

## Assessing the Countries' Competitiveness Based on Value Added Concept

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### Abstract

The paradigms of global competitiveness are changed recently because of the new trade patterns and global production networks development. This tendency requires rethinking of national economic growth policy with focus on the impact of international competitiveness factors. This study investigates the impact of fundamental macroeconomic parameters on the global competitiveness. A set of 27 European countries is assessed in the period of 2006-2018 considering their economic performance and development. The determinants of growth and competitiveness are studied. The results show that competitiveness in European countries depends on exchange rate fluctuations. The paper provides comparative studies including developed countries, Central-East European countries, GIIPS countries and offers insight for policy formulation on growth and competitiveness. Ordinary least squares (OLS) with pooled data, panel data with fixed effects (FE), random effects (RE), and the dynamic panel data model were used as principal methods. The empirical findings obtained are particularly important to consider for economic policies and strategies of economic development.

**Keywords:** Global Competitiveness, Value Added, Exchange Rate, FDI

**JEL Classification:** F12, F63

### 1. Introduction

The development of new trade patterns and global production networks is changing the paradigms of global competitiveness, which requires rethinking of national economic growth policy. An important factor of international competitiveness is expanding the presence of local companies in global value chains and production networks, provided high share of domestic value added. The redistribution of production capacity into more competitive segments and value added creation requires development of human capital and promotion of innovation, which are key economic drivers of competitive advantages. That is why the studies of macroeconomic factors of international competitiveness are growing in importance in theoretical and practical aspects.

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More competitive and open economies attract investment and trade that promotes economic growth (Cattaneo *et al.*, 2013). Global value chains become the important link in promoting international competitiveness, since: 1) the role of small and medium-sized enterprises in foreign trade is increasing; 2) the countries move beyond traditional comparative advantages to access new markets; 3) upgrading towards higher value-added goods is taking place. In particular, the following major paradigms have changed:

- (1) In general countries cannot stay isolated in production of competitive goods or services. The strategies of competitiveness must be adapted to global or at least regional dimensions of value chains. The import more often is considered as a mean to gaining effective access to resources in order to specialize in core competencies (Cherkas and Chekh, 2018; Gkypali *et al.*, 2019). Flows of competitive advantages are going in a two-way direction. For example, the affiliates of multinationals are developing new competencies that can be used to benefit the entire network (Jayaraman and Luo, 2007).
- (2) Many researches indicate the transition to new international trade paradigm which includes trade of tasks and business functions (Brumm *et al.*, 2019). For producer it is not necessary to cover all segments of value chain, but to determine the best position of the company in global manufacturing network and offer the most competitive task or business function (Ernst and Center, 2018). Sector of services could provide important positive incentives to high value added creation, while efficient production requires competitive services, skilled workforce and innovation.
- (3) International competition turns into vertical: companies can simultaneously be competitors and suppliers of critical resources and competences (Gkypali *et al.*, 2019). In this context, global value chains become the main transmission channels for global flows: technology, capital, knowledge, international standards and high value-added services. Some of them are not available domestically, but are offered globally, therefore a country cannot become or remain competitive without effective links to world markets.
- (4) Barriers to trade and competitiveness are moving gradually from borders (traditional tariffs and quotas) beyond borders (non-tariff barriers, corporate regulation and standards) (Korol and Cherkas, 2015; Nielsen, 2018). Private corporate regulation of labour standards, environmental performance and human rights modifies the criteria of international competitiveness, while trade policies and preferential trade agreements protect some local companies but harm others.

In order to stimulate socio-economic growth, greater attention is required to the development of competitive production and the redistribution of production capacity into more competitive higher value-added segments. However, the assessment of the international competitiveness factors considering the impact of value added remain insufficiently disclosed in domestic and foreign literature. Mechanisms of the competitive potential growth based on the trajectory networks require comprehensive analysis. Furthermore, empirical studies of macroeconomic impact on the global competitiveness in the context of value added creation remain very urgent.

Therefore, the aim of the study is to estimate the effects of fundamental macroeconomic parameters on the global competitiveness. Section 2 presents the data, while statistical methodology is provided in Section 3. The empirical analysis of the implied panel methods are presented in Section 4 that is followed by the conclusions.

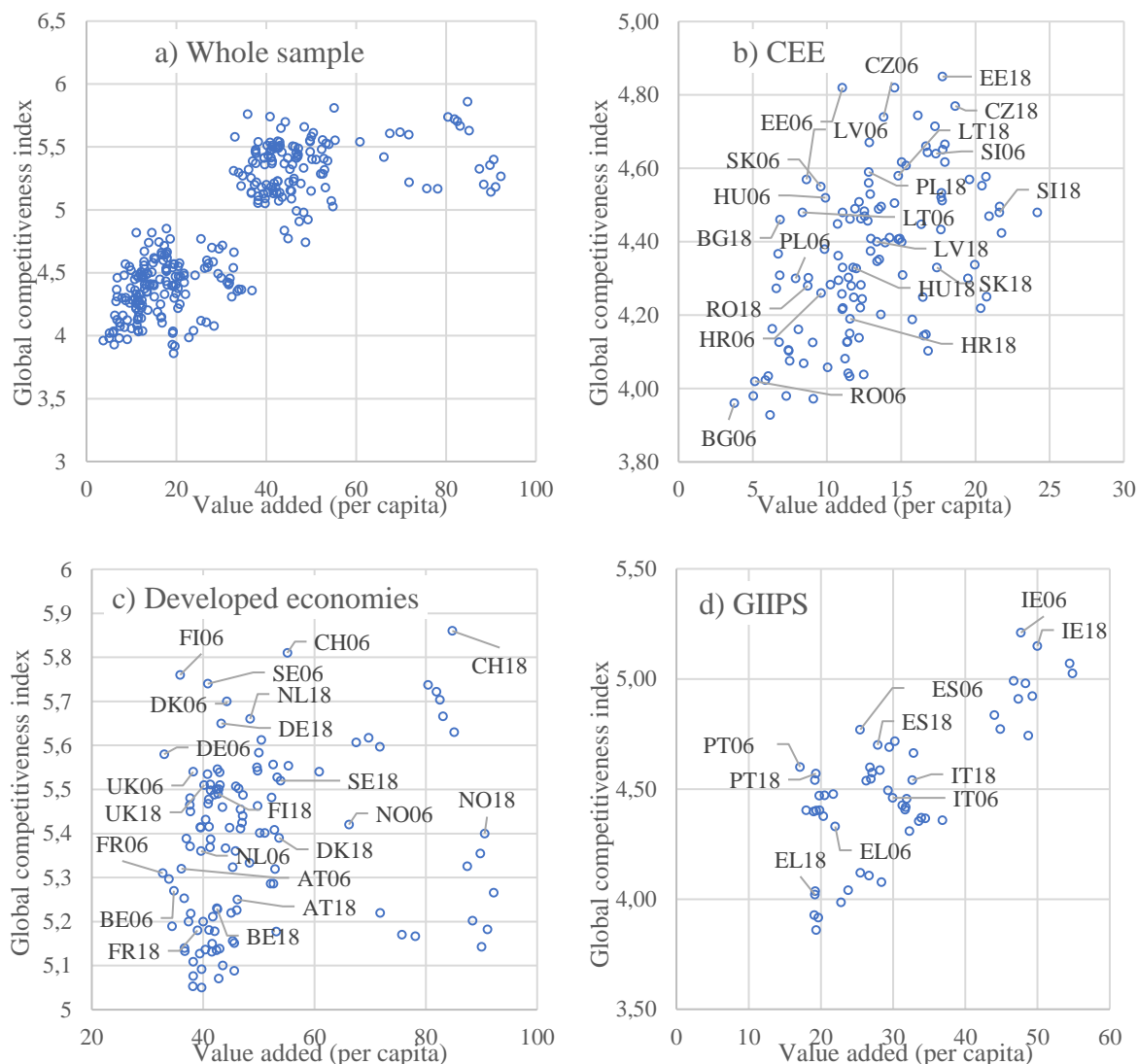
## 2. Data

The factors of international competitiveness were studied using annual data of 27 European countries in the period 2006–2018<sup>3</sup>. The group was divided into three subsamples: developed economies (Austria (AT), Belgium (BE), Denmark (DK), Finland (FI), France (FR), Germany (DE), Netherlands (NL), Norway (NO), Sweden (SE), Switzerland (CH), and United Kingdom(UK)), CEE (Central and Eastern Europe: Bulgaria (BG), Croatia (HR), Czech Republic (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Poland (PL), Romania (RO), Slovakia (SK) and Slovenia(SI)) countries and GIIPS (Greece (EL), Italy (IT), Ireland (IE), Portugal (PT) and Spain (ES)). Fig. 1a-1d report the countries' specific positions considering global competitiveness index and value added. Global competitiveness index is collected from World Economic Forum database used for the Global Competitiveness Report. These figures give some preliminary evidence about the differences in cross-country data. Developed economies demonstrate increasing over time competitiveness, however, value added per capita remains less dynamic (Fig. 1c). The country with the highest level of competitiveness (Switzerland) demonstrates the highest value added per capita among developed European economies. CEE countries (Fig. 1b) and GIIPS (Fig. 1d) show lower competitiveness and value added compared to the whole sample. Greece and Ireland differ from other GIIPS countries in the opposite directions: Greece shares many characteristics with CEE,

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<sup>3</sup> The sample covered all EU countries, except Cyprus, Malta and Luxembourg as they have very specific economic patterns. Instead, Norway and Switzerland were included, however they are not EU members politically they share many of the main economic characteristics and belong to the economic ecosystem of EU.

while Ireland’s pattern is closer to the developed economies, at the same time having high levels of government debt.



**Figure 1.** Global competitiveness index versus value added (per capita, thous. USD), 2006-2018

Note: the countries are labeled using ISO 2 codes and are marked for the first and last year.

Source: authors’ own elaboration based on World economic forum and UNCTAD.

Based on the literature review, the following dataset was formed to study the factors of international competitiveness:  $GCI_{it}$  – Global competitiveness index, (0-5);  $Va_{it}$  – Value added at basic prices per capita, USD;  $Manuf_{it}$  – Manufacturing, value added (% of GDP);  $E_{it}$  – Exchange rate, price level ratio of PPP conversion factor (GDP) to market exchange rate;  $M_{ht_{it}}$  – Import of high-tech sector (% of total import);  $FDI_{it}$  – Foreign direct investment, inflows (% of GDP);  $IIT_{ht_{it}}$  – Intra-industry trade index, high-tech sector;  $HC_{it}$  – Human capital, index (years of schooling and returns to education);  $Debt_{it}$  – Debt of central government (% of GDP);  $BB_{it}$  – Budget balance (% of GDP);  $Cor\_PI_{it}$  – Corruption Perceptions Index (0 – highly corrupt, 100 – clean of corruption);  $Crisis_{it}$  – dummy variable (0 – no crisis,

1 – crisis). Data were used in logarithms except the budget balance and dummy variable to limit the influence of outliers. The data were collected from World economic forum and Unctad databases.

### 3. Methodology

We performed the analysis applying panel data model and the empirical estimation included the following methods: ordinary least squares (OLS) with pooled data, random effects (RE) model, fixed effects (FE) and the dynamic panel data model (DM). Methodology of OLS, RE and FE was the same as in Antoniuk and Cherkas (2018). The dynamic panel data model included a lagged dependent variable  $y_{it-1}$ :

$$y_{it} = \alpha_i + \delta y_{i,t-1} + \hat{x}_{it} \beta + u_i + \varepsilon_{it} \quad (1)$$

Estimation with dynamic panel model is convenient for long panels of countries with a large cross-section and is useful to treat endogeneity bias (Cantore *et al.*, 2017). By considering the use of dynamic panel model, the results could be contrasted with the coefficients obtained with static panel estimation. The Hausman test is applied to compare the fixed and random effects models. Aiming to check whether competitiveness is determined by the set of explanatory variables, the specification of the model corresponds to the equation:

$$GCI_{it} = a_0 + a_1 Va_{it} + a_2 Manuf_{it} + a_3 E_{it} + a_4 BD_{it} + a_5 FDI_{it} + a_6 IIT_{htit} + a_7 HC_{it} + a_8 Cor\_PI_{it} + a_9 Debt_{it} + a_{10} Crisis_{it} + \varepsilon_{it} \quad (2)$$

The explanatory variables are described in detail in Section 2. The measurement of intra-industry trade ( $IIT_{htit}$ ) was applied according to the methodology of Grubel and Lloyd (1971).

### 4. Estimation Results

Global Competitiveness Index determinants are displayed in the Table 1 and Table 2. According to the results of Hausman test, the fixed effects technique is reliable for all subsamples, except of developed economies. The Breusch-Pagan LM test confirms the use of RE technique. The impact of value added ( $Va_{it}$ ) on global competitiveness ( $GCI_{it}$ ) is positive (FE for the whole sample and GIIPS, RE for developed economies), except CEE where we obtain a significant negative relation in case of dynamic panel estimation. The countries with low level of manufacturing in GDP usually show weak performance in high-tech exports (Cherkas and Chekh, 2018). The influence of manufacturing value added ( $Manuf_{it}$ ) on global

competitiveness show positive impact in subsamples of CEE (FE and dynamic model), developed economies (RE model) and GIIPS (dynamic model).

**Table 1.** Global Competitiveness Index determinants for the whole sample and CEE

<i>Explanatory variables</i>	<i>Global Competitiveness Index</i>					
	<i>(Whole sample – 27 countries)</i>			<i>(CEE)</i>		
	<i>(1) OLS</i>	<i>(2) FE</i>	<i>(3) DM</i>	<i>(1) OLS</i>	<i>(2) FE</i>	<i>(3) DM</i>
<i>Constant</i>	0.158*	0.801***	-0.036	1.016***	1.536***	0.758***
	(0.07)	(0.21)	(0.08)	(0.10)	(0.32)	(0.16)
<i>GCI<sub>it-1</sub></i>	–	–	0.935***	–	–	0.505***
			(0.08)			(0.11)
<i>Va<sub>it</sub></i>	0.022***	0.048***	0.016*	0.015***	-0.011	-0.016*
	(0.00)	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)
<i>Manuf<sub>it</sub></i>	0.009	0.016	-0.027	-0.044*	0.096*	0.058*
	(0.01)	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)
<i>E<sub>it</sub></i>	0.032**	-0.078***	-0.042***	-0.013	-0.023	-0.041**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.03)	(0.01)
<i>BB<sub>it</sub></i>	0.001*	0.001*	-0.000	0.002	0.002*	0.002*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
<i>FDI<sub>it</sub></i>	0.002***	-0.000	0.000	-0.002**	-0.003***	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
<i>IIT<sub>ht<sub>it</sub></sub></i>	0.035**	0.031	0.017	0.107***	0.052	0.013
	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
<i>HC<sub>it</sub></i>	0.120***	-0.030	-0.040	0.135*	-0.549*	-0.110
	(0.02)	(0.14)	(0.08)	(0.05)	(0.21)	(0.11)
<i>Cor<sub>PI<sub>it</sub></sub></i>	0.252***	0.049**	0.002	0.101***	0.119***	0.019
	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
<i>Debt<sub>it</sub></i>	-0.018***	-0.010	0.014*	-0.025***	-0.005	0.007
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
<i>Crisis<sub>it</sub></i>	0.007	-0.008	-0.008*	-0.026**	-0.003	-0.002
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
N	270	270	243	110	110	99
<i>R<sup>2</sup></i>	0.914	0.328	–	0.699	0.541	–
<i>F-test</i>	288.65	11.35	–	26.29	10.49	–
<i>Hausman (<math>\chi^2</math> value)</i>		151.34	–	–	45.12	–
<i>Prob &gt; <math>\chi^2</math></i>		0.000			0.000	
<i>Breusch-Pagan (<math>\chi^2</math> value)</i>		259.12	–	–	33.93	–
<i>Prob &gt; <math>\chi^2</math></i>		0.000			0.000	

Notes: \*\*\*, \*\* and \* represent the levels of significance of 1%, 5% and 10% respectively. The values of the standard errors are in parenthesis.

Source: Authors' calculations based on data from WEF and UNCTAD.

Currency appreciation ( $E_{it}$ ) has negative impulse on global competitiveness ( $GCI_{it}$ ) for the whole sample and developed economies in all specifications. Companies controlling more upgraded stages in value chains gain more competitive advantages from outsourcing, including the lead firms in developed European countries. For CEE countries we obtain no significant

results for FE model, but only for the dynamic model. Given that for many countries of Eurozone currency devaluation is no longer available as an instrument of competitiveness increase, a fiscal devaluation is applied (Shevchuk, 2016).

**Table 2.** Global Competitiveness Index determinants for developed economies and GIIPS

<i>Explanatory variables</i>	<i>Global Competitiveness Index</i>					
	<b>(Developed economies)</b>			<b>(GIIPS)</b>		
	<b>(1) OLS</b>	<b>(2) FE</b>	<b>(3) DM</b>	<b>(1) OLS</b>	<b>(2) FE</b>	<b>(3) DM</b>
<i>Constant</i>	0.301 (0.18)	0.301 (0.18)	-0.043 (0.27)	0.583** (0.21)	0.084 (0.44)	-0.024 (0.18)
<i>GCI<sub>it-1</sub></i>	–	–	0.756*** (0.11)	–	–	0.734*** (0.11)
<i>Va<sub>it</sub></i>	0.014*** (0.00)	0.014*** (0.00)	-0.006 (0.01)	0.003 (0.01)	0.070* (0.03)	0.003 (0.01)
<i>Manuf<sub>it</sub></i>	0.033*** (0.01)	0.033*** (0.01)	-0.011 (0.01)	0.135*** (0.03)	-0.007 (0.04)	0.058* (0.03)
<i>E<sub>it</sub></i>	-0.049* (0.02)	-0.049* (0.02)	-0.065*** (0.01)	-0.059 (0.04)	-0.083* (0.03)	-0.027 (0.03)
<i>BB<sub>it</sub></i>	-0.001* (0.00)	-0.001* (0.00)	0.000 (0.00)	0.001 (0.00)	0.002** (0.00)	0.000 (0.00)
<i>FDI<sub>it</sub></i>	0.001** (0.00)	0.001** (0.00)	0.000 (0.00)	-0.000 (0.00)	0.001 (0.00)	-0.000 (0.00)
<i>IIT<sub>htit</sub></i>	-0.085*** (0.02)	-0.085*** (0.02)	0.015 (0.03)	0.001 (0.03)	-0.030 (0.02)	-0.007 (0.02)
<i>HC<sub>it</sub></i>	0.039 (0.04)	0.039 (0.04)	0.105 (0.10)	0.103* (0.05)	0.536* (0.25)	0.117 (0.11)
<i>Cor<sub>PIit</sub></i>	0.257*** (0.03)	0.257*** (0.03)	0.100* (0.04)	0.131*** (0.03)	0.004 (0.03)	0.010 (0.03)
<i>Debt<sub>it</sub></i>	-0.021* (0.01)	-0.021* (0.01)	0.003 (0.01)	-0.028 (0.01)	-0.012 (0.01)	0.016 (0.01)
<i>Crisis<sub>it</sub></i>	0.007 (0.01)	0.007 (0.01)	-0.002 (0.00)	0.018 (0.01)	-0.025** (0.01)	-0.014 (0.01)
N	110	110	99	50	50	45
<i>R<sup>2</sup></i>	0.735	0.5426	–	0.910	0.739	–
<i>F-test</i>	31.30	–	–	54.43	27.61	–
<i>Hausman (χ<sup>2</sup> value)</i>		14.26			126.42	
<i>Prob&gt; χ<sup>2</sup></i>		0.162			0.000	
<i>Breusch-Pagan (χ<sup>2</sup> value)</i>		60.26			23.77	
<i>Prob&gt; χ<sup>2</sup></i>		0.000			0.000	

Notes: \*\*\*, \*\* and \* represent the levels of significance of 1%, 5% and 10% respectively. The values of the standard errors are in parenthesis.

Source: Authors' calculations based on data from WEF and UNCTAD.

The obtained results indicate that foreign direct investment (*FDI<sub>it</sub>*) support competitiveness in developed European economies (RE), while in subsample of CEE the negative impact of *FDI<sub>it</sub>* is significant (FE). Improving the budget balance (*BB<sub>it</sub>*) show significant positive impact

on global competitiveness for the whole sample (1)-(2), CEE (2)-(3) and GIIPS (2). For the developed economies the budget enhancement impacts negatively, which reflects the contradictions of austerity measures across the EU countries. In addition, for subsample of GIIPS in FE model we observe a negative impact of crisis ( $Crisis_{it}$ ) dummy variable.

The findings concerning the influence of intra-industry trade ( $IIT_{htit}$ ) on global competitiveness report significant positive impact for the whole sample and CEE (OLS), confirming active participation of this region in processes of production fragmentation. The quality of human capital ( $HC_{it}$ ) contributes to the global competitiveness growth for the whole sample (OLS) and GIIPS (OLS and FE), however, the impact is negative in case of CEE, because of high level of labor force emigration. The impact of Corruption Perception Index ( $Cor\_PI_{it}$ ) show negative effect of corruption on countries' competitiveness that also was shown in Riaz *et al.* (2018). According to the results, the increase of government debt ( $Debt_{it}$ ) impacts negatively for the whole sample (OLS), CEE (OLS), developed economies (OLS and RE). In order to avoid misspecification we add the results of dynamic panel data model that could be seen as a supporting evidence in favor of static models.

## 5. Conclusions

Our paper concerns the principal economic indicator of development and performance, namely the competitiveness, and its macroeconomic determinants in European countries. The whole sample was divided into three sub-groups that allowed more precise assessment of its developmental peculiarities in applied policies. Increase in competitiveness should be an ultimate priority of economic policies, therefore, the evaluation of impact of countries' macroeconomic indicators is an important task. The determinants of competitiveness for the whole sample are: value added growth, currency depreciation, budget balance improvement, quality of human capital, reduction of corruption. In CEE countries we find no significant impact of exchange rate (FE) and value added growth on competitiveness (FE), however, there is a positive effect of value added in manufacturing (leading export sector in CEE). The results for developed economies are mostly consistent with the whole sample, except negative effect for budget balance (RE). We can observe some differences in global competitiveness indicators influence among implied countries groups, which are mostly connected with value added, FDI and exchange rate influence. In particular, currency devaluation and value added growth contribute mostly for competitiveness growth in developed countries, while its increasing in CEE countries is connected with value added in manufacturing and in GIIPS – with human



capital and budget balance improvement. Anti-corruption policies appear to be a common priority for all countries of the sample.

The study opens several research questions to be addressed in our future research. For instance, the economic divergence of CEE countries and implementing technological-oriented structural transformations in order to avoid a middle-income trap.

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