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## Competitiveness of selected countries from Central and Eastern Europe in the era of globalisation

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Institute of Economic Research Working Papers

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**COMPETITIVENESS OF SELECTED COUNTRIES FROM CENTRAL AND  
EASTERN EUROPE IN THE ERA OF GLOBALISATION**

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## Competitiveness of selected countries from Central and Eastern Europe in the era of globalisation

**JEL Classification:** F02, O11, O40, B23

**Keywords:** *competitiveness; CEE economies; Perkal method*

### Abstract

**Research background:** The changes that took place in the late twentieth century led to the transformation of the political system in the countries of Central and Eastern Europe (CEE). As a result, there has been an increase in the competitiveness of some of the economies among the CEE states. Due to different priorities and goals, these countries are also characterised by different levels in socio-economic development.

**Purpose of the article:** The aim of the article is to identify the determinants affecting the competitiveness among the selected CEE countries.

**Methodology/methods:** Based on Eurostat data, a set of determinants affecting competitiveness was established. A number of determinants have been eliminated in relation to the variation coefficient. At the same time, a classification of the level of competitiveness among the CEE countries has been made by using the Perkal method. The analysis used 14 selected indicators, 10 of which are considered as stimulating and 4 as deteriorating the competitiveness of national economies. The result led to obtaining a synthetic level indicator of potential of the CEE countries.

**Findings & Value added:** Following the findings of the conducted analysis, the highest economic competitiveness exists in Estonia and in the Czech Republic, while the lowest was found in Romania and Bulgaria. The results of the evaluation obtained with the Perkal method concerning the competitiveness of the CEE countries that belong to the EU are largely consistent with those presented in different global competitiveness rankings. However, the method applied in this article seems much simpler and less time-consuming, allowing at the same time an optimal choice of analytical determinants. The selected linear Pearson correlation's coefficient confirmed that there is a strong positive relationship between the designated values of the synthetic indicator of competitiveness and the GDP per capita. This confirms the validity of test method used.

### Introduction

The changes that occurred in the late twentieth century in Europe led to the transformation of the political system in the countries of Central and Eastern Europe (CEE). The processes of globalisation associated with the liberalisation of movement of goods and capital and the opening of markets has led to profound social and economic transformations in these countries (Kornai, 2006, pp. 218, 222-240). To these belong the former Soviet republics Lithuania, Latvia, Estonia, Belarus, Ukraine and the Visegrád Group countries Poland, Czech Republic, Slovakia and Hungary. The group of countries in Central and Eastern Europe also includes the countries formed after the break-up of the former Yugoslavia, including among others Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro and Macedonia and other Balkan countries like Romania, Bulgaria and Albania. Some of them (Poland, Hungary, the Czech Republic, Slovakia, Romania and Bulgaria as well as former Soviet republics Lithuania, Latvia and Estonia) have acceded the European Union (EU), among which some have already adopted the single currency.

The transformation of the CEE countries made it possible to improve their competitive market positions. The academic literature often provides studies on economies of the countries that are members of the EU or on individually selected countries outside this group. There are also studies on factors affecting competitiveness in the CEE region and on individual countries in this region (e.g. Apanasovich *et al.*, 2016, pp. 33-37; Bevan & Estrin, 2004, pp. 782-785; Giroud *et al.*, 2012, pp. 2213-2219; Krajnyák & Zettmeyer, 1998, pp. 328-334; Binelli *et al.*, 2015, pp. 242-246; Aidukaite, 2011, pp. 212-217).

Interesting also appears the question of the level of competitiveness, however not so much in relation to other countries in the world but rather in relation to countries within the CEE group to extract and analyse differences between them. With regard to the international rankings, the level of economic and social development existent in the analysed countries has improved significantly after the entry into the European Union. Despite the EU membership, however, there are still visible development disparities.

For the purpose of the article, the authors decided to first identify the determinants affecting the competitiveness between the selected CEE countries in order to then assess the changes in the levels of their respective competitiveness potentials. To achieve this objective, a set of determinants has been defined (stimulants and destimulants) that affect regional competitiveness. To carry out such a study, the analysis focused on the academic literature with particular emphasis on competitiveness rankings.

## **Research Methodology**

The analysis selected those CEE countries that joined the EU, namely: Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia and Hungary. The classification of the level of competitiveness of these countries have been established by using the Perkal method including 14 selected indicators, 10 of which were considered as stimulants and 4 as destimulants for the competitiveness of the chosen national economies. The analysis was made for 2014 and on the basis of data published by Eurostat.

As stimulants to competitiveness have been included:

- x<sub>1</sub> - activity rates (share of population at the age 15-64 years),
- x<sub>2</sub> - GERD – gross domestic expenditure on R&D (% GDP),
- x<sub>3</sub> - exports of high technology products as a share of total exports,
- x<sub>4</sub> - total fertility rate (number of children per woman),
- x<sub>5</sub> - life expectancy by age (for children at the age less than year),
- x<sub>6</sub> - duration of working life,
- x<sub>7</sub> - lifelong learning (share of population at the age 15-64 years),
- x<sub>8</sub> - employment in knowledge-intensive activities (share of total employment),
- x<sub>9</sub> - nominal labour productivity per person (% of EU28 total = 100),
- x<sub>10</sub> - export market shares (% of world total)

Among the destimulants the following have been taken into account:

- x<sub>11</sub> - unemployment - annual average (share of population),
- x<sub>12</sub> - general government gross debt (% GDP),
- x<sub>13</sub> - HICP - inflation rate, annual average rate of change (%),
- x<sub>14</sub> - people at risk of poverty or social exclusion (% of total population)

The Perkal method used in this analysis helps to compare different selections of stimulants and destimulants, plus the result of its use allows for obtaining a synthetic indicator for the competitiveness potential in the regions. It is characterised by transparency and, what is most important, by a low information loss during data aggregation. The purpose of the use of this method was to create a classification of objects (CEE countries) according to a fixed set of characteristics. The higher the value of the synthetic indicator, the more favourable is the situation in a given country in terms of competitiveness. In this analysis, the index has been constructed on the assumption that all the elements (features) are the same at each level of generalisation.

The first step in the analysis was the determination of variables that describe the object of the study. This was followed by the selection of 14 variables that show a complete and comprehensive picture of the level of development and competitiveness of countries, including the value of the variation coefficient (with the critical value assumed at 5%). In addition, one of the criteria considered by selecting the set of characteristics was the actuality, availability and their comparability.

A normalisation of the given stimulants was then undertaken according to the equation (Dudzik & Głowacki, 2010, pp. 40-41):

$$T_{ij} = \frac{X_{ij} - \bar{X}_j}{S_j}$$

whereby:

$T_{ij}$  – value of the normalised indicator  $j$  for country  $i$

$X_{ij}$  – indicator value  $j$  for country  $i$

$\overline{X_j}$  – medium indicator value  $j$

$S_j$  – standard indicator deviation  $j$

In the case of the destimulants, the following equation has been applied:

$$T_{ij} = -\frac{X_{ij} - \overline{X_j}}{S_j}$$

The normalisation allowed for comparability between different indicators, even though they were originally expressed in different units (Dudzik & Głowacki, 2010, p. 41):

$$P_i = \frac{1}{n} \sum T_{ij}$$

whereby:

$P_i$  – indicator of competitiveness of a country  $i$

$n$  – total number of determinants (stimulant and destimulants)

Hereby, it was assumed in the analysis that each selected determinant has the same impact on the level of a given phenomenon.

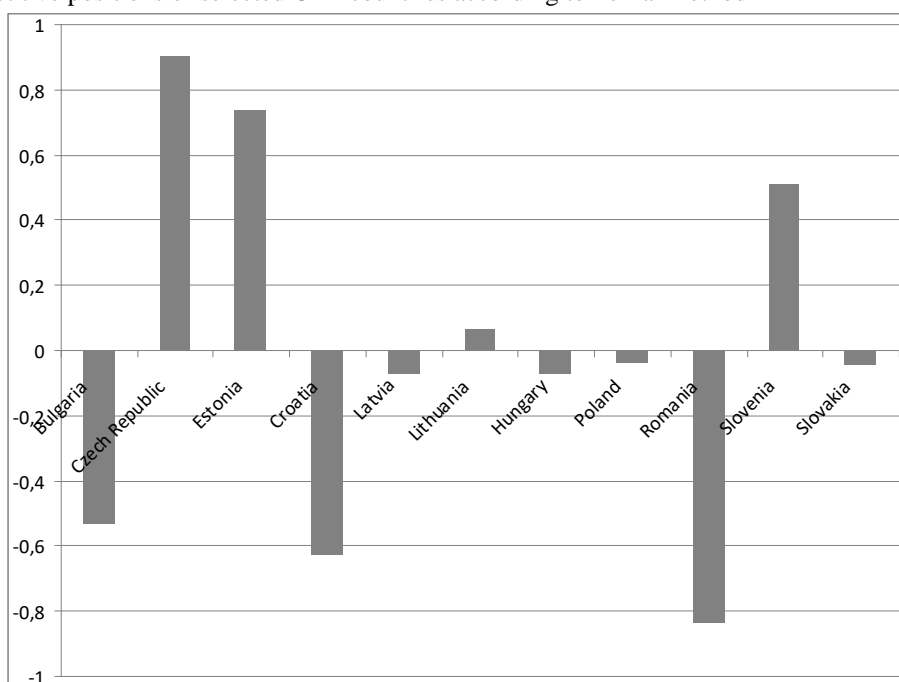
The next stage of the analysis calculated synthetic indicators of the level of competitiveness by summing together all the indicators for a given country. The value of the synthetic indicator designated by the Perkal ranges does not go beyond the  $[-3;3]$  range. For countries with a higher level of competitiveness, the indicator adopts positive values, while for those with a weak level of competitiveness, negative values are indicated (Parysek & Wojtasiewicz, 1979, p. 26). The classification of countries done according to the level of competitiveness used two taxonomic parameters, that is, it calculated the average and the standard arithmetic deviation into the equation.

## Results and discussion

On the basis of the obtained results (figure 1), the CEE countries were divided into three groups:

- I class – most competitive countries: the Czech Republic, Estonia and Slovenia,
- II class – countries with an average level of competitiveness: Lithuania, Poland, Slovenia, Latvia and Hungary,
- III class – countries with the lowest competitive potential: Bulgaria, Croatia and Romania.

**Figure 1.** Competitive positions of selected CEE countries according to Perkal method



Source: Own compilation

Categorising a country as belonging to one particular group was largely dependent upon the normalised values of the destimulants and stimulants, as shown in Table 1.

**Table 1.** Minimal and maximal values of determinants concerning the EU CEE countries in year 2014

Determinants		Normalised value of a country	
		minimal	maximal
<b>STIMULANTS</b>			
x <sub>1</sub>	activity rates (share of population at the age 15 - 64)	Romania (-1,5128)	Latvia (1,1461)
x <sub>2</sub>	GERD – gross domestic expenditure on R&D	Romania (-1,3576)	Slovenia (2,1655)
x <sub>3</sub>	exports of high technology products ( % of total exports)	Bulgaria (-1,332)	Estonia (1,717)
x <sub>4</sub>	total fertility rate (children per woman)	Poland (-1,92)	Latvia (1,4797)
x <sub>5</sub>	life expectancy by age (for children at the age less then year)	Bulgaria (-1,138)	Slovenia (2,1649)
x <sub>6</sub>	duration of working life	Hungary (-1,2840)	Estonia (1,9972)
x <sub>7</sub>	lifelong learning (share of population at the age 15 - 64)	Romania (-1,1080)	Slovenia (1,8076)
x <sub>8</sub>	employment in knowledge-intensive activities (% of total employment)	Romania (-2,7900)	Hungary (1,0589)
x <sub>9</sub>	nominal labour productivity per person (% of EU28 total = 100)	Bulgaria (-2,4010)	Slovakia (1,2404)
x <sub>10</sub>	export market shares (% of world total)	Croatia (10,8760)	Poland (2,3668)
<b>DESTIMULANTS</b>			
x <sub>11</sub>	unemployment – annual average (%)	Croatia (-2,0970)	Czech Republic (1,2918)
x <sub>12</sub>	general government gross debt (% GDP)	Croatia (-1,6640)	Estonia (1,7650)
x <sub>13</sub>	HICP – inflation rate, annual average rate of change (%)	Romania (-1,7390)	Bulgaria (2,6080)
x <sub>14</sub>	people at risk of poverty or social exclusion (%)	Bulgaria (-1,603)	Czech Republic (1,6745)

Source: own compilation

The maximum and minimum values had the greatest impact on the obtained results when using the Perkal method. The findings can be compared with the two best known rankings of competitiveness published by the IMF and the WEF as well as with the basic measure of economic performance i.e. the GDP per capita (Table 2).

**Table 2.** Competitive position of EU CEE countries in 2014

Country	Perkal method		IMD ranking		WEF (GCI) ranking		GDP per capita, PPS, (euro)
	ranking	value	ranking	value	ranking	value	
Czech Republic	1	0,9026	33 (2)	62,213	37 (2)	4,53	14900
Estonia	2	0,7360	30 (1)	64,383	29 (1)	4,71	15000
Slovenia	3	0,5111	55 (9)	46,245	70 (9)	4,22	18100
Lithuania	4	0,0688	34 (3)	62,014	41 (3)	4,51	12500
Poland	5	-0,0399	36 (5)	61,767	43 (5)	4,48	10700
Slovakia	6	-0,0435	45 (6)	53,302	75 (10)	4,15	14000
Latvia	8	-0,0696	35 (4)	61,841	42 (4)	4,50	11800
Hungary	7	-0,0720	48 (8)	52,505	60 (8)	4,28	10600
Bulgaria	9	-0,5323	56 (10)	45,784	54 (6)	4,37	5900
Croatia	10	-0,6259	59 (11)	38,974	77 (11)	4,13	10200
Romania	11	-0,8354	47 (7)	52,841	59 (7)	4,30	7600
Total country number in the ranking / max. value	11	3,0000	60	100 pts	144	7,00	does not apply

Source: own compilation based on research results of IMD Competitiveness Scoreboard (2014), Schwab (Ed.) (2014, pp. 68-69), Eurostat.

The countries in table 2 are ordered according to the results obtained with the Perkal method. As regards the IMD and WEF competitiveness rankings, the places in parentheses refer to the order among the EU CEE countries, had they only been taken into account in the study. The above table shows that the applied Perkal method allowed obtaining similar results to those obtained in a more complex method for assessing

competitiveness. All methods of evaluation confirmed that the highest competitiveness among these countries exists in Estonia and in the Czech Republic. Differences subsist in the case of the countries being further down in the rankings, which most likely results from the selection of variables to determine the competitiveness: concerning the Global Competitiveness Index (GCI) published by the WEF, more than 100 evaluation criteria are taken into account (Schwab (Ed.) 2014, pp. 9, 537-545) and the assessment of competitiveness used in the IMD World Competitiveness Yearbook, one finds more than 300 factors (<https://worldcompetitiveness.imd.org/>).

The Perkal method strictly focuses on economic factors and selected social issues. It however omits political and legal factors, which also have an influence on the competitiveness of national economies and which are taken into account by the IMD and WEF rankings.

It is worth noting here that the highest value regarding the Perkal indicator points to the countries that joined the EU structures in 2004, which may in turn indicate that with the EU accession, the competitive position of those countries have not only increased among countries belonging to the Central and Eastern European region but it also increased their competitiveness on the international level.

By using the Pearson's linear correlation coefficient, the relationship between the synthetic indicator obtained by Perkal method on the one and the GDP per capita value, PPS (euros), on the other hand was also examined. The calculation showed that the Pearson value equalled 0.8395, which indicates a strong positive relationship between the analysed variables. In contrast, the calculations showed a moderate positive correlation (0.5542) between the synthetic indicator and the results obtained in the IMD ranking. A similar comparative analysis of the synthetic indicator in relation to the results coming from the WEF ranking also proves a moderate positive correlation (0.5407).

Already lot of research on economic growth and improvements of competitiveness has been carried out. G. W. Kolodko has studied the economies of the CEE countries and other countries that emerged after the collapse of the Soviet Union. The best growth rate of real GDP in the period 1989 – 1999 among these countries was in Poland, Slovenia and Slovakia. In his forecasts for the years 2003-2004, G. W. Kolodko presented a similar set of countries as leaders (Kolodko, 2001, pp. 287, 294, 302-303). J. Kornai conducted a similar analysis for the year 2003, based however on the actual data. Kornai's research confirmed the forecast made by G. W. Kolodko. By contrast, the rankings of countries made on the basis of the average real GDP per capita growth and average labour productivity growth (as %) provided different results. Concerning both indicators, the highest value was observed for Latvia, Estonia and Lithuania (Kornai, 2006, pp. 212-214). The highest GDP per capita (PPS) value in 2008 achieved Slovenia, the Czech Republic and Estonia. In 2009, the Gini index was lowest for the Czech Republic, Slovakia and Hungary (as well as the absolute poverty rate) (Aidukaite, 2011, pp. 213, 215).

Assessing the analysed literature sources with the results obtained by using the Perkal method, it can be said that the highest competitive potential possesses the Czech Republic, Estonia and Slovenia, to which G. W. Kolodko and J. Kornai pointed out in their earlier quoted analysis. Equally, these countries have the highest level of GDP per capita among those analysed. Accordingly, the results based on the Perkal method are in line with other studies, which largely confirm the validity of used test method.

## Conclusions

Competitiveness is primarily associated with a strong and sustainable economy and knowledge society. These issues are discussed at the national level concerning development strategies as well as are subjects of research in economics. In the current study of competitiveness, the analysis used simple and transparent synthetic indicator, which is characterised by a low loss of information associated with the aggregation of data.

The Perkal method is not only quite frequently used in evaluating the level of competitiveness and innovation but it is also applied to analyse other issues related to regional development. Furthermore, it is commonly used to study regional level understood as areas or parts of a country. However, as in the current study, it may be used to assess competitiveness of regions understood as group of countries.

The results regarding the competitiveness of the CEE countries belonging to the EU and obtained with help of the Perkal method are largely consistent with the results presented in the rankings of countries' global competitiveness. However, the applied method is much simpler and less time consuming and it also allows for an optimal selection of factors for the given assumptions, thereby determining the choice of the analysed issue as regards its socio-economic development. However, this method does not take into account political, legal or social contingencies, which also have a large impact on the level of competitiveness of economies.

Following the calculations of the level of competitiveness as determined by the Perkal method, one point is still worth noting: the earlier the Central and Eastern European countries had joined the European Union structures, the higher would have been their international competitiveness. This could have probably resulted from a better use of the EU funds for restructuring and modernisation of their economies as well as better availability of funds in recent years as compared to the earlier period.

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