Josef Taušer, Pavel Žamberský, Radek Čajka
University of Economics, Prague

Comparative price levels of new EU member countries

Abstract

This article analyzes comparative price levels of 10 new EU member countries from Central, East, and South-East Europe and discusses their main determinants. A comparison of comparative price levels is logically followed by a comparison of relative GDP per capita in purchasing power parities. Further, the Balassa-Samuelson effect is theoretically explained and empirically tested using a sample of EU27 countries (excluding Luxemburg). The results of simple regression analysis confirm that differences in comparative price levels can be explained by the differences in relative GDP per capita in purchasing power parities. Besides the Balassa-Samuelson effect there are, however, many other factors that have an impact on comparative price levels. They are related to the lower competitiveness of domestic companies on international markets as the result of such factors as a lower quality of production, inefficient organizational structures and management styles, insufficient marketing and business skills, or a poor approach to international distribution channels.

Keywords: Price convergence, comparative price levels, European Union, Balassa-Samuelson effect
JEL: F15, F31

Introduction

It has already been nine years since the Czech Republic, together with nine other countries, joined the European Union, while three other states from the region have joined the EU since then. The different levels of comparative prices and real GDP per capita of these 10 countries with respect to the EU average were one of the most important issues in the process of EU enlargement. It was generally assumed that membership in European Union would significantly accelerate the convergence processes. This as-

sumption was empirically tested for instance by Dreger et al. [2008] and Matei [2009]. The convergence process itself was then analyzed from different perspectives, for example by Žďárek [2009 and 2011].

This article looks at the current situation in order (1) to investigate the comparative price levels of 10 new EU member countries from Central, East, and Southeast Europe in 2011[1] (hereinafter "10 new EU countries"), and (2) to analyze its main determinants.

Basic comparison

Despite a long period of complicated economic transformation, the 10 new EU member countries are still not competitive enough in comparison with old member countries. Organizational structures and management styles are not efficient, quality of production and labor productivity are significantly lower, and formal and informal relations on world markets have yet to be created.

As a result, purchasing power parity[2] may not hold in the new member countries because these economies would not be competitive if the exchange rates were equal to the ratio of domestic and foreign aggregate price levels. In a hypothetical case, exports would fall and consequently the domestic currency would depreciate. Thus, under the specific conditions of economic transformation, equilibrium exchange rates are systematically undervalued in relation to purchasing power parity.

Undervaluation of domestic currency in relation to parity creates a shield for domestic companies that may sell their products for cheaper prices than foreign competition while realizing the same level of relative profit. If the exchange rate is higher than parity (direct quotation), the domestic comparative price level is lower than the price level in a more advanced economy. A lower comparative price level implies a lower level of relative costs. Thus, domestic companies may sell their products on the world markets cheaper in comparison with foreign competitors.

Lower comparative price levels of new member countries are an equilibrium situation that coincides with the external economic balance under the conditions of lower competitiveness. In the graph below, the comparative price levels of the 10 new member countries are illustrated. Graph 1 is based on official data provided by Eurostat (May 2013). Comparative price levels are measured as the ratio between purchasing power parities for final consumption by private households including indirect taxes and the market exchange rate for each country. The comparative price levels are shown in relation to the EU average (EU27 equals 100).

The comparative price level of all 10 analyzed countries in transition is still significantly lower than the EU27 average. Only Slovenia reaches more than 80% of average price level in EU27. Four countries (the Czech Republic, Estonia, Latvia, and Slovakia) have comparative price level between 70% and 80% of the average price level

Comparative price level of selected new member countries in 2011 (EU27 = 100)
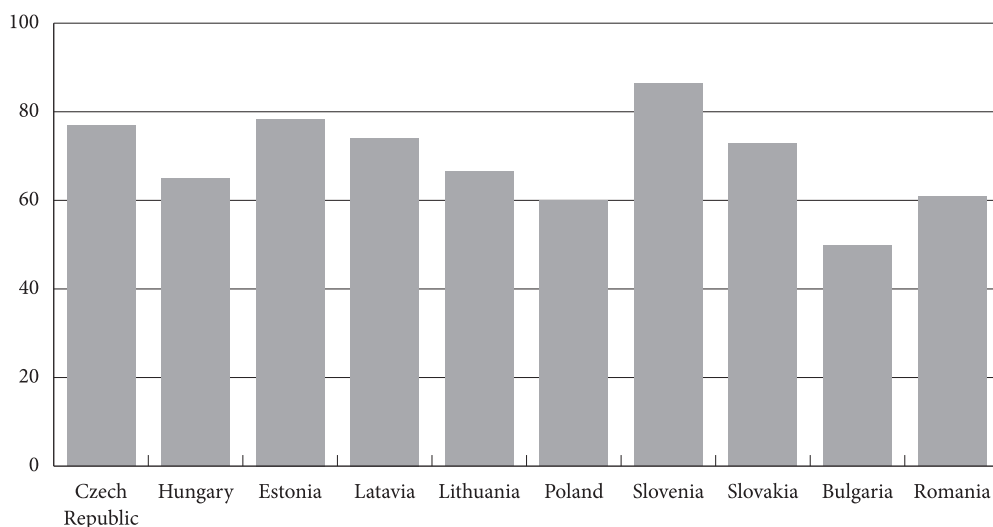
S o u r c e: Eurostat (May 2013).

in EU27. The comparative price level of other four countries (Hungary, Lithuania, Poland, and Romania) lies between 60% and 70% of average price level in EU27. The comparative price level of Bulgaria then equals only about 50% of average price level in EU27.

In the table below, the countries are grouped into four rows. The first row holds countries with a comparative price level of more than 80% of the average price level in EU27. In the second row there are countries whose comparative price level reaches 70%-80% of the average price level in EU27. The third row shows countries with comparative price levels between 60% and 69.9% of the average price level in EU27. The last row indicates a comparative price level lower than 60% of the average price level in EU27.

TABLE 1. **Comparative price level of selected new member countries in 2011**

Comparative price level	Countries
More than 80% of EU27 average	Slovenia
70%-80% of EU27 average	Latvia, Czech Republic, Slovakia, Estonia
60%-69.9% of EU27 average	Hungary, Lithuania, Romania, Poland
Less than 60% of EU27 average	Bulgaria

S o u r c e: Eurostat (May 2013).

On average the comparative price level of selected countries reaches about 69% of the average price level in EU27, which implies a strong undervaluation of new members' currencies. This indicates insufficient competitiveness of these economies, as is implied by a number of real economic factors. Among all real economic variables, the differences in labor productivity are emphasized in most international comparative studies. New member countries display a lower level of labor productivity than the advanced economies; lower labor productivity implies a lower comparative price level.

Balassa-Samuelson Effect

The relation between the relative labor productivity and the comparative price level is usually explained by the Balassa [1964] and Samuelson [1964] effect (hereinafter "B-S effect"), which has been precisely summed up by Pilbeam [1998]. The key assumptions of the model are:
- The consumer basket is made up of non-tradable goods (such as services) and tradable goods.
- Tradable goods have the same price everywhere due to arbitrages.
- Workers in more advanced countries have higher productivity in the sector of tradable goods whereas labor productivities are equal in the sector of non-tradable goods.
- Local wage levels between tradable and non-tradable goods sectors are equalized (so-called wage contagion).
- Prices are set with respect to the ratio of nominal wages and labor productivity.

Taking these assumptions into consideration, we can assume that the new member countries should have lower comparative price levels than the more advanced economies. Less developed countries have lower labor productivity in the sector of tradable goods. Since the prices of tradable goods are generally the same everywhere, countries with lower labor productivity will have lower wage levels in this sector as well. Because of wage contagion, the wages of less developed countries are also comparatively lower in the sector of non-tradable goods. However, labor productivities in the sector of non-tradable goods are equal for all the countries, which ultimately results in comparatively lower price levels of non-tradable goods in less developed countries. Based on the ratio of non-tradable goods in the total consumer basket, overall comparative price levels of less developed countries are, then, lower in comparison to more advanced ones. Of course, this basic idea has been subjected to many empirical tests (for instance [Čihák and Holub, 2005]; [Zhou, 2011]) and also to various extensions (see for example [Borgersen and King, 2011]).

Labor productivity usually correlates with the relative GDP (gross domestic product) per capita in purchasing power parity. The graph below shows the relative GDP of the 10 selected countries in transition expressed in relation to the EU average.

GRAPH 2. **Relative GDP per capita in purchasing power parity in 2011 (EU27 = 100)**
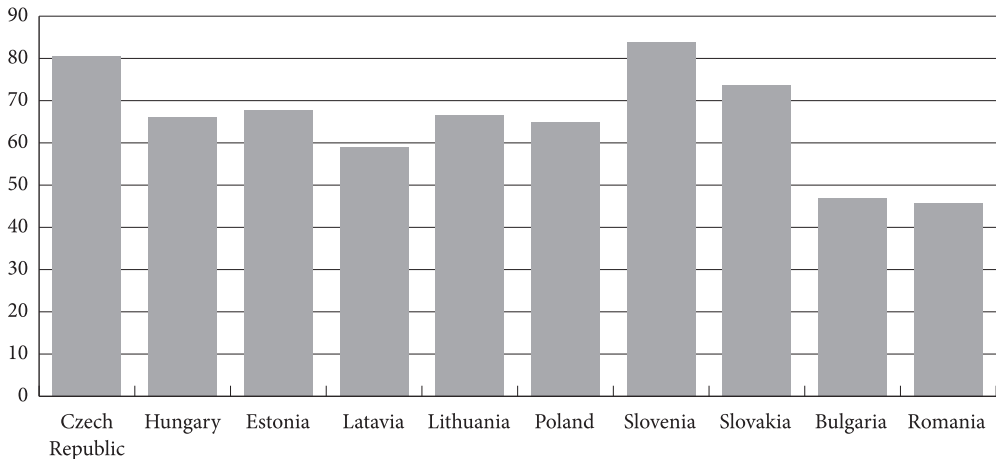
S o u r c e: Eurostat (May 2013).

The relative GDP per capita of selected new member countries is markedly lower than the average GDP per capita in the entire EU. Two countries (Slovenia and the Czech Republic) have a GDP per capita higher than 80% of the EU27 average. The GDP per capita of Slovakia is slightly more than 70% of the EU27 average. The GDP per capita of Hungary, Estonia, Poland and Lithuania lies between 60% and 70% of the EU27 average. The GDP per capita of Latvia is slightly less than 60% of the EU27 average. Bulgaria and Romania have the lowest GDP per capita, lower than 50% of the EU27 average.

TABLE 2. **Relative GDP per capita in purchasing power parity in 2004**

Relative GDP level	Countries
More than 80% of EU27 average	Slovenia, Czech Republic
70% - 79.9% of EU27 average	Slovakia
55% - 69.9% of EU27 average	Hungary, Poland, Lithuania, Latvia, Estonia
Less than 55% of EU27 average	Romania, Bulgaria

S o u r c e: Eurostat (May 2013).

The average relative GDP per capita of the 10 selected countries reaches only about 65% of EU27 average. This real economic backwardness is implied by the lower comparative price level as postulated by the B-S effect.

Model

If we take into account the data on comparative price levels and relative GDP per capita for all EU countries (excluded Luxembourg)[3] provided by Eurostat (May 2013), the correlation coefficient between both variables is 0.911, indicating a relatively strong relationship between the variables.

When conducting simple regression analysis, we will use the natural logarithms of both variables in order to obtain the coefficient of elasticity as the regression coefficient. The results of the analysis are contained in the table 3.

TABLE 3. **Simple regression analysis**

Coefficients	Estimate	Standard Error	T-Statistic	P-Value
Intercept Slope	0,937116 0,79253	0,288323 0,064214	3,25 12,34	0,0034 0,0000
F-Ratio	152,3249			
P-Value	0,0000			
Correlation R-squared	0,9114 86,39%			

S o u r c e: Own analysis based on data by Eurostat (May 2013) and conducted via Gretl.

The analysis shows the results of fitting a linear model to describe the relationship between the natural logarithm of comparative price level **ln (CPL)** and the natural logarithm of relative GDP per capita **ln (GDP)**. The equation of the fitted model is:

$$\ln(\text{CPL}) = 0.937116 + 0.79253 \cdot \ln(\text{GDP})$$

Since the P-value in the analysis is less than 0.01, there is a statistically significant relationship between the natural logarithm of comparative price level and the natural logarithm of relative GDP per capita at the 99% confidence level.

The R-Squared statistic indicates that the model explains about 86% of the variability in comparative price levels. The slope of fitted regression line equals 0.79 indicating that growth in relative GDP by 1% corresponds with the growth in comparative price level by 0.79%.

As for the diagnostic control of the model, we have applied the White test to investigate whether the variance of residuals of a variable in a regression model is constant. Since the P-value equals 0.83, we do not reject the homoscedasticity. Furthermore, we have employed the Jarque-Bera test to check the normality of the residuals. Since the P-value equals 0.44, we do not reject the normality. Finally, we have used the Augmented Dickey-Fuller test to find out whether there is a significant serial autocorrelation of the

residuals. Since the P-value equals 0.004, we confirm the stationarity of the residuals. Graph 3 shows the fitted regression line.

Simple regression analysis – fitted regression line for 2011
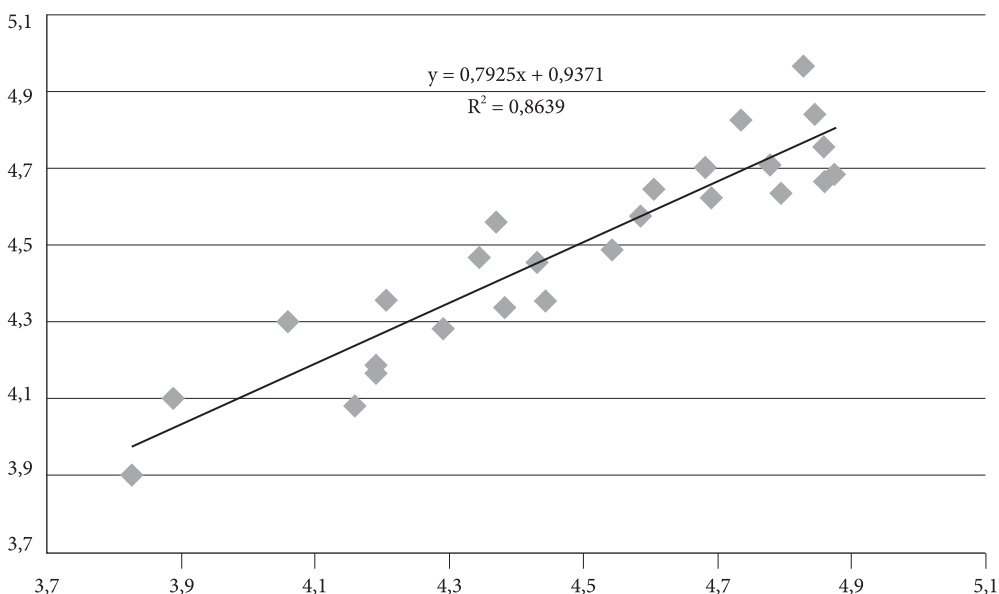
S o u r c e: Own analysis based on data by Eurostat (May 2013).

Discussion of other factors

Apart from the B-S effect, there are many other reasons that the comparative price levels of new member countries are lower in relation to the comparative price levels of more advanced economies. The B-S effect postulates the prices of tradable goods are equal if measured in the same currency. However, in reality, the new member countries usually reach lower comparative prices of their internationally traded products on world markets [Nešvera, 2006]. This is common, since the exports of new member countries are either of worse quality or limited by institutional barriers in international trade such as different access to world distribution channels, differences in consumer preferences, and a lower quality of business and marketing activities.

Since the comparative export prices of new member countries are lower, the relative cost expressed in terms of domestic comparative price levels will be lower as well, so

that the domestic companies are able to produce and export their goods. If the domestic comparative price levels were hypothetically identical, the domestic companies would not be competitive enough because they would have to increase their prices in order to maintain the required rate of return. Consequently exports would fall and the exchange rate would depreciate.

Thus, a lower domestic comparative level not only corresponds to the lower relative GDP per capita but also reflects the lower level of comparative export prices which is due to a number of factors such as lower quality of domestic production, insufficient business capacities, and lack of formal and informal relations with the companies on world markets.

Summary

The comparative price levels of 10 new member states of the European Union are significantly lower than the average price level in the EU27. The lower comparative price level is a consequence of many different aspects that are connected with (1) lower labor productivity in the sector of tradable goods (B-S effect), and (2) lower non-price competitiveness of domestic companies on international markets due to the lower quality of the production, inefficient organizational structures and management styles, insufficient marketing and business skills, and a poor approach to international distribution channels.

Acknowledgement

Notes

[1] On May 1, 2004 eight Central and Eastern European countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia) plus two Mediterranean countries (Malta and Cyprus) joined the European Union. Romania and Bulgaria accessed the European Union on Jan. 1, 2007, and Croatia joined on July 1, 2013. The presented analysis focuses, however, only on former communist countries, i.e. it excludes Malta and Cyprus. The research was completed before Croatia joined the EU.

[2] For more details see for example Cassel [1918], Blanchard [2000] or Krugman and Obstfeld [2008].

[3] Luxembourg represents a very specific economy with a very high share of financial services in the GDP and with many foreign workers. From the statistical point of view, therefore, it is more accurate to exclude Luxemburg from the analysis.

References

Balassa B. (1964), The Purchasing-Power Parity Doctrine: A Reappraisal, The Journal of Political Economy, No. 6, Dec.

Blanchard J.O., Fischer, S. (2000), Lectures on Macroeconomics, The MIT Press, London

Borgersen T. and King R.M. (2011), Reallocation and Restructuring: A Generalization of the Balassa-Samuelson Effect. Structural Change and Economic Dynamics, Vol. 22, No 4, pp. 287-298

Cassel G. (1918), Abnormal Deviations in International Exchanges, Economic Journal No. 28

Čihák M. and Holub T. (2005), Price Convergence in EU-Accession Countries: Evidence from the International Comparison, Economie Internationale No. 102, pp. 59-82

Dreger Ch.K. et al. (2008), Price Convergence in an Enlarged Internal Market, Eastern European Economics. Vol. 46, No. 5, pp. 57-68

Krugman P.R., Obstfeld M. (2008), International Economics: Theory and Policy. Addison-Wesley

Matei I. (2009), Testing for Price Convergence: How Close Are EU New Member's States to Euro Zone? Economics Bulletin, Vol. 29, No. 4, pp. 3083-3094

Nešvera V. (2006), Analýza vývoje cen v zahraničním obchodě se zeměmi EU [online], Praha: Český statistický úřad, No. 96: http://www.czso.cz/csu/2006edicniplan.nsf/t/060053C386/$File/cele.pdf. Analýzy ČSÚ

Pilbeam K. (1992), International Finance, Macmillan Press LTD, 1992

Samuelson P.A. (1964), Theoretical Notes on Trade Problems, The Review of Economics and Statistics, May

Zhou K. (2011), Is the Chinese Renminbi Undervalued? An Examination of the B-S Effect Using Diverse Datasets, China Economist, Vol. 6, No. 6, pp. 102-111

Žďárek V. (2009), Challenges for the New EU Member States on the Road to the Eurozone, International Economics & Economic Policy, Vol. 6, No. 2, pp. 157-177

Žďárek V. (2011), An Empirical Analysis of the Process of Price Convergence of the Czech Republic and New EU Member States towards the Euro Area, Politická Ekonomie, Vol. 59, No. 4, pp. 454-474

Internet

Eurostat, http://epp.eurostat.cec.eu.int, May 2016