, the second place was taken in most cases by Germany, and to a lesser extent by Sweden, which means that Czechia was also slightly gravitating towards the continental model of capitalism (which is also confirmed by data in Tables 2 and 3). For Slovakia, it was Italy that usually ranked the 2nd in terms of institutional proximity, except one case, when it was Sweden.

After analyzing the robustness of the results to various values of the parameter ψ, it is worth considering what values of this parameter are recommended. There is not one right answer to this. It all depends on the role we assign to distant observations and outliers as well as what absolute level of similarity we would like to achieve. For Poland, the parameter ψ equal to 1 gives the similarity coefficients at an average level of 27% (this is the average for all seven coefficients). Such a similarity of the institutional matrix seems too small. On the other hand, with $\psi = 100$, the similarity coefficients averaged 99%, suggesting almost full institutional similarity between Poland and Western European countries, which is also difficult to consider as a satisfactory result.

One of the methods of selecting the desired value of the ψ coefficient is the assumption that the average level of similarity of the institutional environment between the CEE countries and the countries of Western Europe should not significantly differ from the similarity of these groups of countries in terms of income levels. In 2020, the GDP per capita (calculated according to the purchasing power parity) in Poland slightly exceeded 2/3 of the average level of per capita income in the EU15 group. If we adopt this line of reasoning, it turns out that the best, from the cognitive point of view, is the similarity coefficient calculated for the value of the parameter ψ for which the similarity of the institutional matrix of Poland and Western European countries is roughly like the existing income gap. As a result, the parameter ψ equal to 3 would be chosen. It results from the fact that for $\psi = 3$ the coefficients of similarity between Poland and Western European countries are equal on average to 63%. Of course, it should be remembered that the above considerations concern only the degree of similarity between countries, expressed in percentage terms, and to a lesser extent they

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affect the relative ordering of the reference countries in terms of the degree of similarity.

4. Conclusion

In the study, we compare 11 CEE countries, which are new EU members, with 7 Western European countries representing 4 Western European models of capitalism (continental, Mediterranean, Scandinavian and Anglo-Saxon) in the area of product market competition. The analysis covers the 2005-2018 period and 24 variables characterizing a given institutional area. The comparison of countries is based on the own concept of the similarity coefficient.

One of the elements of novelty and originality is the analysis of the robustness of the results, carried out in two aspects. The first one is to check whether it matters what specific country of Western Europe is treated as an ideal representative of a given model of capitalism. Secondly, we verify to what extent the introduced cut-off point in calculating the similarity coefficient (parameter ψ in formula (1)) affects the obtained results.

The analysis shows that the CEE countries are the most similar to the Mediterranean model of capitalism. The continental model ranks second. At the same time, it should be stated that the results are enormously robust to the assumptions made. The high institutional similarity of the CEE countries was seen towards both Spain and Italy (with an inevitable dominance of the first country). Moreover, the classification of Western European models of capitalism regarding the degree of proximity to the CEE countries is also robust to the cut-off point in the similarity coefficient (although the absolute values of this coefficient are different for various cut-off points).

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