NATIONAL COMPETITIVENESS OF VISEGRAD GROUP COUNTRIES ACCORDING TO NEW WEF METHODOLOGY

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Abstract

Competitiveness rankings are a widely used method of international comparison among countries. The Global Competitiveness Index (GCI), the composite indicator of national competitiveness discussed in this paper, is accepted by policymakers and other authorities for its ability to integrate a significant number of variables describing the positive and negative aspects of countries' competitiveness. The explanatory power of this international ranking depends strongly on the choices made during the process of construction of the composite index (CI). Starting with preliminary results published in GCR 2017-18, the WEF compiled a new competitiveness index, the GCI 4.0, which succeeded the GCI. The GCI (based on a consistent methodology) was published in the period 2006-17. The new methodology brings a revision of individual variables and pillars of competitiveness, reorganisation of input data (wider representation of hard data), and a different approach to normalisation of input data. However, the final aggregation of the pillar values into the final index represents the most fundamental methodological change. In the GCI 4.0, the 12 pillar scores are averaged to produce the overall rating, with all pillars weighted equally. The aim of this paper is (1) to identify competitive advantages and disadvantages of the V4 countries using the new WEF methodology, (2) to compare their average results using the original and the new WEF methodology (3) to apply the alternative attitude to the final aggregation (the geometric mean of pillars), and (4) to explain the differences in results found.

Key words: Global Competitiveness Report, GCI, GCI 4.0, national competitiveness, the composite indicator

JEL Code: E60, F40, F60

Introduction

Our paper is based on a discussion about the impact of methodological changes and aggregation methods on the results of the Visegrad Group Countries in the composite indicator, which is published by the World Economic Forum (WEF).

We start by a brief discussion of the term 'competitiveness'. In this part of our paper, our focus is placed on the most often criticised aspects of the measurement of the national

competitiveness by the composite indicators. The following section of the paper deals with the differences between the original and the new WEF's methodology for the construction of the Global competitiveness index (the GCI and the GCI 4.0). The new WEF attitude to the CGI's structure is reflected in the changes in the countries' ranking in the individual pillars, its effect on the compatitive advantages and disadvantages of different countries being varied. We primarily focus on the impact of the WEF's methodological changes on the results of the Visegrad group countries (the V4). However, methods used for our analysis allow us to describe the impact on the EU-28 position in the whole countries' sample (114 countries) as well.

The critical change resides in a different attitude to the final aggregation. While the original methodology was based on the differentiation of countries according to the stage of development, the new methodology propounds the same weighting system for all countries. This new WEF's approach inspired us to use the freely accessible WEF data, apply different aggregation method (a geometrical mean), and assess its impact on the ranking of the V4 and the EU-28 in the sample of 114 countries.

1 National competitiveness – a brief review of present attitudes to this concept

The term 'competitiveness' is not (and maybe cannot ever be) defined unambiguously because of the different conditions and context in which it is used. It is always necessary to link meaningful measurement of competitiveness to the level of analysis (national, industry, firm or product) and consider the competitive performance, its long term sustainability, and the management of the competitive process. While firm competitiveness (in the economic literature) is usually linked to the firm's productivity growth, the concept of national competitiveness - although the term 'national competitiveness' is used frequently - does not have a clear definition. According to P.J. Buckley, Ch. L. Pass and K. Prescott (1988) and others, it is necessary to differentiate between different levels of competitiveness and consider these connections:

1) competitiveness on firm and industry level includes both efficiency (reaching goals at the least possible cost) and effectiveness (choosing the right intentions); 2) competitiveness is a relative concept in three aspects: relative to the situation of a different historical point of time, relative to existing comparators, and relative to a well-defined counter-factual position; 3) the role of trade performance in competitiveness should be evaluated sensitively and carefully; 4) the crucial role of management is emphasised on the industry level and the role of government

as a policymaker and subject, which determines the institutional and environmental conditions for the business and economic performance, is pointed out on the national level.

Similarly, the study of Chabowski and Mena (Chabowski & Mena, 2017) pronounced a connection between international management elements, a market-based perspective, and global competitiveness and pointed out the critical role of international marketing to a company's development, strategic implementation, and performance. Rosenbaum (2011) remarks that ordinal competitiveness rankings attempt to order countries in terms of their relative competitiveness (rankings usually do not say anything about absolute differences in competitiveness). 'The only message that is correctly conveyed is that another country's performance has improved more (or deteriorated less) to the criteria used to produce the ranking.' (Rosenbaum, 2011, p.82)

Applying correlation of ranks and correlation of rank changes, Rosenbaum (2011) shows that competitiveness rankings, with some limitations, deliver a consistent message in terms of the relative placement of countries. According to Rosenbaum (2011), these results can be explained by a similar methodology and the underlying data.

Using a panel data approach, Neagu (2018) found a validated influence of the GCI on the annual rate of GDP in the EU countries. His findings show that the impact is higher in the group of Eastern and Central European countries than in the Western European (well developed) countries and the EU-28 as a whole. (Neagu, 2018).

The critics of the WEF methodology usually draw the policymakers' attention to problems with: 1) the model specification (rankings are based on the assumption that competitiveness can be measured in a meaningful way; rankings assume that the determinants of competitiveness do not differ between countries); 2) the choice of variables (wide usage of soft data obtained by questionnaire responses is often criticised[1]); 3) the identification of causal relations; 4) the weighting scheme, and 5) the method of linear aggregation. Pérez-Moreno et al. (2016) pronounce total substitutability between the twelve pillars in the WEF composite index and propose the following improvements of the computation of the GCI: double reference point scheme in the normalisation and an aggregation function, which deals with the problem of substitutability between pillars. Petrarca and Terzi (2018) criticise mainly the original WEF weighting scheme (weights are fixed but vary according to the stage of development). These authors present an alternative method to compute the GCI employing a partial least squares path model with endogenously derived weights. Their findings are not consistent with the WEF's

[1] As Rosenbaum (2011), and Necadova (2019) warn, survey data may be skewed by both a home bias (national point of view) and a perception bias (impact of general attitude among respondents).

theoretical assumptions, i.e. they do not find the reasons for different (fixed) weights according to the stage of development. Adamkiewicz (2019) points to the following drawbacks of the WEF's methodology: the mix of input-side and output-side variables (i.e. variables connected with GDP, so named 'the GDP-contaminated variables') in combination with the stage-of-development weights artificially improves the image of the GCI as a predictor of national productivity. Aiginger and Vogel (2015) also distinguish between input and output competitiveness and arrange countries' ranking according to costs, structure, and capabilities (drivers of competitiveness) as well as according to economic, social, and ecological performance (performance pillars).

2 Aims and methods

The expected benefit of this paper is based on comparison of countries' results according to the original and the new WEF's methodology. Due to the changes in the number of evaluated countries during the reference period (we used time series 2007-17 for the GCI and time series 2017-19 for the GCI 4.0), the WEF's data were adjusted. All countries not evaluated in the year 2007 were eliminated, and therefore, our sample consists of 114 countries. To obtain the countries' final values, ranking in individual pillars, and in the composite indicators, we the average countries' results in the periods mentioned above were used. Following the aim to reduce the substitution among the pillars in the GCI 4.0, an alternative attitude to the final aggregation of pillars' values (the geometrical mean) was employed. Finally, the frequency distribution of countries enables to show the impact of the new WEF methodology on the position of the EU-28 in the whole sample of countries.

3 The original and new methodology to the construction of the GCI

The Global Competitiveness Report (the GCR) aims to detect the microeconomic and macroeconomic foundations of national competitiveness, which it defines as the set of institutions, policies, and factors that determine the level of productivity of a country. The concept of competitiveness contains static and dynamic components: although the productivity of a country determines its ability to sustain its level of income, it is also seen as one of the key determinants of an economy's growth potential.

According to both the original and the new methodology, the determinants of competitiveness are grouped into 12 pillars of competitiveness (see Table 1 and 2). The World

Economic Forum (the WEF) draws its data from two sources: international hard data sources and the Executive Opinion Survey (the EOS)[2].

Table 1 shows the different weights for pillars depending on the stage of development. For a better understanding of the final effects of the methodological changes (see Chapter 3), it is necessary to provide the following view on the WEF's weighting scheme.

Tab. 1: The original WEF's weighting scheme (the GCI)

WEF sub-indices	WEF pillars	Stage 3 (20:50:30) A:B:C	Stage 2 (40:50:10) A:B:C	Stage 1 (60:35:5) A:B:C
A. Basic requirements (16/37)	1. Institutions (0/21)*	5	10	15
	2. Infrastructure (3/6)*	5	10	15
	3. Macroeconomic environment (5/0)	5	10	15
	4. Health and primary education (6/4)	5	10	15
B. Efficiency enhancers (13/36)	5. Higher education and training (2/6)	8.5	8.5	5.95
	6. Goods market efficiency (5/11)	8.5	8.5	5.95
	7. Labour market efficiency (2/8)*	8.5	8.5	5.95
	8. Financial market development (0/8)	8.5	8.5	5.95
	9. Technological readiness (4/3)*	8.5	8.5	5.95
	10. Market size (2/0)	8.5	8.5	5.95
C. Innov. and soph. factors (1/17)	11. Business sophistication (0/10)*	15	5	2.5
	12. Innovation (1/7)*	15	5	2.5

Source: WEF (2017b), author's processing. Note: The quantities of the two types of variables used in sub-indices and pillars (hard data/soft data) are mentioned in the 1st and 2nd column (in brackets). Weights of sub-indices for the different stages of development are listed in the headlines of the 3rd, 4th, and 5th column (in brackets). The content of the table comprises weights of pillars. Pillars with '*' sign contain indicators which enter into the GCI in two different pillars. Avoiding double counting is assured by giving a half-weight to this variable.

The original methodology supposed the differences in the weights by pillar and country, from 5 to 15 per cent, according to (1) the sub-index to which the pillar belonged and (2) the country's stage of development. In the original methodology, the basic requirements (i.e., institutions, infrastructure, macroeconomic environment, and health and primary education) accounted for 60 per cent of the overall GCI score in the case of low-income countries and commodity-dependent economies. In contrast, the importance of these competitive indicators for the developed countries was three times lower. The opposite situation and the biggest differences in the weights were typical for the evaluation of the 11th and the 12th pillars (the

[2] The EOS captures the perception of business executives about the environment in which they operate. Most questions in the EOS follow a structure asking participants to evaluate, on a scale of 1 to 7, where 1 represents the worst possible evaluation and 7 represents the best.

importance of these pillars was even six times higher for the developed countries compared to the developing countries). From this point of view we can identify the pillars with strong expected influence on the final ranking for the developed countries including the V4 (11th pillar: Business sophistication and the 12th pillar: Innovation) and for the developing countries (the pillars of Basic Requirements).

The dynamic changes of the economic environment resulting from globalisation have led to the WEF new attitude to the measurement of national competitiveness. The Global Competitiveness Report 2017-18 was the last edition based on the methodology mentioned[3]. Since the GCR 2018, the WEF have definitively changed its methodology and published the new composite index, the GCI 4.0. The pillars (see Table 2) are grouped into four sub-indices: enabling environment, human capital, markets, and innovation ecosystem. These four components are used only for presentation and analytical purposes; the linear aggregation (the arithmetic mean) is used for the final aggregation of 12 pillar scores (i.e., each pillar is weighted equally, the weight is 8.33 per cent). The GCI 4.0 comprises of 103 indicators (compared with 114 indicators of the original methodology). The extent of the changes inside the composite index is significant - compared to the original methodology, 67 per cent of the indicators are new, and both the amount of soft data (the number of indicators derived from the EOS) and their combined weight was reduced, accounting now only for 30 per cent of the overall score (opposed to between 69 per cent for advanced economies and 57 per cent for least-developed economies in the GCI). (WEF, 2017b, 2019b)

Tab. 2: The new WEF's weighting scheme (the GCI 4.0)

Sub-indices (hard data/soft data_EOS)	Pillars (hard data/soft data)	Sub-indices (hard data/soft data)	Pillars (hard data/soft data)
Enabling Environment (27/18)	1. Institutions (13/13)	Markets (15/15)	7. Product market (3/4)
	2. Infrastructure (7/5)		8. Labour market (4/8)
	3. ICT adoption (5/0)		9. Financial system (6/3)
	4. Macroeconomic stability (2/0)		10. Market size (2/0)
Human Capital (4/6)	5. Health (1/0)	Innovation Ecosystem (10/8)	11. Business dynamism (4/4)
	6. Skills (3/6)		12. Innovation capacity (6/4)

Source: WEF (2019b), author's processing. Note: All pillars are weighted equally (8.33%).

[3] The preliminary version of the new index, the GCI 4.0, was introduced together with this last edition of the GCI.

The above brief view on the methodological changes in the construction of the composite indicator is considered a suitable starting point for our comparison of the competitive advantages and disadvantages of the V4 in the next part of this paper.

4 Results

4.1 Competitive advantages and disadvantages of the V4

Competitive advantages and disadvantages are usually evaluated by the country's rank in the given indicator or pillar. With this in mind, a country in a given pillar (indicator) can achieve a relatively good position even with a lower value and vice versa (i.e. a worse position with a higher indicator value). Since our goal is to assess the impact of obtained value on the country's overall performance, the competitive pros and cons are evaluated according to the pillar's values. Table 1 and 2 present the pillars with the highest and the lowest values for the individual countries, as well as the countries ranks in the whole sample. For each country, three pillars with the highest (lowest) score are shown – these are highlighted in light grey tint. Furthermore, if the value in one of three best / worst pillars for one country is the fourth highest / lowest for another country, it is given as well (if it is not, the symbol x is put in the relevant field of the table).

Tab. 1: The GCI_competitive strengths and weaknesses of Visegrad group countries

		Country (rank/value)			
strengths	***weights***	**Czechia 34. (4.6)**	**Hungary 56. (4.3)**	**Poland 40. (4.4)**	**Slovakia 59. (4.3)**
4. Health and primary education	5.0	33. (6.1)	55. (5.8)	33. (6.1)	45. (5.9)
3. Macro environment	5.0	27. (5.4)	59. (4.7)	51. (4.9)	40. (5.1)
5. Higher education and training	8.5	27. (5.0)	45. (4.6)	*31. (4.9*)	*50. (4.5)*
10. Market size	8.5	x	x	19. (5.1)	x
8. Fin.market development	8.5	x	x	x	33. (4.6)
weaknesses	*weights*	Czechia	Hungary	Poland	Slovakia
12. Innovation	15.0	31. (3.8)	43. (3.5)	43. (3.5)	64. (3.2)
1. Institutions	5.0	61. (3.9)	72. (3.7)	72. (3.7)	76. (3.6)
10. Market size	8.5	40. (4.5)	75. (3.8)	x	57. (4.0)
2. Infrastructure	5.0	*41. (4.6)*	x	75. (3.8)	*57. (4.1)*

Source: own processing based on the WEF methodology, WEF (2017a, b). Note: results are based on the average values for both time periods (the GCI: 2007-17, the GCI 4.0: 2017-19).

If we consider a competitive advantage (or disadvantage) in the same group of indicators as a measure of homogeneity, we can regard the V4 as a homogeneous group of countries.

Regarding competitive pros, four pillars are mentioned for Poland and Slovakia. Moreover, there is only one pillar (10th pillar Market size), which is both a competitive advantage for one country (Poland) and a competitive disadvantage for others. Due to the methodological changes (new indicators in the 10th pillar), this situation does not repeat in the GCI 4.0.

Tab. 2: The GCI 4.0_competitive strengths and weaknesses of Visegrad group countries

		Country (rank/value)			
strengths	***weights***	**Czechia 30. (71.0)**	**Hungary 48. (64.3)**	**Poland 37. (68.3)**	**Slovakia 41.(66.6)**
4. Macro stability	8.33	1. (100)	46. (89.8)	37. (99.1)	32. (99.5)
5. Health	8.33	41. (86.9)	64. (80.6)	48. (85.1)	53. (83.3)
2. Infrastructure	8.33	19. (83.7)	27. (79.8)	26. (79.9)	32. (77.8)
weaknesses	*weights*	Czechia	Hungary	Poland	Slovakia
12. Innovation capacity	8.33	29. (56.7)	41. (47.7)	38. (57.6)	43. (46.0)
7. Product market	8.33	45. (59.5)	88. (52.7)	x	74. (54.5)
1. Institutions	8.33	42. (60.3)	64. (54.1)	48. (57.1)	54. (55.9)
3. ICT adoption	8.33	x	x	58. (48.7)	x

Source: own processing based on the WEF methodology, WEF (2019a, b). Note: results are based on the average values for both time periods (the GCI: 2007-17, the GCI 4.0: 2017-19).

Comparison of the overall countries' ranking in the GCI and the GCI 4.0 (see ranks in the title of the 3rd, 4th, 5th, and 6th columns in both tables) shows that the new WEF methodology brings about better results for the V4. In our view, this can be explained mainly by: 1) equal weights for all pillars (a comparison of the pillar's weights in the case of advantages and disadvantages shows higher importance of pros and lower importance of cons according to the new WEF methodology); 2) smaller representation of soft data in the GCI 4.0[4]. The new methodology causes the greatest improvement for Slovakia (by 18 places). The position of Hungary is better by 8 places, Czechia moved up 4 places in the ranking, while Poland improved by mere 3 places. The reason for the smallest improvement of Poland leans on the methodological change in the 10th pillar. The new organisation of this pillar reduces the competitive advantages primarily based on the country size.

[4] E.g., Necadova (2019) points out the importance of the national specifics for the explanatory power of survey data and argues that the predominantly critical attitude of respondents from the V4 negatively influences their assessment in survey data especially in the post-crisis period (2010 – 16).

4.2 Impact of methodological changes in the position of EU-28 in the whole sample (114 countries)

Table 3 (as well as Fig. 1 and 2 in Appendix) summarises our results. Columns 3 and 4 allow comparing the impact of the WEF methodological changes on the EU-28 ranking; column 5 presents results based on the use of geometric mean as a method of a final aggregation of pillars (the GAGCI 4.0). Columns 6 and 7 show the differences between the countries' rankings and enable to assess whether a methodological change brings about an improvement or deterioration in country's ranking.

Tab. 3: Ranking of the EU-28 countries according to the GCI, the GCI 4.0, and the GAGCI 4.0

		A: GCI (2007-2017)	B: GCI 4.0 (2017-19)	C: GAGCI 4.0 (2017-19)	Dif. A – B (ranking)	Dif. B – C (ranking)	A: values	B: values	C: values	Dif. B-C (values)
Austria	AUT	15	22	23	-7	-1	5.2	76.4	74.3	2.1
Belgium	BEL	16	21	22	-5	-1	5.2	76.5	74.5	2.0
Bulgaria	BGR	60	50	47	10	3	4.2	63.6	62.6	1.0
Croatia	HRV	71	66	62	5	4	4.1	60.7	59.4	1.4
Cyprus	CYP	50	43	43	7	0	4.3	65.6	63.8	1.7
Czech Rep.	**CZE**	**34**	**30**	**31**	**4**	**-1**	**4.6**	**71.0**	**68.5**	**2.5**
Denmark	DNK	11	10	10	1	0	5.4	80.6	79.3	1.2
Estonia	EST	30	32	33	-2	-1	4.7	70.8	67.8	3.0
Finland	FIN	6	11	11	-5	0	5.5	80.1	78.7	1.4
France	FRA	18	17	14	1	3	5.1	78.1	77.1	1.0
Germany	DEU	5	5	4	0	1	5.5	82.4	81.4	1.0
Greece	GRC	76	55	53	21	2	4.0	62.2	60.8	1.4
Hungary	**HUN**	**56**	**48**	**48**	**8**	**0**	**4.3**	**64.3**	**62.5**	**1.8**
Ireland	IRL	26	23	20	3	3	5.0	75.6	74.8	0.8
Italy	ITA	42	31	29	11	2	4.4	70.9	69.5	1.4
Latvia	LVA	51	42	44	9	-2	4.3	66.0	63.3	2.7
Lithuania	LTU	38	39	39	-1	0	4.5	67.3	65.1	2.2
Luxembourg	LUX	23	19	21	4	-2	5.1	76.6	74.8	1.8
Malta	MLT	43	36	40	7	-4	4.4	68.6	64.9	3.7
Netherlands	NLD	7	6	5	1	1	5.5	82.3	81.4	0.9

Poland	**POL**	**40**	**37**	**36**	**3**	**1**	**4.4**	**68.3**	**66.2**	**2.1**
Portugal	PRT	39	33	32	6	1	4.5	70.1	68.4	1.7
Romania	ROU	65	51	49	14	2	4.2	63.3	62.2	1.2
Slovak Rep.	**SVK**	**59**	**41**	**38**	**18**	**3**	**4.3**	**66.6**	**65.3**	**1.3**
Slovenia	SVN	45	35	35	10	0	4.4	69.4	67.4	2.1
Spain	ESP	32	25	25	7	0	4.6	74.4	71.5	2.9
Sweden	SWE	4	9	8	-5	1	5.5	81.5	79.8	1.7
Unit.Kingdom	GBR	10	8	6	2	2	5.4	81.8	80.8	1.0

Source: own processing based on the WEF methodology, WEF (2017a, b; 2019a, b). Note: results are based on the average values for both periods (the GCI: 2007-17, the GCI 4.0: 2017-19).

A positive difference in column 6 indicates the country's positive shift in the ranking due to the new WEF methodology. A positive difference in column 7 means the country's ranking was improved as a result of more equal values in the pillars, i.e. a lower tendency to substitution among the pillars. In column 6, improvements can be seen especially in the new member states (the biggest improvement was found for Slovakia, by 18 places, and for Romania, by 14 places), while deterioration is typical for the original member states[5]. The highest negative effect of the new WEF methodology was found for Austria (decrease in the ranking by 7 places) and Sweden and Belgium (both deteriorating by 5 places).

The overall impact of the new methodology (the GCI 4.0) and the geometric mean (geomean) in the role of the method for the final aggregation (the GAGCI 4.0) on the EU-28 results can be evaluated by the average rank counted from the EU-28 ranks on the whole sample. The worst rank (34.7) is connected with the original WEF methodology. According to the GCI 4.0, the average of the EU countries' ranks is presented by the value 30.2. Due to the more balanced values among pillars and the below-average tendency to substitution among pillars, the best result (29.6) was achieved using geomean as the method of the final aggregation. The average ranks for new member states (the GCI: 49.4; the GCI 4.0: 42.3; the GAGCI 4.0: 41.9) indicate (compared to the old member states) positive impact of the new WEF methodology and less balanced values among pillars. Our finding of less equal values among pillars in the new member states is evident from the differences between the final values for the GCI 4.0 and the GAGCI 4.0, which are presented in the 11th column. The average difference for the EU-28 is 1.7, 2.0 for the new Member States and 1,5 for the original Member States. The lower difference between GCI 4.0 and GAGCI 4.0 indicates more equal values across pillars and

[5] The exception is Greece with better results according to the new methodology. Significant macroeconomic imbalances in the pre-crisis and post-crisis periods negatively affected Greek ranking according to the GCI.

therefore lower tendency to substitution among the pillars. Geometric mean rewards the countries with more balanced competitiveness indicators on the level of pillars.

The positive impact of the new WEF methodology on the evaluation of the EU-28 countries is also evident from the frequency distributions, which are presented in Figure 1 and 2 in the Appendix.

Conclusion

Our findings presented in this paper are based on the comparison between the original (the GCI) and the new WEF methodology (the GCI 4.0) as well as on the application of alternative aggregation method (geomean) for pillars contained in the GCI 4.0. Obtained results indicate that the new WEF methodology (based on smaller representation of soft data and same weights of pillars) reduces the distortions caused by the stage-of-development weights and the so-called national bias. Our main finding is that the weighting scheme has an essential impact on the countries' ranking. The original WEF weighting scheme has a positive impact on the evaluation of big countries (the results in the 10th pillar were identified as a competitive advantage, e.g. for Poland). This weighting scheme also penalises bad results of the V4 (and the new member states) in the sub-index of Innovation and sophistication factors. In contrast, it does not significantly penalise the developing countries' gaps in the same sub-index (see above, e.g. the nominal weight of the 11th and 12th pillars for countries in the 1st stage of development). The use of the new methodology brought better results for the EU 28 countries, for the new member states, and the V4 (see Table 3). Application of geomean as the method of the final aggregation provides the following finding: lower difference between the GCI 4.0 and the GAGCI 4.0 indicates more equal values across pillars. Geometric mean rewards the countries with more balanced competitiveness indicators on the level of pillars.

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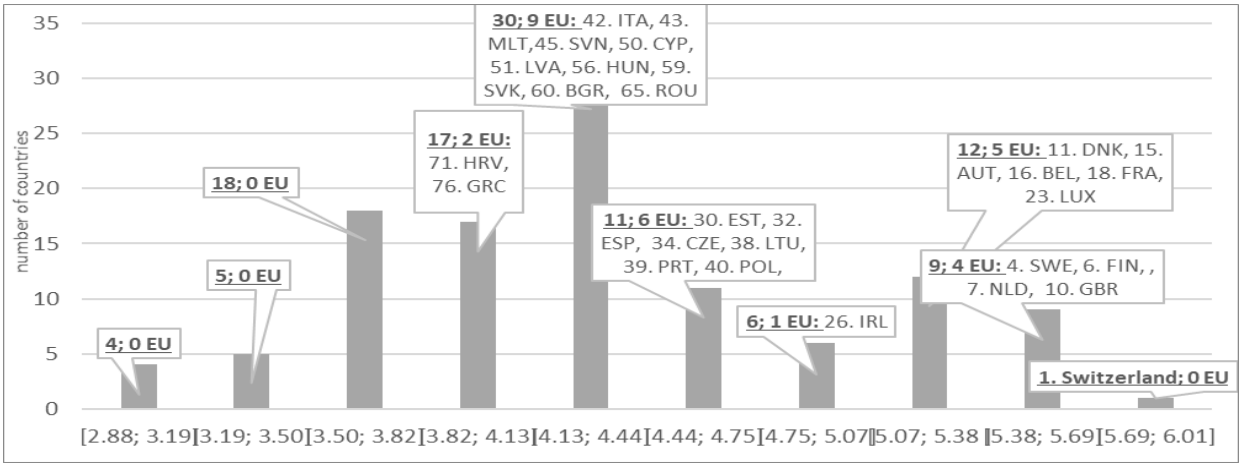
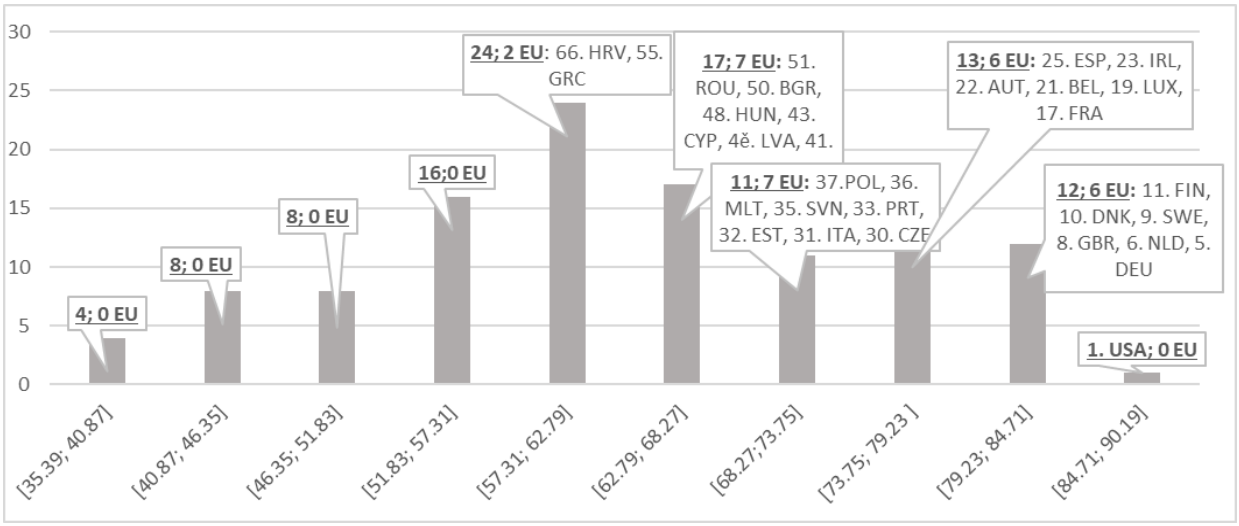
Appendix

Fig. 1: WEF 114_GCI07_17



Source: WEF (2017a), author's processing

Fig. 2: WEF 114_GCI 4.0 17_19



Source: WEF (2019a), author's processing

References

Adamkiewicz, H. G. (2019). The dimensions of national competitiveness: The empirical analysis based on The World Economic Forum's data. *Economics and Business Review*, *5*(3), 92–117. https://doi.org/10.18559/ebr.2019.3.6

Aiginger, K., & Vogel, J. (2015). Competitiveness: From a misleading concept to a strategy supporting Beyond GDP goals. *Competitiveness Review*, *25*(5), 497–523. https://doi.org/10.1108/CR-06-2015-0052

Buckley, P. J., Pass, Ch. L., Prescott, K. (1988). Measurement of international competitiveness: a critical survey. *Journal of Marketing Management, 4*(2), 175-200. doi: 10.1080/0267257X.1988.9964068

Chabowski, B. R., & Mena, J. A. (2017). A Review of Global Competitiveness Research: Past Advances and Future Directions. *Journal of International Marketing*, *25*(4), 1–24. https://doi.org/10.1509/jim.16.0053

Neagu, O. (2018). Is Global Competitiveness Speeding Up the Growth in the EU_ A Panel Data Analysis. *Studia Universitatis "Vasile Goldis" Arad.Seria Stiinte Economice., 28*(4), 1-23. doi:http://dx.doi.org.zdroje.vse.cz:2048/10.2478/sues-2018-0017

Necadova, M. (2019). Changes in Economic Sentiment Indicators before and after Economic Crisis (Position of Visegrad Group and Germany in EU). *Central European Business Review*, *8*(4), 55–85. https://doi.org/10.18267/j.cebr.220

Pérez-Moreno, S., Rodríguez, B., & Luque, M. (2016). Assessing global competitiveness under multi-criteria perspective. *Economic Modelling*, *53*, 398–408. https://doi.org/10.1016/j.econmod.2015.10.030

Petrarca, F., & Terzi, S. (2018). The global competitiveness index: An alternative measure with endogenously derived weights. *Quality and Quantity*, *52*(5), 2197-2219. doi:http://dx.doi.org.zdroje.vse.cz:2048/10.1007/s11135-017-0655-8

WEF (2017a). *GCI Dataset.* Geneva, Switzerland. Retrieved from http://reports.weforum.org/global-competitiveness-index-2017-2018/downloads/

WEF (2017b). *The Global Competitiveness Report 2017-2018*. Geneva, Switzerland. Retrieved from http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf

WEF (2019a). *GCI 4.0 Dataset.* Geneva, Switzerland. Retrieved from http://reports.weforum.org/global-competitiveness-report-2019/downloads/

WEF (2019b). *The Global Competitiveness Report 2019*. Geneva, Switzerland. Retrieved from http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

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