REVIEW OF ECONOMIC PERSPECTIVES – NÁRODOHOSPODÁŘSKÝ OBZOR,
VOL. 13, ISSUE 2, 2013, pp. 63–76, DOI: 10.2478/revecp-2013-0001

The Impact of Price-Cost Competitiveness Factors on Economic Growth

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Abstract: The aim of this study is to verify the assumption that price-cost competitiveness factors affect long-term economic growth in the sample countries. This analysis is based on the neoclassical growth model extended by human capital. Furthermore, variables reflecting the cost-competitiveness and cost-effective real exchange rate and unit labor costs were added to the model. The default is a panel regression methodology and related methods of data analysis. The sample consists of EU member states that meet the requirement of a small open economy and membership in the OECD. On the basis of this criterion, the following countries were selected: Belgium, Czech Republic, Denmark, Estonia, Ireland, Hungary, Netherlands, Austria, Slovenia and the Slovak Republic. Annual frequency in the time frame 1999-2010 is the reference period. This is shown by the analysis results in the case that the selected sample of countries with affordable cost factors appears to be significant. The selected indicators of competitiveness can be one of the prominent factors that influence economic growth in developed countries, yet they are not a fully sufficient and comprehensive source of growth factors in terms of competitiveness.

Key words: Competitiveness, Economic growth, Panel Regression, Price-Cost Factors.

JEL Classification: E13, F43

Introduction

The main effort of almost all governments, at least of those of developed countries, is to ensure stable and long-term economic growth. In this context, one can consider the issue of the role of competitiveness factors. To what extent are the competitiveness factors correlated with economic growth? Economic theories have been trying to find the origin of the wealth of nations since the mercantilist times. At present, the factors of economic growth are increasingly recognised as possible indicators of international competitiveness (Hämäläinen, 2003).

However, competitiveness at the level of national economies is not clearly and unequivocally defined, there is no universally acceptable definition of this concept. Hindls (2003), for example, uses the following definition: *"The competitiveness of the economy is a term which synthetically expresses a country's ability to penetrate foreign markets with its goods and services and gain comparative advantages from international exchange."* The Institute for Management Development (2007) perceives competitiveness of a country as a part of economic theory which inquired policy and reality influencing the ability of a country to create and maintain such an environment

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which ensures greater added value for its companies and greater prosperity for the inhabitants. Most professional publications, however, at least agree on the methodology of measuring competitiveness. Generally, three possible ways of measuring competitiveness are used: through price-cost factors, business performance and through multi-criteria indicators. The first two methods cover only a part of competitiveness. A comprehensive overview of the competitive advantages is provided by multi-criteria indicators mainly. These, however, cannot be used for more sophisticated analyses due to different annual calculations.

Macroeconomic modelling has played an important role in recent years even beyond theoretical research. Conclusions obtained this way are implemented in practice and help both describe the current state of the economy and provide some predictions of future development. An appropriate model is expected to make a credible, quality and quantitative interpretation of economic development, and should also be empirically verifiable in the sense of real data (Šmídková, 1995). The model specified in this paper falls within the group of regression models and[2] allows assessing both time and the cross-sectional data set, and was therefore chosen as the best. In the theoretical level, a number of authors dealt with panel data models and their specifications (e.g. Baltagi, 2010, Granger and Huang, 1997).

The aim of this work is, based on the neoclassical growth model extended with human capital, to verify the assumption that price-cost competitiveness factors have an impact on economic growth in the selected sample of countries. Panel regression and the related methods of data analysis will be the key methodology for this analysis. The model will be applied to a panel of 10 countries (their selection is specified on page 6), with the selected sample consisting of EU countries which meet the requirement of an open economy and OECD membership between 1999 and 2010.

Theoretical Basis of Competitiveness and Economic Growth

Solow (1956) and Swan (1956) brought a relatively new view of growth theories, which formed the basis allowing them further modification. The neoclassical growth model is built on the idea that every economy is developing into a "steady state". A steady state represents a long-term equilibrium, and is considered a situation in which both capital per worker and product per worker are constant. This model is thus built on two-factor production function which allows substituting labour and capital. Constant economies of scale[3] is one of the assumptions; the model is also based on the assumption of diminishing returns of capital.[4] Overcoming the steady state, i.e. achieving further growth in an economy, can be achieved by involving technical progress which is given exogenously.

Since the mid 1980s, the approaches to long-term growth have been called new endogenous growth theories. Initially, these theories tried to supplement the neoclassical growth model and eliminate its shortcomings. Eventually, however, they have grown into an entirely new self-standing theory based on macroeconomic assumptions. The

[2] Provided the data set available is complete.
[3] If labour and capital increase by a certain percentage, then output increases by the same percentage.
[4] If the endowment of labour with capital increases, product gains decrease.

essence of these models was mainly based on endogenizing technical progress and a broader definition of capital[5] by e.g. Romer (1986) and Lucas (1988).[6]

Heilbroner and Milbery (1997) and Fogel (1994) question the validity of the traditional neoclassical economic theory in the light of rapid technological changes, increased mobility of production factors and growing structural problems of developed economies. There are many factors that affect the speed and size of economic growth. These factors may include climatic environment, education, property rights, tendency to saving, presence of seaports, etc. Empirical growth theories have suggested a number of economic and non-economic variables that may affect economic growth (Sala-i-Martin, 1997; Bleaney and Nishiyama, 2002). Also, an increasing number of businesspeople, economic policy makers and scientists recognize the importance of international competitiveness as a factor of economic growth and living standards (Hämäläinen, 2003).

Porter (1990) argues that improving competitiveness is increasingly important for national prosperity. It depends on the degree of productivity, with which nations make use of human, natural and capital resources. Productivity sets a sustainable living standard. Nations compete to offer the most productive environment for business. There is therefore an apparently close relationship of the mutual position of economic growth and competitiveness. Furthermore, Porter (1994) constructed the "diamond model", which defines four competitiveness factors: factors of resources, demand conditions, corporate strategies and the existence of related and supporting industries. In 2001, this approach was overcome by the competing cubic model, which separately analyzes economic performance, government efficiency, infrastructure and business efficiency (see Zemanová, 2005). The competitiveness concept has been extended with necessary and sufficient conditions by Ezeala-Harrison (2011). The necessary "micro" conditions define the business environment of a country. A competitive country then displays higher production factor productivity or lower costs per unit, and therefore features more efficient price-cost factors of competitiveness. As sufficient "macro" conditions, the degree of economic liberalization and the institutional environment of the country play a key role.

Economics has been dealing with monitoring competitiveness among countries only shortly. At the macroeconomic level, this applies to the state level or the level of multinational groups in particular. It is rather controversial to provide a relevant definition of this term, as one cannot apply the criterion of survival to individual states, as is the case for businesses.[7] This and other problems, too, lead to the lack of acceptance of the definition of macroeconomic competitiveness among economists; Krugman (1997), for example, raised the objection of different nature of relations between states.

Macroeconomic competitiveness is currently considered to be a part of modern economics. The relevant literature provides two main approaches to the competitiveness

[5] In particular human capital (knowledge and skills of an individual).
[6] This paper does not attempt to describe the genesis of growth theories, focusing primarily on the theoretical basis of neoclassical growth theory and on new growth theories, which underpin the initial analysis.
[7] At the micro level, it is the primary distinguishing sign of competitive and uncompetitive firms.

on the macroeconomic level. The first one is based on the OECD approach, and is used by e.g. the Institute for Management Development. OECD perceived competitiveness as an ability to sell on international markets. Originally defined or understood only as export performance of a country, competitiveness has evolved into a much broader concept. The second one is used by e.g. World Economic Forum or by Porter (1990) mentioned above, and is based on the productivity. Export performance is now seen as the external competitiveness of a country. The aggregate view of macroeconomic competitiveness puts emphasis especially on increasing people's income. According to Balcarová and Beneš (2006), these definitions are closely linked, since the success of domestic goods on foreign markets largely determines the increase in the living standard or the economic growth in the domestic economy. The modern view also takes into account social and environmental factors, legal stability of the country, transparency and quality of its institutions, etc. It is the countless factors affecting the competitiveness that make its evaluation and measurement difficult. Capturing competitiveness in its complexity requires sophisticated multi-criteria methods.

Indicators of Competitiveness and the Economic Formulation of the Model

Depending on the findings in the studies referred to above, a regression model evaluating the relationship of economic growth and competitiveness was developed. This model has been designed in accordance with the study of Mankiw, Romer and Weil (1992), one of the most commonly used models in practice. This concept is based on the neoclassical growth model extended by human capital. In addition to the classic variables such as real output growth, population growth, or capital accumulation, other variables such as the influence of human capital and competitiveness as a growth factor have been included.[8] The original concept of the model is thus extended by price-cost factors of competitiveness.

Price-cost factors are the most commonly used competitiveness indicators, although they reflect only one part of it. The importance of this method increases with the percentage of competitive advantage factors of resources in a country. However, the development of prices and costs tends to be of a short-term nature. The main problem occurs in the ambiguous specification of sources and causes of the country's competitiveness, as on cannot always distinguish clearly whether or not the country's improving economic performance leads, through exchange rate appreciation relative, to the growth of relative prices and costs, or if too high relative costs lead to the reduced competitiveness of the economy (Turner and Van't Jack, 1993). As the extensive study of Balcarová and Beneš (2006) suggests, real effective exchange rate (*REER*), given in the form of an index, is the most appropriate indicator of price-cost factors. Its growth leads to a reduction of competitiveness of an economy as a result of appreciation. If the value of *REER* is greater than 100, it indicates decrease of the economy in relation to foreign countries because of appreciation of the home currency. The calculation is based on the nominal exchange rate, which is then deflated by the price level differential or price index differential between domestic and foreign economies. The efficient form is compiled using weighted averages of bilateral exchange rate relations of the country's currency against the currencies of those countries that are potential competitors of the economy on export markets. Included are also unit labour costs

[8] E.g. Hämäläinen (2003).

(*ULC*), which can be defined as labour costs per unit of output. They are used to measure price competitiveness, as wages are a major component of costs and therefore prices. Here, the share of wages on labour costs or on prices is the decisive indicator; however, costs decrease with growing labour productivity. The lower the *ULC*, the more competitive the economy. Other price-cost competitiveness factors further include various forms of price indices or the actual productivity; however, their effective use is inappropriate due to design shortcomings. A deeper discussion over the construction and the appropriate or inappropriate use of other indicators within the group of price-cost factors is somewhat extensive; therefore, it will not be further discussed (see Balcarová and Beneš, 2006).

Initially, competitiveness of economies was evaluated on the basis of their trade performance or global market share. Increasing share of foreign trade can serve as a source of economic growth. Krugman (1997) claims that competitiveness can be perceived as a "combination of positive trade productivity and of something more". Therefore, the study is applied to an open economy with a high proportion of the country's export performance. One can therefore conclude that the selected economies are competitive through their trade performance. This fact is used as one of the key criteria for selecting the sample of countries. Generally, a high proportion of export performance is an indicator showing the percentage share of exports in GDP. From the perspective of price-cost factors, application of the study on the closed economies is hence useless. Table 1 shows the overall situation in the EU, with countries with higher export performance over 50% in bold. The analysis of countries with export share below 50% would in this case be somewhat irrelevant, since the price-cost factors would lose its point in the sense of price and cost competitiveness in foreign markets.

Table 1: Exports of goods and services as Percentage of GDP (EU 27; year 2010)

Country	EX as % of GDP	Country	EX as % of GDP
Belgium	**79.9**	**Luxembourg**	**165.0**
Bulgaria	**57.4**	**Hungary**	**86.5**
Czech Republic	**67.9**	**Malta**	**96.1**
Denmark	**50.3**	**Netherlands**	**78.0**
Germany	46.8	**Austria**	**54.1**
Estonia	**79.4**	Poland	42.2
Ireland	**101.1**	Portugal	31.0
Greece	21.5	Romania	35.5
Spain	27.0	**Slovenia**	**65.4**
France	25.6	**Slovakia**	**81.2**
Italy	26.6	Finland	40.3
Cypress	42.1	Sweden	49.7
Latvia	**53.8**	United Kingdom	30.5
Lithuania	**68.3**		

Source: Eurostat 2012.

A summary view of the competitiveness of economies provides indicators taking into account practically all qualitative and quantitative phenomena in the economy. Due to the complexity of these indicators, their importance in recent years has been growing. WEF and IMD deal with the interpretation of these competitiveness indicators. However, due to a very variable structure of the criteria and reference sample of countries, these indicators cannot be considered suitable elements for monitoring the development of competitiveness over longer time series.

Based on the theoretical knowledge acquired, one can define hypotheses for the behaviour of individual coefficients vis-á-vis economic growth per capita (*GDP/pc*) as follows:

- Capital accumulation (*CAP*) through the savings growth rate or investment growth rate leads to an increase in long-term economic growth, but only on the way to a steady state (see the neoclassical growth model).
- In this study, the dependent variable is *GDP/pc*; in this case, the population growth (*POP*) will thus reduce economic growth per capita. Therefore, the influence of this parameter has a negative effect on economic growth.
- A better use of existing physical capital can be achieved by increasing the share of human capital (*HUM*), leading to a more efficient use of labour productivity and to economic growth.
- Increasing the competitiveness of economies has a positive effect on economic growth. In the case of price-cost factors, the growth of effective exchange rate (*REER*), i.e. appreciation, leads to reducing the competitiveness of an economy. Identically, an increase in unit labour costs (ΔULC) also leads to its reduction. The growth of these variables has therefore a negative effect on economic growth.

Hypotheses that have been defined can be summarized in the following equations (see below), which postulate the functional dependence of economic growth according to the explanatory variables, either according to positive or negative changes.

Data, Formulation and the Estimation of the Basic Regression Model

All of the data used are of quantitative and secondary nature. They are annual time series. As the data base, statistical database of Eurostat (2012) is primarily used. Empirical verification of the relationship between the price-cost factors and economic growth is applied to a panel data for 10 countries in the period of 1999-2010. As a spatial basis for the verification of the dependence, a sample of EU countries is used due to data availability and the use of identical standards in the individual methodologies. Selected countries also meet the requirement of an open economy to ensure trade performance as a factor of competitiveness (see above), as well as the OECD membership to ensure greater homogeneity of the sample of countries under comparison. These conditions are met by Belgium, Czech Republic, Denmark, Estonia, Ireland, Hungary, Netherlands, Austria, Slovenia, Slovak Republic and also Luxembourg, which, however, was withdrawn from the sample due to its atypical

economy.[9] The calculations are particularly performed in E views, version (7); additional calculations are performed in MS Excel.

Real gross domestic product per capita (*GDP/pc*) expressed in terms of real GDP per capita in purchasing power parity is the dependent variable, capital accumulation (*CAP*) approximated by the share of investments to the GDP in purchasing power parity per capita, and population (*POP*) expressing the level of population in the destination in millions, is the independent variable. Finally, human capital (*HUM*) represents the share of population with at least secondary education to the total labour force, expressed relatively as a percentage. Elements of competitiveness are approximated by real effective exchange rate (*REER*) expressed by index[10] and real unit labour cost (*ΔULC*), shown as annual percentage changes, always for the *i-th* country in period *t* for all variables.

The analysis is conducted by the means of a panel regression, which enables a two-dimensional view of data or the observation of many phenomena over several time periods (Baltagi, 2010). The formulation of the model created on the basis of the economic foundations will be based on the general notation of panel data regression. In the case of the formulation proposed, the mathematical notation of the selected estimated equation is as follows:

$$GDP/pc_{\ it} = \hat{\beta}_0 + \hat{\beta}_1 CAP_{it} + \hat{\beta}_2 POP_{it} + \hat{\beta}_3 HUM_{it} + \hat{\beta}_4 REER_{it} + \hat{\beta}_5 \Delta ULC_{it} + \hat{u}_{it};$$
$$i = 1,..,10;\ t = 1999,..,2010 \qquad (1)$$

The basic proposed equation contains five explanatory variables; thus, six partial regression coefficients can be estimated therein ($\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4, \hat{\beta}_5$). The coefficient $\hat{\beta}_0$ is the estimated level constant. The coefficient $\hat{\beta}_1$ (or $\hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4, \hat{\beta}_5$) shows an average change in the dependent variable *GDP/pc*, if there is an increase in the unit independent variable *CAP* (or *POP*, *HUM*, *REER*, *ΔULC*).

The method of least squares is commonly used in building the regression equations. The least squares method provides adequate estimates of parameters only if simultaneously fulfilling all the assumptions about the data, see Wooldridge (2002). In the data set, no atypical values have been detected under standard tests; therefore, the model is estimated using the method of least squares. It is necessary to first correctly divide the data into individual panels and confirm its stationarity. Only then, based on the existence of long-term relationships, one can select a sample of countries eligible for a panel regression. Without these steps, the output could not be considered objective. Subsequently, statistical and econometric verification of the model is performed. All tests are applied at a 5% significance level.

[9] Luxembourg is excluded due to the extremely small size of its economy and also due to its above-average values of macroeconomic indicators related to a selected sample of countries.

[10] The year 1999 is the fixed base period and the specific *REER* for indicators of sustainable development is deflated using the CPI on a panel of 36 countries (EU27 + 9 other industrial countries: Australia, Canada, United States, Japan, Norway, New Zealand, Mexico, Switzerland and Turkey).

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As was mentioned above, in order to be objective, it is necessary first to analyze the stationarity of each of the time series, or stationary time series must be used in order to create high-quality regression equation from data in panels. Stationarity is understood as stochastically consistent behaviour of a time series. One way to evaluate it is to examine the time series chart and subjectively evaluate and decide whether the time series is stationary, or whether the series should be differentiated one or more times in order to stationarize it. These subjective estimates are not entirely sufficient in a larger extent. There are several statistical tests to detect stationarity termed as unit root tests. These may include tests by Levin, Lin and Chu (2002), Breitug (2000), Im, Pesaran and Shin (2003), Choi (2001), etc.

In the case of the estimated model, all autoregressive parameters are identical for all objects; under this assumption, the test by Levin, Lin and Chu (the LLC test) seems to be the best option.

Following the stationarity analysis, the model can be estimated using the method of least squares with either fixed or random effects.

Table 2: Results of the test of stationarity of time series.

Variable	Statistics at levels	Stationarity at levels	Difference statistics, 1st order	Stationarity in the difference, 1st order
GDP/pc	-0.94	N	-7.01	S
CAP	-5.61	S	-	-
HUM	0.72	N	-6.56	S
POP	-4.01	S	-	-
REER	-1.89	S	-	-
ΔULC	-2.30	S	-	-

Source: Own calculations.

Table 2 demonstrates the results the LLC stationarity test results for individual variables, with the first two columns showing stationarity at levels and the following columns in the first differences. Normally, non-stationary time series can be converted to stationary ones using the first or higher differences. Thus, if we find the time series stationary according to the values, the symbol "S" (stationary) is assigned. If the opposite is true an "N" (non-stationary) is assigned. For series that are non-stationary in the first few levels, stationarity tests are also performed in the first differences. The presence of unit roots, as seen in Table 2, was found in the variables *GDP/pc* and *HUM*. Rows can therefore be regarded as non-stationary. This fact could be expected especially in the case of *GDP/pc*, where its character usually displays a temporary deviation from the long-term trend affecting its level. Concerning stationarity, *CAP*, *POP*, ΔULC and *REER* proved as problem-free. The non-stationary nature of time series was performed by transforming the values to the first difference.

In the subsequent estimate, it is also likely that unobserved individual elements which can take the form of fixed or random effects will occur. Fixed effects represent the constancy of certain variables in time and space. For the model with random effects, we assume that the individual effect is a random variable, uncorrelated with the independent variables. Neither its mean value nor variance depend on the independent variables. The question now is whether to estimate the model with fixed or random effects. The disagreement on this issue is a frequently discussed topic in professional publications[11]; however, the model with fixed effects is generally considered more acceptable. After removing the non-stationarity of the selected time series from the model, it was estimated with both fixed and random effects.

Hausmann test compares estimates of the fixed and random effect model. The null hypothesis states that there is no correlation between individual effects and explanatory variables of model. Hsiao (2003) tells that it can be expressed as follows (2):

$$H = \left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right)' \left[Var\left(\hat{\beta}_{FE}\right) - Var\left(\hat{\beta}_{RE}\right)\right]^{-1} \left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right), \quad (2)$$

which has asymptotic $\chi 2$ test with k (number of columns in the matrix X) degrees of freedom, where $\hat{\beta}_{FE}$ is estimation of fixed effect, $\hat{\beta}_{RE}$ is estimation of random effect. Acceptation of the null hypothesis means that both estimates are consistent and differences between estimates are small; p-value is greater then 0.1. If those conditions are fulfilled, it is appropriate to use the random effect model.

The use of random effects in this model appears to be inappropriate. Verification carried out by Hausman test failed to prove that individual effects are not correlated with any of the independent variables. Furthermore, the model was estimated with fixed effects with the occurrence being also confirmed by the Fixed Effects test. In this case, the results do not show any systematic error any more. In addition to solving the issue of stationarity and fixed effects, the model was also estimated and corrected using White Cross-Section Method for the possible presence of heteroscedasticity. This method is one of the possibilities how to estimate covariant matrix coefficient and is robust to the heteroskedasticity between the cross-section variables in one time.

The model was thus further estimated with fixed effects in the following form:

$$GDP/pcdif^1{}_{it} = \hat{\beta}_0 + \hat{\beta}_1 CAP_{it} + \hat{\beta}_2 POP_{it} + \hat{\beta}_3 HUMdif^1{}_{it} + \hat{\beta}_4 REER_{it} + \hat{\beta}_5 \Delta ULC_{it} + \hat{u}_{it} \quad (3)$$

After necessary adjustments carried out in order to optimize the variables using the F-test, the estimated model (see Table 3) shows its statistical significance as a whole at the 1% significance level. The overall regression significance (F-test) is quite high in this case. Using the t-test, verification of statistical significance of individual variables is carried out. HUM failed to prove its significance here. However, this fact does not indicate the absence of influence of human capital on economic growth; it merely refers to the fact that this variable, expressed as the share of population with at least secondary education in the labour force, poorly approximates the level of human capital for the given sample of countries. In general, the quantification of human capital is a rather

11 For this issue see Baltagi (2010) in sub-section 2.3.1.

difficult matter, also in terms of data availability. The relevant coefficient of this variable is moreover negative, which does not correspond to the expected (positive) effect which was based on assumptions.

Table 3: Values of the modified base model

F-statistic		11.79418*	
R-squared		0.634782	
Variable	Coefficient	t-Statistic	Economic verification (T/E)
β_0	14985.92	2.955041*	-
CAP	0.376433	4.291740*	+/+
HUM	-29.32793	-0.729394	+/-
POP	-0.002022	-2.756019*	-/-
REER	-13.63162	-4.985979*	-/-
ΔULC	-162.0945	-6.868250*	-/-

Source: Own calculations.

*Note: *statistical significance on 1% significance level;**statistical significance on 5% significance level. T- theoretical direction of influence, E - empirical results.*

Other individual coefficients were verified using the t-test as significant at 5% significance level. The values further confirm both the positive effect of *CAP* and the negative affect of *POP*, *REER* and ΔULC. The coefficients have the following expected direction of influence: *CAP* (+), *POP* (-), *REER* (-) and ΔULC (-). Individual variables are thus verified as significant with the expected signs in accordance with economic theory. The coefficient of determination shows that these independent variables explain the dependent variable quite strongly, which is consistent with the hypothesis and with economic theory.

The functional relationship among the indicators of population, capital, and the dependent variable of economic growth are confirmed by long-term expert studies. As was mentioned in the introduction, the evaluation of the competitiveness is a somewhat vague discipline. The results mentioned above suggest that the criteria of price-cost factors of competitiveness are sufficient and constitute an important resource for the given sample of countries that could affect economic growth. The hypothesis of the impact of price-cost factors on economic growth has thus been confirmed. The statistical significance assumes that the growth of competitiveness of individual countries (measured by price-cost factors) leads to the growth of *GDP/pc* in these countries. However, this may not always be the rule. As is clear from the theoretical part of this study, price-cost factors represent only one way to indicate competitiveness, although they seem to be most suitable. The author believes that in today's rapidly evolving world and with increasing demands on knowledge-based economies, price-cost factors as the only competitiveness indicator are insufficient, especially in developed economies. For these countries, one should take into account other non-price elements that aggregate indices published by the WEF or the IMD. Baumol (1967) further states

that unit labour costs or real effective exchange rate are more significant factors of competitiveness for countries that are trying to catch up with economically developed countries, or that are undergoing the first stage of transformation.

For the sake of completeness of this paper, we can thus present the modified model, after removing the *HUM*. This fact is presented in Table 4, showing that after eliminating non-significant variables, the model, according to F-statistics, is significant as a whole, and the individual variables are also significant at the 1% significance level. Even here, individual variables are thus verified as significant, with the expected signs in accordance with economic theory.

Table 4: The value of the modified model

F-statistic		12.76437*	
R-squared		0.633499	
Variable	Coefficient	t-Statistic	Economic verification (T/E)
β_0	14649.16	3.060183*	-
CAP	0.384016	4.260941*	+/+
POP	-0.001980	-2.824122*	-/-
REER	-13.87320	-4.711389*	-/-
ΔUCL	-162.7269	-6.793228*	-/-

Source: Own calculations.

*Note: *statistical significance on 1% significance level;**statistical significance on 5% significance level. T- theoretical direction of influence, E - empirical results.*

Conclusion

The ability to increase competitiveness of national economies and the growth of economic performance are two closely linked variables. Differences among countries cause different levels of economic performances, which this leads to growth of their efforts and strengthening of their position in international economic relations. The definition of competitiveness is somewhat vague; as a result, we can come across different papers on this topic in professional publications.

The aim of the present paper was, based on the neoclassical growth model extended with human capital, to verify the assumption that price-cost competitiveness factors have an impact on economic growth in the selected sample of countries. The model as a whole was statistically significant with a relatively high degree of determination. The functional dependence could not be demonstrated for one independent variable – the human capital (*HUM*). This may be due to an improper use of this indicator for the selected sample of countries for the reporting period. The evaluation of human capital both in the theoretical and empirical field is quite a complex task; the issue is also complicated in terms of data availability. Other individual coefficients were verified as significant at the 5% significance level. The coefficients have the following expected direction of influence: *CAP* (+), *POP* (-), *REER* (-) and *ΔULC* (-). Using the regression analysis performed, the hypothesis concerning the impact of price-cost factors on

economic growth was confirmed, as these variables turned out to be statistically significant in the model. In the case of the main variables under examination (*REER* and *ΔULC*), the dependence in relation to economic growth has thus been found to be negative. It can therefore be concluded that the increase in price-cost factors leads to the stifling of long-term economic growth in these countries.

The fact that this relationship has been demonstrated does not necessarily prove an absolute link between these variables. Selected studies point to the fact that price-cost factors are of a short-term nature and their significance are important in particular in the early days of economies in transition as well as in developing countries.[12] Therefore, this dependence can also be influenced by the choice of countries, since half of the sample are post-transition countries. The theoretical and empirical knowledge enables us to conclude that for the innovation-based countries or economies headed to this state, price-cost factors of competitiveness will not represent the primary source of economic growth.

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