

THE ANALYSIS OF THE EU MEMBER STATES' COMPETITIVENESS BASED ON STATISTICAL METHODS

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Abstract

In our current paper we analysed the alignments of the EU member states based on the 2005 and 2008 IMD and WEF competitiveness rankings and based on the indicators used for the ranking which can be considered as decisive ones having indirect effect. We analysed the realignments within and among the groups based on their rank values in the competitiveness ranking.

Key Words: *regionality, competitiveness, statistical analysis*

JEL Classification: R10, O11, C1

1. INTRODUCTION

Nowadays, more and more literatures are dedicated to the issue of the economic competitiveness, however, there is not any standard theory on it which can be considered as a commonly accepted one.

Michael Porter, one of the most prominent representatives of the competitiveness researches puts the production in the centre of his analyses. According to him, the productivity can be considered as the prime determinant of a nation's standard of living, including GDP per capita. (Porter, 1990, p 6). For this reason, we have to focus on to identify and to understand the factors determining productivity. However, it has to be done on the level of certain industries instead of analysing a national economy as whole. (Porter, 1990, pp 6-7).

In contrast to Porter, Krugman considers totally meaningless to anatomize the national competitiveness. According to him, competitiveness cannot be defined on national only on company level (Krugman, 1994, pp 30-31). If a company is not enough competitive, it is freed

out from the market and goes out of business. However, countries do not go out of business. For this reason, national competitiveness, as a concept, cannot be defined.

Chikán, Czakó, Zoltay-Paprika define national competitiveness as an ability by which a country is able to produce and sell such product which meets the international trading requirements and during this process the country is able to increase the rate of return of its own production factors (Chikán, Czakó, Zoltay-Paprika, 2002, p 25). During their researches, the authors focuses on the use of the production factors.

Beyond the before mentioned literatures, several transnational organisations are also pay special attention to the issue of the competitiveness. According to the OECD the national competitiveness measures the advantages or disadvantages of a country in selling its products in international markets (OECD, 2005). The European Union also treats competitiveness and its analysis as a priority. The major element of its competitiveness report published in every year is the analysis of the productivity. Namely, the EU indentifies productivity as the key factor for competitiveness in the long-run (EU Commission, 2008, p. 4).

The Institute for Management Development (IMD) and the World Economic Forum (WEF) also pays special attention to the analysis of national competitiveness. The two institutions prepare worldwide recognised competitiveness rankings. IMD presents its competitiveness ranking in its World Competitiveness Yearbook since 1989 while the WEF in its Global Competitiveness Yearbook since 1979 in every year. The two institutions define the competitiveness in different ways. IMD defines the competitiveness „*as the ability of a nations to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people*” (IMD, 2008, p. 32). It analyses and ranks which country is able to create more favourable environment for companies. Because, according to IMD, wealth is created on company level. For this reason, IMD can serve as a guide mainly for enterprises on which country can provide better operational environment.

In contrast to IMD, WEF defines the competitiveness „*as the set of institutions, policies and factors that determine the level of productivity of a country*” (WEF, 2008, p. 3). The organization focuses on the productivity. According to it, since the Short and long term prosperity, economy and citizens' welfare of a country depends on the productivity, the more a country is able to deliver more favourable conditions to increase productivity, the more it is competitive. For this reason, WEF can serve as a guide rather for governments in connection of the competitiveness.

Material and method

In order to be able to compare 2005 and 2008 figures, those countries (Bulgaria, Cyprus, Latvia, Lithuania) which have been covered only in one year from the two, in 2005 or 2008 by IMD, WEF, have been left from the analysis. As a result of it, eight, 2005 and 2008 indicators and competitiveness ranks of 22 countries have been analysed by us. In case of all indicators we used rank values referring on the given country for our calculations.

The analysed countries and their abbreviations

	Country	Abbreviation		Country	Abbreviation
1	Belgium	Be	12	Hungary	Hu
2	Czech Republic	Cz	13	Netherlands	Ne
3	Denmark	De	14	Austria	Au
4	Germany	Ge	15	Poland	Pol
5	Estonia	Es	16	Portugal	Por
6	Ireland	Ir	17	Romania	Ro
7	Greece	Gr	18	Slovenia	Slo
8	Spain	Sp	19	Slovakia	Slk
9	France	Fr	20	Finland	Fi
10	Italy	It	21	Sweden	Sw
11	Luxembourg	Lu	22	United Kingdom	UK

Indicators covered by the analysis

	Indicator	Abbreviation	
		2005	2008
1	IMD competitiveness ranking	IMD	IMD*
2	GDP growth (%)	GDP%	GDP%*
3	GDP per capita (PPS)	GDP/fo	GDP/fo*
4	Unemployment rate (%)	Unemp%	Unemp%*
5	Employment rate (%)	Empl%	Empl%*
6	WEF competitiveness ranking	WEF	WEF*
7	Burden of government regulation	bur	bur*
8	Public trust of politicians	tru	tru*
9	Quality of the educational system	edu	edu*
10	Extent and effect of taxation	tax	tax*

Source: WEF Global Competitiveness Report 2005-2006, 2008-2009; IMD World Competitiveness Yearbook 2005, 2008

The first 5, commonly accepted indicators reflect the overall level of the economic development. They have objective values. However, in order to standardize the data, we used only their rank values referring on the covered countries for our calculations. For ranking, these indicators are used by IMD only.

The other group of the indicators (6-10) are available as rank values only. It can be considered as soft data collected through opinion surveys. This group of the indicators are used by WEF only. Based on professional considerations, we tried to pick such 4 indicators which reflects the ranking value judgement of WEF and do not used by IMD.

<i>Some „soft” WEF indicator</i>	<i>Questions raised in connection with the indicator</i>
Burden of government regulation	Complying with administrative requirements (permits, regulations, reporting) issued by the government in your country is burdensome/not burdensome
Quality of the educational system	The educational system in your country does not meet the needs of a competitive economy/meets the needs of a competitive economy
Extent and effect of taxation	The level of taxes in your country significantly limits the incentives to work or invest/has little impact on the incentives to work or invest
Public trust of politicians	Public trust in the financial honesty of politicians in your country is very low/very high

Source: World Economic Forum (2008): Global Competitiveness Report, pp. 367, 371, 414, 425

The ranking values of the selected indicators were created based on the values received from opinion surveys. Questions raised in connection of an indicators well reflects the content of a given indicator.

2. RESULTS

2.1 Connections of the indicators used for the analysis

First, we calculated the correlations between the two competitiveness rankings and their 4-4 picked out indicators for both years (for 2005 and 2008). The rank values of the countries remained the original „world rank values”, therefore, in some extent, they also reflect the „distance” among the countries.

In 2005, the IMD competitiveness ranking and the country rankings based on its 4 indicators considered as representant did not show strong correlation, except GDP per capita ($r=0,795$). In 2008, the correlation with the employment rate also strengthened (Table-1). However, GDP per capita is an important but not the exclusive parameter of the competitiveness potential, therefore it is certain that other factors also play determining role in this issue.

Table-1: The value of the correlation coefficients reflecting the strength of the relationship between the IMD competitiveness ranking and the ranking of its 4 representants

<i>IMD</i>	<i>GDP%</i>	<i>GDP/fo</i>	<i>Unemp%</i>	<i>Empl%</i>
<i>2005</i>	-0,210	0,795	0,528	0,629
<i>2008</i>	-0,141	0,805	0,563	0,757

Source: own calculation

The WEF competitiveness ranking also showed only with one of its representants, with the public trust of politicians stronger relationship ($r=0,804$) in 2005. However, in 2008 its relationship became also stronger with the ranking of educational level’s quality (Table-2).

Table-2: The value of the correlation coefficients reflecting the strength of the relationship between the WEF competitiveness ranking and the ranking of its 4 representants

<i>WEF</i>	<i>bur</i>	<i>tru</i>	<i>edu</i>	<i>tax</i>
2005	0,346	0,804	0,673	-0,085
2008	0,447	0,815	0,883	0,034

Source: own calculation

From the indicators of the methods characterizing both competitiveness rankings, the representants were so selected that one of them shows strong while two moderate relationship with the relevant competitiveness ranking. Furthermore, there is one representant which does not show any correlation with the relevant complex competitiveness ranking.

The linear relationship relative to the EU countries of the two ranking values (IMD and WEF) is relatively strong $r=0,839$ and $r=0,876$ (Table-3). Between the two competitiveness rankings good correspondent can be observed. At the same time, it also refers to that that between the two competitiveness rankings more differences can be found as well.

Table-3: Correlations of the rankings and ranking differences

Variable pairs	value of „r”
IMD and WEF rankings in 2005	0,839
IMD and WEF rankings in 2008	0,876
2005 and 2008 IMD rankings	0,954
2005 and 2008 WEF rankings	0,950
Differences of IMD and WEF rankings in 2005 and 2008	0,505
Differences experienced in the IMD and WEF rankings during 3 years	-0,220

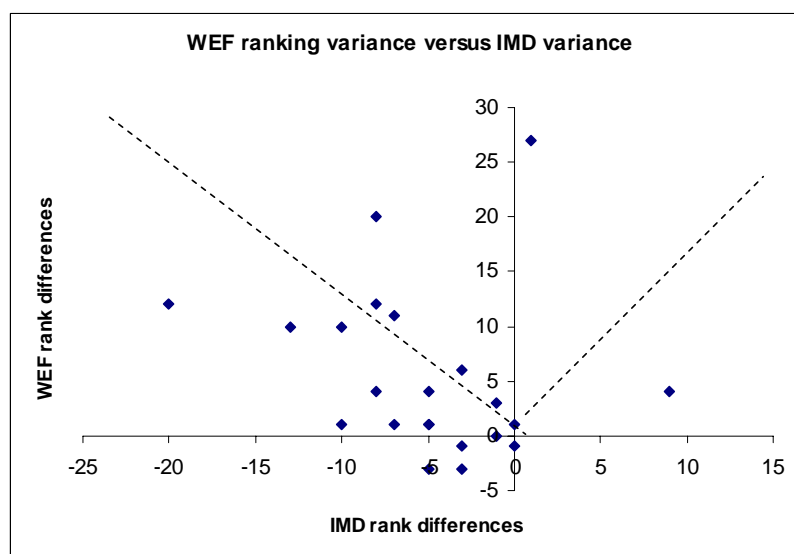
Source: own calculation

Moderate strong relationship can be observed between the development of the differences of the two sort of ranking values in the two analysed years ($r=0,505$). These ranking developments refer to some similarities. However, the differences of the IMD ranking values for the two years do not show any relationships with the differences of the WEF ranking values for the two years ($r=-0,22$). Namely, the development in the ranking of the countries were determined by different viewpoints.

The figure showing the relationship of the two different competitiveness rankings suggests to create 4 groups (Figure-1). Countries in the group 1 were ranked higher in the IMD ranking while slipped back in the WEF ranking. Countries in the group 2 slipped back while countries in the group 3 were ranked higher in both rankings. The position of three countries remained nearly the same (Belgium, Ireland, Denmark). Two countries slipped back in both rankings (Finland and Hungary). Austria, Netherland and Sweden were ranked higher in both rankings. The majority of the countries were ranked higher in the IMD ranking but slipped back in the WEF ranking.

By the cluster analysis another sort of group formation can be observed. In this case, instead of the direction of the shift in the competitiveness ranking, the grouping is based on the rank values of the indicators selected as representant.

Figure-1: Grouping of the EU countries in line with the degree of their rank changes based on the two different sort of competitiveness indicators



Source: own editing

The position of three countries (Belgium, Ireland and Denmark) remained nearly the same. We can find them in the near of the origo. The two countries (Finland and Hungary) in the right upper quadrant slipped back in both competitiveness rankings. In case of Hungary, the degree of the setback was larger in the WEF ranking while in case of Finland in the IMD ranking. Austria, Netherlands and Sweden in the left down quadrant were higher ranked in both rankings. The majority of the countries are in the left upper quadrant. These countries improved their positions in the IMD ranking while slipped back in the WEF ranking.

By means of the cluster analysis, we can observe a different group formation. This time the grouping is based on the rank values of the indicators selected as representants instead of the direction of the shift in the competitiveness ranking. First we group and characterize the EU countries by using the 4 selected IMD (GDP%, DGP/fo, Unemp% and Empl%) indicators for both years (Table-4-5).

Table-4: Rank averages of the groups created in line with the 2005 IMD variables

Group	Group members	IMD	GDP%	GDP/fo	Unemp%	Empl%
1	Be, Fr, Gr, Sp, It, Hu, Fi, Cz, Slo	36,2	40,4	27,1	36	40,2
2	Au, Sw, UK, Ge, Por, De, Ne	20,1	49,0	19,1	23,6	18,7
3	Ir, Lu	11,0	25,0	2	12,0	14,5
4	Es, Ro, Pol, Slk	44,5	15,5	42,3	46,0	41,5

Source: own calculation

Table-5: Rank averages of the groups created in line with the 2008 IMD variables

Group	Group members	IMD*	GDP%*	GDP/fo*	Unemp%*	Empl%*
1	Be, Fr, Gr, Sp, It, Hu, Fi, Cz, Sln	34,7	46,3	21,5	36,7	41,3
2	Au, Sw, UK, Ge, Por, De, Ne, Fi	18,7	44,0	16,5	29,5	22,7
3	Ir, Lu, De, Ne	8,3	36,5	6,5	12,8	9,8
4	Es, Ro, Pol, Slk, Cz, Sln	33,7	14,7	31,5	32,7	29,5

Source: own calculation

Thereafter, we observe the moving and occurent realignment of the created groups based on the IMD ranks. The columns of the table-6 show the group formation for 2005 while the lines the group formation for 2008. Countries within the same cell belonged to the same group in both years. The lines and columns within the table are settled in increasing order of the group's rank averages. Due to the realignment among the groups, the groups included different country groups.

Table-6: The composition and average rank values of the groups created for 2005 and 2008 by clustering based on the 4 IMD variables

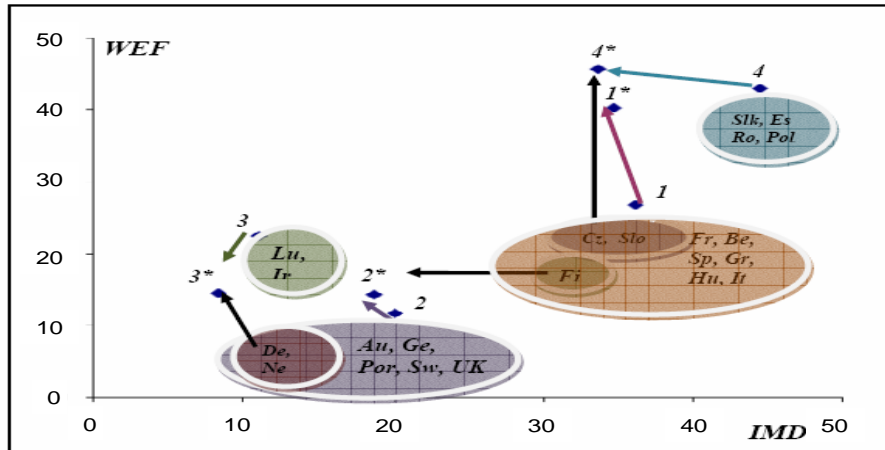
2008.	11,0	20,1	36,2	44,5	Average*
Group 1			Be, Fr, Gr, Sp, It, Hu		34,7
Group 4			Cz, Sln	Es, Ro, Pol, Slk	33,7
Group 2		Au, Sw, UK, Ge, Por,	Fi		18,7
Group 3	Ir, Lu	De, Ne			8,3
2005.	Group 3	Group 2	Group 1	Group 4	

* The rank average of the group

Source: own calculation

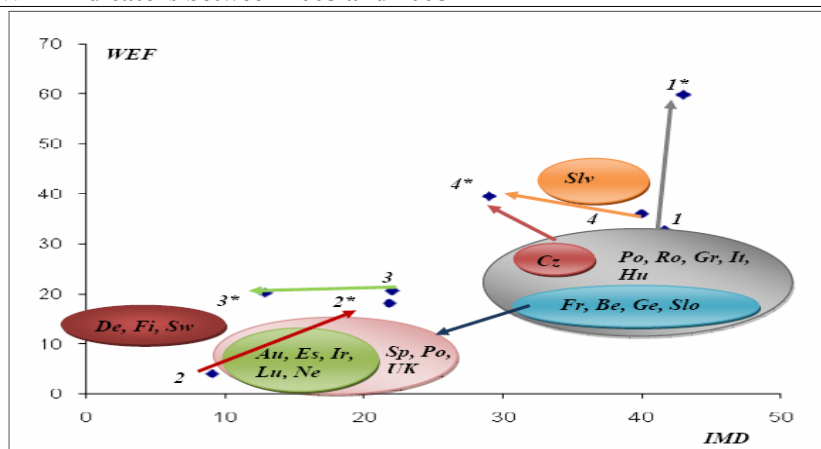
Figure-4 already shows shifts and realignment based on two viewpoints. This time, the figure shows the groups created by cluster analysis based on their IMD and WEF competitiveness rank values for 2005. This is complemented by the arrows belonging to the groups which shows the degree and the direction of the shift for 2008. Axis x shows the IMD while axis y the WEF rank values.

Figure-4: Shifts and realignment of the groups created by cluster analysis based on the 4 IMD indicators between 2005 and 2008



The groups created in line with the IMD indicators also relatively differentiate based on the WEF ranking. During the covered 3 years period, minor realignment can be noticed which can be well followed on Figure-4. From the covered 22 countries, 5 countries moved into another group. Germany (De) and Netherlands (Ne) moved into an IMD group which can be characterized with better parameters while the Czech Republic (Cz) and Slovenia (Slo) into a group which is more unfavourable based on WEF ranking. The position of Finland (Fi) improved according to both viewpoints. The shifts among the groups and the valuation of the groups based on their average rank values is included in Table-6.

Figure-5: Shifts and realignment of the groups created by cluster analysis based on the 4 WEF indicators between 2005 and 2008



Source: own editing

These analyses were also repeated based on the 4 representant WEF indicators. The figures are included in Table-7 and illustrated by figure-5.

Table-7: The composition and the average rank value of the groups created by clustering based on the 4 WEF indicators for 2005 and 2008

Group 2008	4	20,6	32,7	36	The average rank value of the groups
1.			Gr, It, Hu, Pol, Ro		59,8
4.			Cz	Slv	39,5
3.		Ir, Lu, Ne, Au, Es			20,2
2.	De, Fi, Sw	UK, Sp, Por	Be, Fr, Ge, Sln		18,1
Group 2005	2	3	1	4	

Source: own calculation

3. CONCLUSION

By analysing separately the two different competitiveness rankings and their index groups it can be noticed that well differentiating groups are evolving which also show separation based on the single (own) indicators.

However, the group creation based on one of the competitiveness indicator groups (e.g. IMD) does not show well separable groups based on the values of the other indicator (e.g. WEF) (Table-4-5) And vice versa. The group formations are specific. They take into considerations specific viewpoints being typical of the given indicator groups (typical of the institution preparing competitiveness ranking).

Irrespectively of this, the final result, the correlation between the ranking of the countries show pretty high value ($r=0,8$). It reflects that, even it is judged based on other viewpoints, the two institutions, irrespectively from minor differences, prepares the same or rather very similar competitiveness rankings. The correlation coefficients show the strengthening of this correspondence ($r=0,839$ in 2005 and $r=0,876$ in 2008).

Generally, it can be set out that, in spite of the relatively strong correlation of the results of the two rankings, in the two rankings there are more differences and counter-positioning regarding the countries' rank.

We intended to show these contrasts and similarities and characterize the ranked EU member states based on their competitiveness ranks and its developments.

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