Routledge
Taylor & Francis Group

Economic Research-Ekonomska Istraživanja

ISSN: 1331-677X (Print) 1848-9664 (Online) Journal homepage: https://www.tandfonline.com/loi/rero20

An empirical analysis of factors affecting competitiveness of C.E.E. countries

Valentina Diana Rusu & Angela Roman

To cite this article: Valentina Diana Rusu & Angela Roman (2018) An empirical analysis of factors affecting competitiveness of C.E.E. countries, Economic Research-Ekonomska Istraživanja, 31:1, 2044-2059, DOI: 10.1080/1331677X.2018.1480969

To link to this article: https://doi.org/10.1080/1331677X.2018.1480969

Published online: 24 Jun 2018.

ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA
2018, VOL. 31, NO. 1, 2044–2059
https://doi.org/10.1080/1331677X.2018.1480969

Routledge
Taylor & Francis Group

An empirical analysis of factors affecting competitiveness of C.E.E. countries

Valentina Diana Rusu[a] and Angela Roman[b]

[a]Department for Interdisciplinary Research in Social Sciences and Humanities, Alexandru Ioan Cuza University of Iasi, Iasi, Romania; [b]Faculty of Economics and Business Administration, Department of Finance, Money and Public Administration, Alexandru Ioan Cuza University of Iasi, Iasi, Romania

ABSTRACT

This paper analyses the main economic factors that are influencing the competitiveness of Central and Eastern European (C.E.E.) countries. The research was carried out on a sample of ten countries (Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia and Slovakia), over the period 2004–2016. These countries were grouped by their stage of economic development, respectively: efficiency driven economies, in transition between efficiency and innovation and innovation driven economies. An econometric analysis on panel data was used, considering as a dependent variable the competitiveness of a country, quantified by the Global Competitiveness Index. As independent variables, we took into account a set of seven macroeconomic and business environment indicators which could have an impact on a country's competitiveness. The results obtained show important differences between countries, but also some resemblance. Although all the considered countries are emerging ones, the factors that have a significant influence on the competitiveness differ significantly. Thereby, if for efficiency-driven countries, G.D.P., inflation rate, trade, labour productivity and costs are important determinants of competitiveness, for innovation-driven countries the determinants of competitiveness are: G.D.P., inflation rate, tax rate, F.D.I., trade and costs. As regards the C.E.E. countries in transition only G.D.P., inflation rate and labour productivity are determinants of competitiveness.

ARTICLE HISTORY
Received 17 July 2017
Accepted 22 May 2018

KEYWORDS
C.E.E. countries; competitiveness; global competitiveness index; economic growth; panel data

JEL CLASSIFICATIONS
F6; C5; O11; O52

1. Introduction

A major preoccupation of the policy-makers in both developed and developing countries is nowadays the national competitiveness and how they can increase it. In the literature there is not a unitary approach of the concept of national competitiveness. There are many studies that have treated this subject, and present different opinions. For example, Krugman (1995) considers competitiveness as being the equivalent of productivity. According to the Organization for Economic Co-operation and Development (O.E.C.D.), competitiveness

CONTACT Valentina Diana Rusu valentinadiana.ig@gmail.com

must be understood as 'the ability of companies, industries, regions, nations or supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis' (Hatzichronoglou, 1996). Other studies in the field (Kharlamova & Vertelieva, 2013, p. 40; Porter, Sachs, & Warner, 2000) highlight that national competitiveness refers to the economic structures and institutions of a country that help the economic growth as a weight in the structure of global economy. Also, European Competitiveness Report (European Commission, 2014) presents a competitive economy as being that economy that has a consistently high rate of productivity growth. The report also indicates that the economic competitiveness of a country depends on the performance of the small and medium enterprise (S.M.E.) sector, on the growth and employment potential of these firms. To be competitive, a country has to outperform its competitors in terms of research and innovation, entrepreneurship, competition, education and training. The mentioned study shows that efficient public administration is a key driver of E.U. countries competitiveness.

From a similar perspective, the International Institute for Management Development (2003) defines competitiveness as the ability of nations to create and maintain an environment in which enterprises can compete, to manage the totality of its resources and competencies to increase the prosperity of its population. The World Economic Forum (2016, p. 4) defines competitiveness as 'the set of institutions, policies and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can achieve'.

From those presented above, we observe that competitiveness is a very complex concept. Generally, we can affirm that competitiveness represents the favourable position of a country, especially in international trade, but also the ability to improve its position. If a country has high rates of economic growth, which can ensure a constant increase in real wages, it will be able to promote and sustain the domestic firms on the world market, but also would help the creation of new jobs. Under these circumstances, that country can be considered as having a competitive economy.

Through this paper, we want to test which economic factors are determinants of national competitiveness, and also to see if this factor depends on the stage of development of the country. This paper enriches the research field by using a data-set regarding seven economic indicators, from ten countries from Central and Eastern Europe which are also members of the European Union (namely Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia), for a period of 13 years (2004–2016). To achieve the goal of the paper and to test the major hypothesis, we use an econometric analysis on panel data.

Our paper contributes to the expansion of knowledge in the field by realising an extended analysis on ten Central and Eastern European (C.E.E.) countries grouped by their stage of development, for a period of 13 years, and considering seven economic indicators with potential impact on international competitiveness. The novelty of our research consists of the comparative analysis realised between three groups of countries. Previous studies have considered fewer indicators as determinants of competitiveness, or have investigated fewer countries (sometimes only one specific country) and did not perform a comparative analysis of economies on stages of development.

The identification of the main determinants of the international competitiveness (according to the stage of development of the country) would help the policymakers to decide on

which economic issues should intervene in order to enhance international competitiveness of their country.

The paper is structured as follows: the first section presents the theoretical background and the hypotheses of the study, describing also the evolution of the considered variables for a period of 13 years; section 2 presents the methodology of the research used and the econometric model; section 3 reflects the results and discusses the main findings of our empirical study; the last section summarises the conclusions and shows the limits and future directions of research.

2. Theoretical background and hypotheses

The objective of this paper is to test which one of the considered economic indicators has an important influence on the competitiveness of the Central and Eastern European countries. For measuring the competitiveness, we have used as proxy the Global Competitiveness Index (G.C.I.), measured by scores from 1 to 7 (a higher average score means a higher degree of competitiveness), which was taken from World Economic Forum. The G.C.I. is calculated as a weighted average of several components of competitiveness that are grouped into 12 pillars of competitiveness, namely: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods markets efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation (World Economic Forum, 2016). Each pillar has attributed a relative weight in the calculation of G.C.I., according to the stage of development of the country. Some of the pillars are consisting mostly of qualitative data and, because these data are not available from official sources, the World Economic Forum use survey data, which helps to provide a much more accurate measurement of an economy's competitiveness climate. The World Economic Forum's annual Executive Opinion Survey measures business climate from the world countries and it represents the principal source of data for the computation of different index highlighted in the annual Global Competitiveness Reports. Two-thirds of the data used for calculating the G.C.I. scores come from survey data and only a third from statistical data. This represents a limitation of our research and may explain the results obtained regarding the influence of explanatory variables.

For our empirical analysis, we have chosen a panel of ten countries from Central and Eastern Europe (namely Bulgaria, Czech Republic, Hungary, Estonia, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia) and a period of 13 years (2004–2016). In order to realise a comparison between this countries, we have used the classification of this economies by their stage of development according to the Global Competitiveness Report (World Economic Forum, 2016). This report considers that, in the first stage, the economy is factor-driven and countries compete based on their factor endowments—primarily unskilled labour and natural resources. When a country becomes more competitive, the productivity is increasing and wages are rising and the development is advancing. In this situation, the country will move into the efficiency-driven stage of development. Finally, when a country moves into the innovation-driven stage, wages will have risen by so much that they are able to sustain those higher wages and the associated standard of living only if their businesses are able to compete using the most sophisticated production processes and by innovating new ones.

Table 1. Sub-index weights and income thresholds for stages of development.

	Stage of development				
	Stage 1: Factor-driven	**Transition from stage 1 to stage 2**	**Stage 2: Efficiency-driven**	**Transition from stage 2 to stage 3**	**Stage 3: Innovation-driven**
G.D.P. per capita (U.S.D.)	< 2.000	2.000–2.999	3.000–8.999	9.000–17.000	> 17.000
Weight for basic requirements	60%	40–60%	40%	20–40%	20%
Weight for efficiency enhancer	35%	35–50%	50%	50%	50%
Weight for innovation and sophistication factors	5%	5–10%	10%	10–30%	30%

Note: The exact applied weights are detailed in the individual economy profiles from the Global Competitiveness Report.
Source: World Economic Forum (2016, p. 38).

Table 2. Classification of the considered C.E.E. countries by each stage of development.

Stage 2: Efficiency-driven	**Transition from stage 2 to stage 3**	**Stage 3: Innovation-driven**
Bulgaria	Hungary	Czech Republic
Romania	Latvia	Estonia
	Lithuania	Slovenia
	Poland	
	Slovak Republic	

Source: Processed after World Economic Forum (2016, p. 38).

For the inclusion of the countries in one of these stages of development there are two criteria used: the level of G.D.P. per capita at market exchange rates and the share of exports of mineral goods in total exports (countries with more than 70% of their exports made up of mineral products are to a large extent factor driven and countries that are resource driven and significantly wealthier than economies at the technological frontier are classified in the innovation driven stage). The countries that register values for the two mentioned criteria (G.D.P. per capita and the share of exports of mineral goods in total exports) situated between the values specific to each stage of development are considered to be 'in transition' (World Economic Forum, 2016) (see Table 1).The weights attributed to the major three sub-indexes of the G.C.I. according to the stage of development of a country and the level of income considered as a criteria for the inclusion of countries in one of the stages of development are centralised in Table 1.

Taking into account the mentioned criteria, we have included each one of the ten Central and Eastern European countries considered in the analysis in the correspondent stage of development, as can be seen in Table 2.

As we mentioned above, for measuring competitiveness, we consider the Global Competitiveness Index (G.C.I.), measured by the scores from 1 to 7 (a higher average score means a higher degree of competitiveness), which will be the dependent variable of our econometric models. When analysing the evolution of this index for each country from C.E.E., we observe similarities, but also differences. Thus, from Figure 1, we observe that some countries have registered a reduction of their competitiveness in 2016 compared to 2004 (Estonia, Hungary, Slovak Republic and Slovenia), while other countries

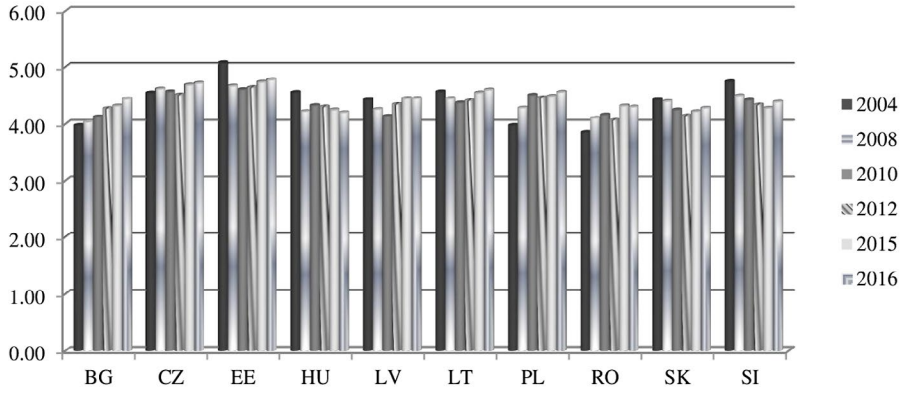

Figure 1. The dynamics of the global competitiveness index in the CEE countries. Source: Processed by the authors after data from World Economic Forum, global competitiveness reports, the global competitiveness index historical dataset.

have registered an observable improvement of their competitiveness (Bulgaria, Poland and Romania). On the other hand, Czech Republic, Latvia and Lithuania had a sinuous evolution of the G.C.I. with increases and decreases, finalised with almost similar values in 2016 compared to 2004. Seeing these differences in the evolution of competitiveness, we formulate the major hypothesis of our study, namely: the factors with a potential impact over a country's competitiveness (in our case, C.E.E. country members of the European Union) are different according to the stage of economic development of that country.

The competitiveness is influenced by a series of macroeconomic and business environment indicators, indicators which we have chosen as the explanatory variables of our models. The annual data for the explanatory variables are obtained from the World Development Indicators database (World Bank, 2017) and Eurostat (European Commission, 2017). For the dependent variable, the annual data are obtained from the Global Competitiveness Index Historical Data-set and the Global Competitiveness Reports (World Economic Forum, 2017). We have chosen seven potential determinants of competitiveness, namely: Gross Domestic Product, inflation rate, tax rate, foreign direct investment, trade, labour productivity, and cost of business start-up procedure.

The growth of Gross Domestic Product (G.D.P., expressed in annual percentage) is one of the indicators that we have considered as explanatory variables in our study. The influence of G.D.P. on competitiveness has been investigated by a series of studies. For example, Podobnik, Horvatić, Kenett, and Stanley (2012) have analysed the relationship between G.D.P. and competitiveness, and showed a positive functional dependence between G.C.I. as a proxy for competitiveness and G.D.P. Their conclusions were that, generally speaking, rich countries are considered to be more competitive than poor countries, implying that there is a functional dependence between G.C.I. and G.D.P. The authors also observed that, for all E.U. countries, during the recent economic downturn, the reduction of G.D.P. was significantly smaller in more competitive countries than in less competitive countries. Other studies (Dobrinsky & Havlik, 2014; Korez-Vide & Tominc, 2016) also showed that economic growth (measured by G.D.P. growth rates) and global competitiveness of a country (measured by the Global Competitiveness Index scores' growth rates) are positively related to each other. Thus, we also expect a positive correlation between G.D.P. and G.C.I., especially for more competitive countries.

Analysing the data for our study, we find that particularly efficiency-driven C.E.E. countries recorded high growth of G.D.P. in the period studied. The upward trend was also observed for transition and innovation-driven countries, but with a decreasing slope when the country is more developed. On the other hand, some innovation-driven C.E.E. countries have registered a deterioration of the growth of G.D.P. in 2012–2013. We have to keep in mind that the period under review also includes the period of the recent financial crisis. Thus, analysing the data, we observe that, in the period 2008–2010, all the countries from the panel recorded a significant decrease of G.D.P.

The level of total tax rate (tax expressed as a percetnage of commercial profits) is another macroeconomic indicator considered as an explanatory variable for our study. In the last years, almost every member country of the European Union has cut the corporate tax rates. In the last years, the tax rate in C.E.E. countries has registered a reduction, with a decrease of the tax rate of 8% in 2013, and then followed by a very small increase (0.09%). In almost all the analysed countries, the level of tax rate as a percentage of the commercial profits has a decreasing trend. The sharpest decrease of 25% was registered in Estonia (in 2013). This decrease was registered after an increase of 15% in 2012. Summers (1988) investigates the inter-relationship between tax policy and competitiveness, and highlights the impact of alternative tax reforms on international competitiveness. The author shows that excessive tax burdens are frequently blamed for the poor international performance of industries. Other studies (Knoll, 2010; Miller & Kim, 2008) find that high corporate tax rates undermine the international competitiveness of a country. The reduction of the corporate tax rates could represent an important step for attracting more investment capital and could increase firms' productivity and investment incentives. Thus, ultimately, the reduction of the corporate tax rates could stimulate the long-term competitiveness of the country by enhancing economic freedom. On the other hand, according to Summers (1988), tax measures which stimulate investment attract funds from abroad, leading to an appreciation in the real exchange rate and a reduction in the international competitiveness of domestic industry. These results challenge the commonly expressed view that reductions in tax burdens on business will improve competitiveness by enabling them to undertake more productivity-enhancing investment. Therefore, we expect either a negative or a positive relationship between tax rates and the competitiveness of countries.

Openness to the world, through trade, investment and the movement of people, is of vital importance to competitiveness. The benefits of trade and investment integration can be thought of in two ways (World Economic Forum, 2015): they help create new economic opportunities by increasing the size of the market available to domestic firms; also, they drive productivity growth and innovation by exposing firms to international competition, which has significant positive effects on both firms' incentives to innovate and their ability to innovate (Onodera, 2008). Fontagné and Pajot (1997) highlighted the link between foreign direct investments (F.D.I.), trade and competitiveness. The authors showed that outward F.D.I. enhances the competitiveness of the investing industry and inward F.D.I. also has potential benefits in terms of domestic employment and technology, contributing to an increase of competitiveness. On the basis of those presented above, we have considered as explanatory variables of our study the F.D.I. (measured by net inflows as a percentage of G.D.P.) and trade (measured by exports and imports of goods and services as a percentage of G.D.P.).

Other studies (Ilzkovitz, Dierx, Glagau, & Leib, 2008; Taner, Öncű, & Çivi, 2010) also have analysed the relationship between international trade and national competitiveness. The authors showed that a country's trade performance is often viewed as an indicator of its international competitiveness. Competitiveness is associated with trade performance because trade determines an increase of the access of countries to global resources and extends market reach. Moreover, the trade openness is more beneficial to countries with a higher level of G.D.P., as well as trade openness favours countries with a higher level of F.D.I. and with a higher gross fixed capital formation (Fetahi-Vehapi, Sadiku, & Petkovski, 2015; Pilinkiene, 2016).

Regarding F.D.I. impact on competitiveness, Anastassopoulos (2007) examined the relationship of a country's international competitiveness and its accumulation of inward F.D.I. stock for a sample of European Union member countries for the period 2003–2006, by grouping them according to their location in South and North member countries. The author found that the role of government in influencing international competitiveness is very important and the levels of F.D.I. have a more important influence on competitiveness in Southern E.U. member countries compared to Northern E.U. countries.

The exports and imports of goods and services have registered a continuous increase in all C.E.E. countries, from 2010–2016. The foreign direct investments has an increasing trend in the efficiency-driven and transition countries and a decreasing trend in innovation driven C.E.E. countries, with negative values in Estonia (in 2015). Starting from the importance of the two indicators for competitiveness, stated above, we expect a positive relationship between them and G.C.I.

Another important macroeconomic factor considered as a potential determinant of competitiveness is the inflation rate (infl, expressed as consumer prices, annual percentage). The effect of inflation on competitiveness can be considered from two points of view. Thus, on one hand, if the inflation increases, it can be recorded as an increase in business opportunities because a higher level of prices for products and services can lead to increased expectations of the earnings of entrepreneurs, business development and sustaining competitiveness (Sayed & Slimane, 2014; Vidal-Suñé & Lopez-Panisello, 2013). On the other hand, inflation can have a negative impact because it increases costs for starting a business and all the costs on the market (Salman, 2014). Therefore, the relationship between inflation and competitiveness can be either negative or positive.

Another explanatory variable that we have considered is the labour productivity per hours worked index (prod, is reported as the value from 2010 which equals 100). The level of productivity determines the rates of return obtained by investments in the economy, which in turn determines the economy's growth rate (Fischer, 1993; Lucas, 1988; Romer, 1994; Sala-i-Martin, 1996; World Economic Forum, 2015) with positive effects on competitiveness. Atkinson (2013) finds that productivity growth can enable competitiveness, especially if it is concentrated in traded sectors. The author claims that increased productivity lowers costs and enables firms to sell more in global markets without relying on government provided discounts. Other studies (O'Mahony & van Ark, 2003) show that a relative competitive position of a country (or industry within a country) at a point in time depends on its levels of output per hour, its nominal compensation per hour and the market exchange rate. Thus, as a result of our analysis, we expect a positive relationship between productivity and competitiveness.

In our analysis we included a business environment indicator, namely *business costs*, which are expressed by the cost of business start-up procedures (cost, measured as a

percentage of G.N.I. per capita). For the considered economies which are small open economies, business costs are a significant determinant of overall competitiveness and of economic prosperity, employment and standard of living. High business costs make a country less attractive for foreign direct investment and reduce the competitiveness of the goods and services offered by the enterprises. Some studies (Iarossi, 2009) showed that more labour market regulations and regulations about doing business will have higher costs and lower competitiveness. Analysing the data, we observed that the costs of starting a new business in C.E.E. countries, on average, has had a decreasing trend since 2010.

3. Methodology

In order to statistically analyse the data, we first applied unit-root tests on all the variables included in the panel data, to test if data were stationary and control for spurious relationships among variables. The null hypothesis is that all variables contain unit-root. This hypothesis was rejected in half of the cases and, for the variables that have a unit-root (G.D.P., inflation rate, productivity and cost), we have determined the first difference, so providing us the basic conditions to perform a regression analysis on this data.

We have also taken into account the problem of multicollinearity. The correlation test applied to our variables showed that there exists multicollinearity between some of the independent variables (G.D.P., F.D.I., trade and productivity), which may influence the results of our analysis (we considered as the reference point the value of 0.80, according to Bryman & Cramer, 2001). Because of these results, we have used separate regression models in order to avoid including in the same regression the highly correlated variables.

The basic framework used for our panel data model is a regression model of the form (Greene, 2003):

$$Y_{it} = X'_{it}\beta + Z'_i\alpha + \varepsilon_{it} \quad (1)$$

where Y is the dependent variable, X represents the explanatory variables, Z is the individual effect (which comprises a constant term and a set of individual or group specific variables, which are constant over time), i = BG, …, SK represents the unknown intercept of every country; t = 2004, ..., 2016 is the year analysed and ε is the error term.

The regression analysis refers to testing a hypothesis about the relationship between a dependent variable and two or more independent variables. In order to observe the relationship between the score registered for the Global competitiveness index and the economic indicators considered, we have used three different methods, namely, the Pooled Least Square method (by adopting the O.L.S. method to panel data), Fixed effects model and Random effects model. At the same time, the estimator variance–covariance matrix was determined by the White cross method (derived from the treatment of the pool regression as a multivariate regression), because there is suspicion of transverse heteroskedasticity.

4. Results and discussions

The descriptive statistics of the determinant variables considered for our study are summarised in Table 3. From the results, we observe that the variable that registered the higher variation between 2004 and 2016 in the C.E.E. countries is trade. This indicator has varied from almost 57% of G.D.P. in Romania (in 2009) to 171% of G.D.P. in the Slovak Republic

Table 3. The statistic characterisation of the influence factors.

Variable	Min	Max	Mean	S.D.
G.D.P.	−14.81	11.89	2.96	4.56
Infl	−1.54	15.43	3.17	3.08
Tax	27.00	66.80	43.83	8.11
F.D.I.	−15.99	54.61	5.72	8.69
Trade	56.68	170.57	112.93	29.97
Prod	77.70	132.70	99.92	10.02
Cost	0.00	22.90	6.04	5.61

Source: Own calculations.

(in 2016). Another indicator with a relatively important variation is the labour productivity per hours worked index. This index varies from a value of 78 in Lithuania (in 2004) to 133 in Romania (in 2016). Another two indicators also have high values of standard deviation: foreign direct investments net inflows as a percentage of G.D.P. and total tax rate as a percentage of commercial profits. F.D.I. varies from −16% of G.D.P. in Hungary (in 2010) to 55% of G.D.P. in the same country (in 2016). Total tax rate varies from 27% in Bulgaria (in 2013–2014) to 67% in Estonia (in 2012). These variations show that there are important differences between countries regarding the economic indicators considered for the analysis.

The most stable indicators are represented by the inflation rate and the G.D.P. growth, which have the smallest standard deviation.

For our analysis, we have considered different regression models, each one applied to the countries included in one of the three stages: efficiency-driven economies, transition from efficiency to innovation and innovation driven economies. For testing the robustness and the reliability of data, for each category of countries we have considered three different regression models: the Pooled Ordinary Least Squares, Fixed Effects and Random Effects models. We also have used the Hausman test to see which model is more suitable for our sample data. Fixed effects models indicate that the characteristics of countries affect the correlations between the variables, while random effects models are driven by the assumption that random variations exist across countries. The results of all the applied regression models are presented in Table 4.

The results obtained for the Hausman test (see Table 5) determine the acceptance of the null hypothesis, thus we consider the random effects model as being the most appropriate for our sample of data. The random effect model presents the advantage that the results obtained are not representative only for the sample but can be extrapolated to the entire population. Thus, in the following, we will interpret the results obtained after applying a random effects model.

Based on the results of the applied regression models and their statistically significant coefficients, we can conclude that G.D.P., inflation rate, trade, labour productivity and cost of business start-up procedures are the determinants of competitiveness for the efficiency-driven C.E.E. countries. For the countries in transition between efficiency and innovation only G.D.P., inflation rate and labour productivity have an important influence on competitiveness. Finally, for the countries included in the innovation-driven stage, we observe the biggest number of factors that have a statistically significant influence on competitiveness: G.D.P. growth rate, inflation rate, total tax rate, F.D.I., trade and cost of business start-up procedures. Thus, we observe important differences in the factors determining competitiveness, according to the stage of development of the country, which we will describe hereafter.

Table 4. The determinants of international competitiveness for C.E.E. countries by their stage of economic development.

	Stage 2: Efficiency-driven			Transition from stage 2 to stage 3			Stage 3: Innovation-driven		
	P.L.S.	F.E.	R.E.	P.L.S.	F.E.	R.E.	P.L.S.	F.E.	R.E.
G.D.P.	−0.0059	−0.0017	0.0079*	0.0112***	0.0116***	0.0112***	0.0054*	0.0106***	0.0236***
Infl	−0.0213**	−0.0182**	−0.0221**	−0.0023	−0.0032	0.0052**	0.0073	0.0024	0.0548**
Tax	−0.0107*	−0.0238***	−0.0052	−0.0035	−0.0173**	−0.0033	0.0105***	−0.0004	0.0098***
F.D.I.	−0.0069	−0.0064	−0.0056	−0.0002	−0.0007	−0.0007	0.0139***	−0.0093**	0.0173***
Trade	0.0019	0.0042***	0.0016*	−0.0005	−0.0018	−0.0005	−0.0024*	−0.0029**	0.0052***
Prod	0.0077***	0.0111***	0.0060**	0.0036*	0.0035*	0.0036*	−0.0060	−0.0103***	0.0126
Cost	−0.0359***	−0.0314**	−0.0218**	−0.0017	−0.0020	−0.0017	0.0061**	0.0187**	−0.0123**
R^2	0.7713	0.8519	0.6885	0.2043	0.4111	0.2025	0.5534	0.7330	0.7332
Adjusted R^2	0.7078	0.7997	0.6292	0.1307	0.3051	0.1287	0.4790	0.6662	0.5086

Note:
*, ** and *** indicate significance at 10, 5 and 1% levels, respectively.
Source: Own calculations.

Table 5. Results for the Hausman test.

Correlated random effects – Hausman Test			
Pool: C.E.E. countries			
Test cross-section random effects			
Test Summary	Chi-Sq. statistic	Chi-Sq. d.f.	Prob.
Cross-section random	11.011519	5	0.0512

Source: Own calculations.

In the efficiency-driven development stage are included only two C.E.E. countries, namely: Bulgaria and Romania. Thus, for these economies, G.D.P. has a positive coefficient, statistically significant at the 10% level. This result highlights the relationship between G.D.P. and competitiveness, and shows that countries with higher G.D.P. are more competitive than the ones with lower values of G.D.P. This result is in agreement with our expectations, but also with the findings of other empirical studies (Dobrinsky & Havlik, 2014; Korez-Vide & Tominc, 2016; Podobnik et al., 2012).

The inflation rate has a statistically significant influence (at 5% level) on competitiveness (expressed by G.C.I. index). This correlation is negative, showing that an increase of inflation can have a negative impact because it increases costs for starting a business and all the costs on the market. This result is in line with our expectations and the findings of Salman (2014).

Trade as a percentage of G.D.P. has a statistically significant influence at the 10% level on competitiveness. The correlation is positive, showing that exports and imports of goods and services have a positive significant influence on the economic competitiveness; their increase determines an increase of the access of countries to global resources and extends market reach, enhancing international competitiveness. These results are in accordance with the finding of other studies (Ilzkovitz et al., 2008; Taner et al., 2010) and our expectations.

Labour productivity also has a positive effect on economic competitiveness, as we expected. Its coefficient is statistically significant at the 5% level. These results are in line with the findings from the literature in the field. According to some studies (Atkinson, 2013; O'Mahony & van Ark, 2003), the growth of labour productivity per hour worked stimulates competitiveness.

The cost of business start-up procedures is another factor which has a statistically significant influence (at 5% level) on competitiveness. The value of the coefficient is negative, showing that an increased cost of business reduces the competitiveness of the goods and services offered by the enterprises, and implicitly the international competitiveness of the countries from the efficiency-driven stage of development. The findings are consistent with our expectations and the literature in the field.

According to our results, the other economic factors considered in the analysis (tax rate and F.D.I.) do not have a statistically significant impact on the economic competitiveness of C.E.E. countries from the efficiency driven stage.

The biggest number of C.E.E. countries is included in the stage of transition between efficiency and innovation. For these countries, only three of the examined factors have a statistically significant influence on competitiveness, namely: G.D.P., inflation rate and labour productivity. G.D.P. has a positive influence on competitiveness, the coefficient being statistically significant at 1% level. This result is in agreement with our expectations and the findings of other studies (Dobrinsky & Havlik, 2014; Korez-Vide & Tominc, 2016; Podobnik et al., 2012), which showed that richer countries are more competitive than poor ones.

Inflation and labour productivity also have a positive effect on economic competitiveness as we expected. Thus, for the countries that are in transition between efficiency and innovation, an increase of the inflation rate will determine an increase in business opportunities because the higher level of prices for products and services can lead to increased expectations of the earnings of entrepreneurs, business development and sustaining competitiveness. The results of our estimations are consistent with the findings of Vidal-Suñé and Lopez-Panisello (2013) and Sayed and Slimane (2014).

The coefficient of labour productivity is also statistically significant at the 10% level and positive. This fact shows that the growth of labour productivity per hour worked stimulates the competitiveness of a country. These results are in line with our expectations, but also with the findings of some studies (Atkinson, 2013; O'Mahony & van Ark, 2003).

The other economic factors considered in the analysis (tax rate, F.D.I., trade and cost) do not have a statistically significant impact on the economic competitiveness of C.E.E. countries from the transition stage.

For the innovation-driven economies, the variables that have a statistically significant relationship with economic competitiveness are: G.D.P., tax rate, foreign direct investments, trade, inflation rate and cost of start-up procedures. G.D.P. is statistically significant at the 1% level and has a positive influence on the competitiveness of the innovation-driven countries. Higher G.D.P. determines an increase of the economic competitiveness of countries. This result is consistent with the results of other studies (Dobrinsky & Havlik, 2014; Korez-Vide & Tominc, 2016; Podobnik et al., 2012). A similar positive coefficient was also obtained for explaining the relation between foreign direct investments and economic competitiveness, being in accordance to our expectations. This result is in line with the findings of Fontagné and Pajot (1997), which showed that an increase of investments in and out of one country stimulate the competitiveness of the country.

Total tax rate and trade also have positive statistically significant coefficients at the 1% level. The relationship between tax rate and a country's competitiveness is positive, in agreement with the finding of Summers (1988), which showed that tax measures which stimulate investments will attract funds from abroad, leading to an appreciation in the real exchange rate and a reduction in the international competitiveness of domestic industry.

The exports and imports of goods and services have a positive significant influence on the economic competitiveness, relationship being significant at the 1% level. This result is in line with our expectations and the findings of some studies. Taner et al. (2010) and Ilzkovitz et al. (2008) found that an increase of trade determines an increase of the access of countries to global resources and extends market reach, enhancing international competitiveness.

Inflation rate has a positive statistically significant coefficient at the 5% level. This result shows that an increase of the inflation rate determines an increase in business opportunities. Increasing the level of prices for products and services could lead to increased expectations of the earnings of entrepreneurs, business development and, thus, could stimulate the competitiveness. Our findings are consistent with the results of other studies (Sayed & Slimane, 2014; Vidal-Suñé & Lopez-Panisello, 2013).

Cost of business start-up procedures is another factor which has a statistically significant influence (at 5% level) on competitiveness. The value of the coefficient is negative, showing that increased cost of business reduces the competitiveness of the goods and services offered by the enterprises and implicitly the international competitiveness of the country. The results are in line with our expectations and with the results in the literature.

Looking at the value of the R^2, we observe that the highest value of almost 73% is registered for the innovation-driven economies, followed by 69% for the efficiency-driven economies and only 20% for transition ones. Thus, we can affirm that, for the innovative and efficiency driven economies, our models offer a good explanation of the variation in competitiveness. Comparatively, for transition ones, the explanation is weak. However, we have to keep in mind that R^2 considers that every explanatory variable included in the model explains the variation of the dependent variable. As we have seen above, not all the examined variables have significant effects on economic competitiveness. Therefore, for accurate results, we have to look also at the value of R^2 adjusted because it gives the percentage of variation explained by only those independent variables that in reality affect the dependent variable. Thus, for the efficiency-driven C.E.E. countries, the changes in the G.D.P., inflation rates, trade, labour productivity and costs explain only 63% in the variation of competitiveness. For the C.E.E. countries that are in transition between the two stages of development, the changes that occur in G.D.P., inflation and labour productivity explain only 13% of the variation of competitiveness. And, finally, for the innovation-driven C.E.E. countries, the changes in G.D.P., inflation rate, tax rates, F.D.I., trade and costs explain 51% in the variation of competitiveness.

Based on our empirical results, we can conclude that the hypothesis formulated for our research, namely: the factors that affects the economic competitiveness are different in the C.E.E. countries according to their stage of development, was confirmed.

5. Conclusions

The added value of our study results from grouping the C.E.E. countries included in the panel by their stage of economic development. Every country has to work on the development of those competitiveness pillars that are the most important for that country's level of development. However, it is worth noting that all competitiveness pillars are important and a country should not neglect the development of the others. Our research has shown the differences that exist regarding the competitiveness for each observed country according to the level of its development. Thus, we consider that the results of our empirical investigation could be of interest to policy-makers, who should be concerned about identifying the best policies to increase the competitiveness of national economies.

We have investigated the effects of seven factors (identified in the literature) on the global competitiveness index in ten C.E.E. member countries of the E.U. The purpose of our study was to test the hypotheses and to offer evidence with respect to the different impact of the economic factors on competitiveness, according to the level of development of the country. The empirical results obtained show that a part of the considered indicators are significantly influencing the competitiveness of the C.E.E. countries and are in accordance with the results of other empirical studies. Thus, G.D.P., inflation rate, trade, labour productivity and cost of business start-up procedures are the determinants of competitiveness for the efficiency-driven C.E.E. countries. For the countries in transition between efficiency and innovation only G.D.P., inflation rate and labour productivity have an important influence on competitiveness. Finally, for the countries included in the innovation-driven stage, we observe the biggest number of factors that have a statistically significant influence on competitiveness, namely: G.D.P. growth rate, inflation rate, total tax rate, F.D.I., trade and cost of business start-up procedures. Thus, there are important differences with regard to the

economic determinants of competitiveness, according to the stage of development of the country. From all the considered indicators, only G.D.P. growth rate and inflation rate had a significant impact on competitiveness, regardless of the stage of development of the country.

The key limitation of our research is related to the G.C.I., which is a composite indicator; two-thirds of the data used for calculating the G.C.I. scores come from survey data and only a third from statistical data. Other possible limitations can be related to the periods of observations and the small sample of observed countries. Several extensions of our research are possible. In future studies we intend to go deeper into analysis, considering factors within each group of pillars that affect the country's competitiveness. Such analysis would be especially interesting for countries that have dramatically weakened or improved their competitiveness.

Acknowledgements

This work was supported by a grant of the 'Alexandru Ioan Cuza' University of Iasi, within the Research Grants program, Grant UAIC, code GI-UAIC-2017-02.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by a grant of the 'Alexandru Ioan Cuza' University of Iasi, within the Research Grants program, Grant UAIC, code GI-UAIC-2017-02 [grant number GI-UAIC-2017-02].

References

Anastassopoulos, G. (2007). Countries' international competitiveness and FDI: An empirical analysis of selected EU member-countries and regions. *Journal of Economics and Business, 10*(1), 35–52.

Atkinson, R. D. (2013). Competitiveness, innovation and productivity: Clearing up the confusion. *The Information Technology & Innovation Foundation*, August, 2-7. Retrieved from http://www2.itif.org/2013-competitiveness-innovation-productivity-clearing-up-confusion.pdf

Bryman, A., & Cramer, D. (2001). *Quantitative data analysis with SPSS release 10 for windows: A guide for social scientists* (Revised ed.). London: Routledge.

Dobrinsky, R., & Havlik, P. (2014). *Economic convergence and structural change: The role of transition and EU accession*. Wiener Institut für Internationale Wirtschaftsvergleiched. Retrieved from. http://wiiw.ac.at/economic-convergence-and-structural-change-the-role-of-transition-and-eu-accession-dlp-3357.pdf

European Commission. (2014). *European competitiveness report: Helping firms grow. Commission staff working document SWD (2014) 277 final*. Brussels: European Union.

European Commission. (2017). *Eurostat*. Retrieved from http://ec.europa.eu/eurostat

Fetahi-Vehapi, M., Sadiku, L., & Petkovski, M. (2015). Empirical analysis of the effects of trade openness on economic growth: An evidence for south east european countries. *Procedia Economics and Finance, 19*, 17–26.

Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal of Monetary Economics, 32*(3), 485–512.

Fontagné, L., & Pajot, M. (1997). How foreign direct investment affects international trade and competitiveness: An empirical assessment. CEPII Working Paper No. 17.

Greene, W. H. (2003). *Econometric analysis* (5th ed.). Pearson Education.

Hatzichronoglou, T. (1996). Globalisation and competitiveness: Relevant indicators. *OECD science, technology and industry working papers 5*. Paris: OECD Publishing, Organisation for Economic Co-operation and Development.

Iarossi, G. (2009). Benchmarking Africa's costs and competitiveness. In *World Economic Forum, World Band and Africa Development Bank, The Africa Competitiveness Report 2009* (pp. 83–107). Retrieved from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Africa%20Competitiveness%20Report%202009.pdf

Ilzkovitz, F., Dierx, A., Glagau, O., & Leib, K. (2008). *Trade performance and structural competitiveness developments in the euro are: Are member states equipped to meet the globalisation challenges of the 21st century?* Paper presented at the Workshop: The Implications of European Integration. Federal Reserve Bank of St. Louis and the European Union Studies Association.

International Institute for Management Development. (2003). *World competitiveness yearbook 2003*. Lausanne, Switzerland: International Institute for Management Development.

Kharlamova, G., & Vertelieva, O. (2013). The international competitiveness of countries. Economic-mathematical approach. *Economics & Sociology, 6*(2), 39–52.

Knoll, M. (2010). The corporate income tax and the competitiveness of U.S. *Industries Tax Law Review, 63*, 771–957.

Korez-Vide, R., & Tominc, P. (2016). Competitiveness, Entrepreneurship and Economic Growth. In P. Trąpczyński, L. Puślecki, M. Jarosiński (Eds.), *Competitiveness of CEE Economies and Businesses* (pp. 25–44). Springer International Publishing.

Krugman, P. (1995). Growing world trade: Causes and consequences. *Brookings Papers on Economic Activity, 1995*(1), 327–377.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42.

Miller, T., & Kim, A. (2008). High corporate taxes undermine U.S. global competitiveness. *Web Memo: The Heritage Foundation, 2065*, 1–2.

O'Mahony, M. & van Ark, B. (Eds.). (2003). *EU productivity and competitiveness: An industry perspective can Europe resume the catching-up process?*. Luxembourg: Office for Official Publications of the European Communities.

Onodera, O. (2008). Trade and innovation project: A synthesis paper. OECD Trade Policy Working Paper No. 72. Retrieved from http://www.oecd.org/trade/benefitlib/41105505.pdf

Pilinkiene, V. (2016). Trade openness, economic growth and competitiveness. The case of central and eastern european countries. *Engineering Economics, 27*(2), 185–194.

Podobnik, B.M., Horvatić, D., Kenett, D., & Stanley, H.E. (2012). The competitiveness versus the wealth of a country. *Scientific Reports, 2*, Article number: 678. Retrieved from http://www.nature.com/articles/srep00678#abstract

Porter, M., Sachs, J., & Warner, A. (2000). *Executive summary: Current competitiveness and growth competitiveness. The global competitiveness report 2000*. Oxford: Oxford University Press.

Romer, P. M. (1994). The origins of endogenous growth. *The Journal of Economic Perspectives, 8*(1), 3–22.

Sala-i-Martin, X. X. (1996). The classical approach to convergence analysis. *Economic Journal, 106*(437), 1019–1036.

Salman, D. M. (2014). Mediating role of research and development on entrepreneurial activities and growth: Evidence from cross-country data. *World Journal of Entrepreneurship, Management and Sustainable Development, 10*(4), 300–313.

Sayed, O., & Slimane, S. B. (2014). An appraisal of the determinants of entrepreneurship in developing countries: The case of the Middle East, North Africa and selected Gulf cooperation council nations. *African Journal of Social Sciences, 4*(4), 63–74.

Summers, L. (1988). Tax policy and international competitiveness. In J. A. Frenkel (Ed.), *International Aspects of Fiscal Policies* (pp. 349–386). University of Chicago Press.

Taner, B., Öncű, S., & Çivi, E. (2010). The relationship between international trade and national competitiveness. Retrieved from http://www.opf.slu.cz/vvr/akce/turecko/pdf/Taner.pdf

Vidal-Suñé, A., & Lopez-Panisello, M. B. (2013). Institutional and economic determinants of the perception of opportunities and entrepreneurial intention. *Investigaciones Regionales, 26*, 75–96.

World Bank. (2017). *World development indicators*. Retrieved from http://data.worldbank.org/data-catalog/world-development-indicators

World Economic Forum. (2015). *The global competitiveness report 2015–2016*. Geneva: World Economic Forum.

World Economic Forum. (2016). *The global competitiveness report 2016–2017*. Geneva: World Economic Forum.

World Economic Forum. (2017). *The global competitiveness index historical dataset* (Data set). Retrieved from http://reports.weforum.org/global-competitiveness-report-2015-2016/